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# INCIDENCE OF IRON DEFICIENCY ANEMIA IN FIRST DEGREE RELATIVES OF PATIENTS WITH BETA THALASSEMIA MAJOR

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**Abstract:**

***Objective:*** *To find out frequency of iron deficiency anemia in first degree relatives beta thalassemia major patients.*

***Study Design:*** *A comparative, non-invasive study.*

***Place and Duration:*** *In the Medicine and Hematology department of Sir Ganga Ram Hospital, Lahore for one year duration from February 2019 to January 2020.*

***Methods:*** *A total of 300 people were included. Out of which 200 subjects were first degree relatives of beta thalassemia major patients and 100 were normal control subjects. Complete blood count with peripheral smear was done. Serum iron, serum TIBC, serum ferritin, hemoglobin electrophoresis and HbA2 estimation were carried out.*

***Results:*** *There were 93 men and 107 women with thalassemia, aged 18-50. Normal or increased serum ferritin levels were found in 186 people, and low serum ferritin levels (iron deficiency anemia) were found in 14 people in the range <10 ng / ml.*

***Conclusion:*** *The percentage of patients with iron deficiency anemia in relatives of patients with major beta thalassemia is 7%.*

***Key words:*** *Iron deficiency anemia, first degree relatives, high beta thalassemia*

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## INTRODUCTION:

Thalassemia is the most common single-gene recessive disease in humans due to inheritance of the allele affected by both parents[1-2]. In the most severe forms found in homozygous or heterozygous complex anemia ends with death in the first years of life in the absence of treatment[3]. Iron deficiency anemia is classically defined as microcytic anemia. Differential diagnosis includes thalassemia, sideroblastic anemia, some types of anemia due to chronic disease and lead poisoning[4]. Serum ferritin is the first preferred diagnostic test. It can reduce the ability to work in adults and affect motor and mental development in children and adolescents. In iron deficiency anemia, iron storage decreases until iron supply to the bone marrow is sufficient for erythropoiesis[5]. This can be controlled by clinical indicators, starting with low ferritin plasma levels, followed by saturation of plasma iron and transferrin and reaching maximum levels in low red blood cells[6-7]. When enough iron is supplied in the diet, these markers return to normal, indicating a response to dietary supplements. Iron deficiency anemia and minor thalassemia are one of the most common causes of microcytic anemia in the world. Due to the number of red blood cells and similar blood imaging parameters, other methods should be developed to diagnose these two anemia in different and accurate ways. Iron deficiency is much more common than iron overload[8]. Uncomplicated iron deficiency anemia can easily be diagnosed by testing the blood film and red blood cell indicators. Therefore, serum ferritin estimates can significantly contribute to the initial assessment of iron overload and can be used to track the course of treatment. Serum ferritin is the most accurate initial diagnostic test for iron deficiency anemia[9]. Serum ferritin values above 100 ng per ml (100 mcg per liter) indicate adequate iron stores and the possibility of iron deficiency anemia[10]. Correct treatment is important because proper treatment can alleviate symptoms, incorrect treatment can cause clinically significant side effects, and anemia can be a sign of an underlying disease. It has recently been discovered that serum ferritin is extremely useful in distinguishing older patients with and without iron deficiency anemia, and no other standard laboratory test provides additional important information. The purpose of this study is to determine the incidence of iron deficiency anemia in first-degree relatives of patients with major beta-thalassemia.

## MATERIALS AND METHODS:

The study involved 200 seemingly healthy first-degree relatives of major patients diagnosed with beta thalassemia, aged 18-50. Ten ml venous blood was collected. Tubes containing 3 mg ethylenediaminetetraacetic acid (EDTA) (disodium) in 2 ml of blood was added. After staining with May Grunwald Giemsa Stain, two blood smears were prepared and tested for each sample. Complete morphology was performed using the Sysmax Kx-21 analyzer. The remaining blood was allowed to clot. Serum was separated by centrifugation at 3000 rpm for 5 minutes. Iron serum, TIBC serum were estimated on a chemical analyzer of the AR dimension. Hemoglobin electrophoresis with cellulose acetate was performed to separate different hemoglobins. HbA2 estimation was performed by column chromatography and serum ferritin was assessed by ELISA (enzyme-linked immunosorbent assay). Measurement of serum ferritin is useful in determining changes in body iron storage.

