ORIGINAL ARTICLE

# Description of Erythrocyte Morphology With Blood Smear Method of Giemsa Staining in Patients at the Thalassemia Patients Parents Association Indonesia (TPPAI) Kediri

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**ABSTRACT**

**Introduction:** Thalassemia is a group of heterogeneous genetic disorders caused by a decreased rate of synthesis of α or β chains. In thalassemia, one or more globin chains are lacking in production. Hence, there is an excess of globin chains because there are no partners in the process of hemoglobin formation. This condition causes erythropoiesis to be ineffective and erythrocyte gives a picture of hypochromic anemia and because of decreased hemoglobin, erythrocytes become hypochromic and microcytic and many target cells are present. The purpose of this study was to determine the morphological description of erythrocytes in thalassemia patients who are members of the TPPAI branch in Kediri. **Methods:** Purposive Sampling was done in 20 respondents. **Results:** From this study the results obtained 100% microcytic anemia, 100% hypochromic, Poikilocytosis dominated target cells 100%, and basophil stippling was found to be 85%. **Conclusion:** of this study shows that the blood smear of patients with thalassemia is hypochromic microcytic anisopoikilocytosis that is dominated by target cells and the discovery basophil stippling.

**Keywords:** Thalassemia, Microcytic, Hypochromic, Target Cells, Basofil stippling

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## INTRODUCTION

Human blood consists of two main components, namely blood plasma and blood cells. Blood plasma consists mainly of water, whereas blood cells consist of red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (1). Human Hb consists of hem and globin compounds. Hem consists of iron (Fe atoms) while globin is a protein consisting of polypeptide chains. Normal Hb in adults consists of 2 alpha chains (α) and 2 beta chains (β) namely HbA (α2β2 = 97%), partly HbA2 (α2δ2 = 2.5%) and the rest HbF (α2γ2) about 0.5% (2).

Thalassemia is a group of heterogeneous genetic disorders caused by a decreased rate of synthesis of α or β chains (3). Based on the latest data from the World Health Organization (WHO), 250 million of the world population (4.5%) carry genetic thalassemia and Beta-thalassemia (4).

The carrier of thalassemia in Indonesia is around 3-8%, meaning that 3 to 8 out of 100 Indonesians have thalassemia. In Indonesia, thalassemia is the most common genetic disorder. The rate of thalassemia-β carrier is 3-5%, even in some areas, is reaching 10%, while the carrier of the HbE trait ranges between 1.5-36% (5).

Based on data in the Thalassemia Patients Parents Association Indonesia (TPPAI) Kediri, in June 2016 there were 58 thalassemia patients, they were dominated by children from the lower middle class (6). Until now, thalassemia has not been cured. The only treatment for patients is to do a blood transfusion at least once a month in addition to iron therapy to remove excess iron in the body due to routine blood transfusions (5).

Laboratory values vary depending on the severity and imbalance determined by genetic patterns. Because

of the decrease in hemoglobin, red blood cells become hypochromic and microcytic and many target cells are present (7). Based on the description above, researchers want to find out the morphological picture of erythrocytes in thalassemia patients who are members of TPPAI.

## MATERIALS AND METHODS

The materials used for this study were blood, methanol, and Giemsa stain. The tool used included 3cc syringes, dry cotton, 70% alcohol cotton, tourniquet, tube rack, glass object, glass cover, microscope, vacutainer tube, dropper, and painting rack. This type of research is a descriptive study in which this study determines the morphological picture of erythrocytes in patients with thalassemia who are members of the TPPAI Kediri. The study was conducted in 20 laboratories at the Health Sciences Institute of Bhakti Wiyata Kediri by using purposive sampling techniques and samples to be taken in accordance with inclusion and exclusion criteria.

## RESULTS

### Specific Data of Respondent Characteristics

Based on Table I, it can be seen that the lowest MCV pre-transfusion was 56.5 fL, highest MCV pre-transfusion was 37.9 fL and the mean was MCV 71.7 Fl.

**Tabel I : MCV distribution Pre-Transfusion of Thalassemia Patients**

| MCV (fL) | Frequency | Percentage |
|---|---|---|
| 80–90 | 1 | 65 % |
| 70–<80 | 12 | 60 % |
| 60–<70 | 6 | 30 % |
| 50–<60 | 1 | 5 % |
| **Total** | **20** | **100 %** |
| | **MCV** | **fL** |
| | Lowest MCV | 56,5 |
| | Highest MCV | 80,2 |
| | Average | 71,7 |

**Table II : MCHC distribution Pre-Transfusion of Thalassemia**

| MCHC (g/dL) | Frequency | Percentage |
|---|---|---|
| 35 – 40 | 1 | 5 % |
| 30–<35 | 17 | 85 % |
| 25–<30 | 2 | 10 % |
| **Total** | **20** | **100 %** |
| | **MCHC** | **g/Dl** |
| | Lowest MCHC | 27.8 |
| | Highest MCHC | 33.5 |
| | Average | 31.8 |

Based on table II, it can be known that the lowest MCHC pre-transfusion was 27.8 g/dl, the highest was 33.5 g/dl, and the average was 31.8 g/dl.

