## Original Article

# Hypothyroidism and Serum Ferritin Level in Patients with Major ß Thalassemia

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## Abstract

### Introduction

Major ß Thalassemia represents a group of recessively inherited hemoglobin disorder, which is characterized by reduced synthesis of globins chains. Frequent blood transfusions can lead to iron overload, which may result in several endocrine complication especially in the absence of adequate chelating therapy. The objective of this study were to determine the prevalence of hypothyroidism in transfusion dependent thalassemia patients treated in the hematology unit of Shahid Sadoughy hospital and determination of the correlation of hypothyroidism with the Ferritin level.

### Methods

This study was cross-sectional study which was performed during one year.
Sixty five patients, ages between 1.2 years to 27years old entered to this study (47.6%female and 52.4%male)
For all of the patients T3-T4-T3RUP, TSH and ferritin level were tested.

### Results

The mean age of the patients was 10.3 years (47.6% above 10years and 52.4% under 10years old). This study demonstrated that fourteen patients (21%) had hypothyroidism (1.5%overt low T4 and high TSH), which 7.6% was sub clinical (normal T4and high TSH and 12.3% secondary hypothyroidism) in other study prevalence hypothyroidism was 2.2%-16.5%.
There was no correlation between hypothyroidism and serum ferritin level (P-value= 0.38)

### Conclusion

The high rate of hypothyroidism indicates the importance of regular follow up of thalassemia patients to prevent complications.

### Keywords

Hypothyroidism, Ferritin, Major ß Thalassemia

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## Introduction

The thalassemia disorders are a heterogeneous group of inherited anemias characterized by defects in the synthesis of one or more globin chain subunits of the hemoglobin (1,2). Beta-thalassemia Major is a common hereditary hemoglobinopathy which is a reason of microcytic hypochromic anemia and extramedullary ineffective erythropoiesis (2,3). Patients with talassemia Major require multiple blood transfusions. Frequent blood transfusion can lead to iron overload which may result endocrine dysfunction (3, 4,5). Iron can deposit in vital organs such as heart, thyroid, gonad, and pituitary. One of the endocrinopathy is hypothyroidism. Hypothyroidism classify to subclinical hypothyroidism that TSH level is only modestly elevated and free T4 level remains in normal range. Primary hypothyroidism is characterized by an elevated TSH level and decreased (low) T4. Secondary or central hypothyroidism characterized by decreased T4 and low TSH (1, 5).

## Materials and Methods

In this analytical descriptive cross sectional study, patients with major Beta- thalassemia that were treated with blood transfusion in Yazd center were studied. They were treated also with deferoxamine (desferal).

Age and sex had been registered and there were no history of congenital hypothyroidism in patients.

Totally 65 patients range age 1.2 to 27 years old were participated in this study.

Patients were classified in 2 age groups: above 10 years and under 10 years and all the patients were checked for T4-TSH-T3 Ruptake and ferritin level.

Diagnoses of hypothyroidism is upon low T4 (T4<6) and high TSH (TSH>5) and sub clinical hypothyroidism was normal T4 and high TSH.

## Results

In this study 34 patients was under 10 years and 31 patients above 10 years. Among 65 patients 14 persons (21%) had thyroid problem. One patient was obviously affected by hypothyroidism (1.5%) (Mean of the ferritin: 2113) (*Table1*)

Five patients (7.6%) had subclinical hypothyroidism (mean of the ferritin: 2166 ± 1222) and 8 patients (12.3%) had secondary hypothyroidism (mean of the ferritin: 3460).

Analytical statistics ANOVA test did not show any significant corelation between hypothyroidism in patient with major thalassemia and ferritin level (p-value: 0.38) (*Table 1*).

Because of the higher incidence of endocrine disorders in the second decade of life in patient with major thalassemia and with considering that transfusion increased with advancing age. Patient in 2ed decade separately investigated. Among 31 patients above 10 yrs, 25 patients (80.6%) were without any disorders of thyroid (mean ferritin: 3281) 1 patients with subclinical hypothyroidism (3.2%) (mean ferritin:3388) and 5 patients (16%) with secondary hypothyroidism(mean of the ferritin:3349) that (p-value=0.99) and there was not any relation between disorders of thyroid and the ferritin level in blood in patients with major thalassemia above 10 years .