## RESULTS:

This study included 200 patients who were first degree relatives of the main patient with beta thalassemia. Of these 200 people, 78 were normal (41 men constituted 20.5% and 27 women constituted 18.5% of the total); 108 people had features of beta thalassemia (53 men, 26.5% and 55 women, 27.5%) and 14 people with iron deficiency anemia (4 men, 2% and 10 women 5%) [Table 1]. Depending on age, 56 normal, 84 beta-lower thalassemia and 9 people with iron deficiency aged 18-30 were found. Seventeen normal, 20 small beta thalassemia and 2 iron deficiency patients aged 31-40 years and 5 normal, 4 small thalassemia and 3 iron deficiency patients aged 41-50 were found (Table 2). Of the 200 individuals, serum ferritin was normal in 78 (39%), the increase in levels in lesser thalassemia was 108 (54%), and the low level in iron deficiency anemia was 14 (7%) (Table 3).

Table 1: Frequency distribution of genders according to normal, beta thalassemia minor and iron deficiency anemia

| Sex | Normal | Beta thalassemia minor | Iron deficiency anemia |
|---|---|---|---|
| Male | 41(20.5%) | 53(26.5%) | 4(2%) |
| Female | 37(18.5%) | 55(27.5%) | 10(5%) |

Table 2: Frequency distribution of ages according to normal, beta thalassemia minor and iron deficiency anemia

| **Age (years)** | **Normal** | **Beta thalassemia minor** | **Iron deficiency anemia** |
|---|---|---|---|
| 18 – 30 | 56(42%) | 84(42%) | 9(4.5%) |
| 31 – 40 | 17(8.5%) | 20(10%) | 2(1%) |
| 41 – 50 | 5(2.5%) | 4(2%) | 3(1.5%) |

Table 3: Frequency distribution of serum ferritin (ng/ml)

| **Serum ferritin** | **Frequency** | **%age** |
|---|---|---|
| Normal | 78 | 39.0 |
| Thalassemia minor | 108 | 54.0 |
| Iron deficiency anemia | 14 | 7.0 |

## DISCUSSION:

A study in beta siblings in older children showed an incidence of 58% and a male to female ratio of 0.9: 1.15. In another study, the low incidence of beta-thalassemia with high HbA2 and hypochromic microcyte anemia was 3.4% and included 164 (53.4%) men and 143 (46.6%) women[11-12]. Although thalassemia beta is an autosomal recessive disease, there is a slight gender difference between women and men. A study was conducted involving 88 patients, 33 men and 55 women. The average age was 42.9. A study showing that ferritin levels are generally much higher in pregnant women with beta thalassemia and iron deficiency is four times less common[13]. Another study found that 61% of pregnant, non-pregnant women and 32% of pregnant women with beta thalassemia had low ferritin levels, and the male thalassemia carrier had normal iron stores[14]. In India, a study was conducted on relatives of older children with severe transfusion-dependent beta thalassemia. Iron deficiency (serum ferritin <10.0 mcg / liter) beta thalassemia occurred in 6.3% of smaller men and 38.9% of control men. In the female group, 24.4% of the beta-lower thalassemia and 58.8% of the control group had serum ferritin below 10 mcq / liter. Therefore, iron nutrition in lower beta thalassemia was better. It also shows that the beta thalassemia group has the advantage of maintaining iron balance. In this study, the main relatives of beta thalassemia showed significant differences between the male and female population[15]. While iron deficiencies for two hundred people constituted 2% of men and 5% of women, there was a significant increase of 4.5% between the 18-30 age group. Serum ferritin showed a significant difference, while 7% were people with iron deficiency.

## CONCLUSION:

Overall, the study found that among the relatives of major patients with beta thalassemia, there are a significant number of people with iron deficiency, and the percentage of women aged 18-30 is more iron poor than men. Of the 200 patients, it was observed that 78 patients (39%) were normal, patients with beta thalassemia were 108 (45%), and patients with iron deficiency anemia 14 (7%).

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