**Table III : Measurements of Erythrocyte Morphology in Blood Smear of Giemsa Staining in Thalassemia Patients**

| Erythrocyte Morphology | Frequency | Percentage |
|---|---|---|
| | **Erythrocyte Size** | |
| Microcytic | 20 | 100 % |
| Normocytic | 0 | 0 % |
| Makrocytic | 0 | 0% |
| | **Erythrocyte Color** | |
| Hypochrome | 20 | 100 % |
| Normochrom | 0 | 0 % |
| Hyperchrom | 0 | 0% |
| | **Erythrocyte Shape** | |
| Target Cells | 20 | 100% |
| Total | 20 | 100% |
| | **Erythrocyte Shape** | |
| TDC + BS + HC | 2 | 10% |
| TDC + BS | 3 | 15% |
| TDC + HC | 4 | 20% |
| TDC | 11 | 55% |
| Total | 20 | 100% |
| | **Erythrocytes Inclusion** | |
| Basophile Stippling | 17 | 85% |
| No Basophile Stippling | 3 | 15% |
| **Total** | **20** | **100%** |

*Information

TDC : Teardrop Cells
BS : Burr Cells
HC : Helmet Cells

### Erythrocyte Morphological Examination Data for Blood smear Giemsa Staining

Based on the size, the morphology of the erythrocytes was dominated by microsites. Based on the size, the morphology of erythrocytes was dominated by hypochromes. Based on the morphological abnormalities, erythrocytes were dominated by target cells. The erythrocyte morphological deformities were dominated by TDC. Based on the data of Erythrocyte Inclusions, basophile stippling was found.

## DISCUSSION

Based on the results of the study entitled "Erythrocyte Morphological Overview of Blood Smear of Giemsa

Staining in Thalassemia Patients in the Association of Parents of Indonesian Thalassemia Patients (TPPAI) Kediri" with a sample of 20 people.

The description of red blood cell smear in this study showed microsites. Microcytic is the size of erythrocytes less than normal (<6 µm). The microcytic results due to decreased or absent globin synthesis (8). When one of the beta chains is missing or reduced, normal adult Hb is not synthesized and the Hb configuration is disrupted. Microcytic addition can be seen through MCV (9). MCV is a picture of the average erythrocyte value giving information about the average size measurement of erythrocytes. The description of red blood cell smear in this study shows hypochrome. Hypochrome is the pale color on the part (central pallor) in the middle of the erythrocyte that is bigger than usual, bigger than 3 µm. Hypochrome through the value of MCHC (9). Most hypochromic cells will have an MCHC of less than 32%. MCHC can give an average color description of erythrocytes (10). The morphological shape of erythrocytes in a blood smear is dominated by target cells. Target cells appear in the peripheral blood smear shaped like a bull's eye cells. The target cell appears as hypochromic with a volume and a thin layer of hemoglobin located at the center. For their morphology, target cells that appear in anemia are iron deficiency, hemoglobin C disease, thalassemia liver disease, and post-splenectomy (11).

In blood smear, teardrop cells are shaped. Teardrop cells in the blood smear can indicate that the patient has anemia (11). Burr cells in blood smears have one or more spines on the cell membran. Clinically, burr cells increased in various types of anemia (12). Helmet cells formed as a result of the fragmentation process. Cell fragments are formed in the spleen and intravascular fibrin clumps (12). Inclusion body of erythrocytes in blood smears were found basophil stippling. Basophil stippling is the result of remnants of RNA and mitochondria. This remains appears as diffuse basophil grains (11).

The results of the blood smear examination of the Giemsa staining method showed that patients with thalassemia TPPAI were mostly in the size of microcytic erythrocytes, the color of hypochromic erythrocytes, and the shape of the erythrocytes varied. The results of this study are in accordance with the criteria issued by Atlas of Pediatric Peripheral Blood Smears and Hemoglobin in practice which states that in the blood smear of thalassemia sufferers, those with genetic conditions with reduced production of β/α chains, there is an imbalance in the production of hemoglobin causes the production of microcytic and hypochromic erythrocytes (13).

## CONCLUSION

This study reveals that the blood smear of thalassemia patients is microcytic hypochromic and anisopoikilocytosis, dominated by the target cells and basophile stippling.


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