Patients from the viewpoint of hypothyroidism were studied in 2 groups: above 10 years and under 10 years.26 person were normal (%74), One person was obviously hypothyroidism (%2.9) and 4 persons (11.7%) with subclinical hypothyroidism and 3 persons (8.8%) with secondary hypothyroidism were in the group of under 10 years.

Patients above 10 years 25 persons without disorders of thyroids (80.6%) and 1 person with subclinical hypothyroid (3.2%) and 5 persons (16.1%) were affected by secondary hypothyroidism (*Table 2*).

Among the 34 men 4 persons (11.7%) had subclinical hypothyroidism and 7 patients (20%) had secondary hypothyroidism



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From the 31 women, 1 person (3.3%) had obviously hypothyroidism and 1 person (3.3%) had sub clinical hypothyroidism and 1 person had secondary hypothyroidism (*Table 1*).

*Table 1: Relationship between ferritin level and thyroid function test in patient with major β thalassemia*

| Ferritin / thyroid | patients | | | | Mean ferritin | SD | Min | Max ferritin |
|---|---|---|---|---|---|---|---|---|
| | male | | female | | | | | |
| | No | % | No | % | | | | |
| Euthyroid | 23 | 68 | 28 | 90 | 2983 | 1397 | 643 | 6514 |
| Primary hypothyroidism | - | - | 1 | 3.3 | 2131 | | 2131 | 2131 |
| Subclinical | 4 | 11.7 | 1 | 3.3 | 2166 | 1222 | 792 | 3388 |
| Secondary | 7 | 20 | 1 | 3.3 | 3460 | 1251 | 1610 | 929 |
| Total | 34 | 52.3 | 31 | 47.7 | 2965 | 1371 | 643 | 6514 |

PV: 0.38

*Table 2: Relationship between thyroid dysfunction and age*

*< 10 years → 32.5 thyroid dysfunction*
*> 10 years → 19.3 thyroid dysfunction*

| Thyroid / Age | n | | Euthyroid | | Primary | | Subclinical | | Secondary | |
|---|---|---|---|---|---|---|---|---|---|---|
| | % | No | % | No | % | No | % | No | % | No |
| Under 10 years | 52.3 | 34 | 74 | 26 | 2.9 | 1 | 11.7 | 4 | 8.8 | 3 |
| Above 10 years | 47.7 | 31 | 80.6 | 25 | - | - | 3.2 | 1 | 16.1 | 5 |
| Total | 100 | 65 | 78% | 51 | 2 | 1 | 8 | 5 | 12 | 8 |

## Discussion

Sixty five patients were evaluated in this study. The results showed that in Totally 14 persons (21%) had one kind of thyroid dysfunction. There was no significant relation between hypothyroidism in patient with major thalassemia and ferritin level.

Karamifar et al showed that hypothyroidism was seen in 6% of 150 patients with Beta talasemia Major (6).

Zervas et al found that 17 of 200 Beta talasemia major patients (83.5%) were euthyroid, 4% were overt hypothyroidism and 12.5% were subclinical hypothyroidism. No central hypothyroidisms were found. The results showed monitoring of blood transfusion decreased hypothyroidism (7).

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Shamshirsaz and et al showed that hypothyroidism in 7.7% of 220 patients with Beta talasemia Major was seen (8).
Desanctis showed 6.2% of 1861 Beta talasemia Major patients had Primary hypothyroidism (9).
Mehrvar study showed of 437 patients with Beta talasemia Major, 2.2% had hypothyroidism. Relation between ferritin level and thyroid dysfunction were not significant (10). In this study low prevalence of hypothyroism is due to high cut off point of TSH level (TSH>20 miu/l). In total, study of Dr Mehrvar et.al had lowest prevalence of hypothyroidism (2.2 %).
In our study there was high incidence of hypothyroidism (21%).
In patients less than 10 years more subclinical hypothyroidism were found. In patient above 10 years 16.1% was secondary hypothyroidism. Low prevalence of secondary hypothyroidism in patient less than 10 years age could be due to resistant of hyphophysis-thyroid axis to hemosidrosis.

## Conclusion

The results of this study showed the importance of endocrine evaluation in patients with Beta-thalassemia major. Thyroid function test should be done regularly for finding and treatment of hypothyroidism.

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