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ORIGINAL

# Prevalence of Diabetes Mellitus in Patients with Transfusion Dependent ß Thalassemia

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## Abstract

**Introduction**: Thalassemia is common in Iran. Appropriate therapy for this disease includes a regular blood transfusion and chelation therapy. However, patients will inevitably confront with side effects, particularly iron overloads in critical organ including heart, ductless glands and liver. This study tries to determine the prevalence of diabetes mellitus in transfusion dependent ß thalassemia major.

**Patients & Methods**: This is a cross sectional study and included all 437 patients suffering Thalassemia major that were referred to medical centers linked to the Iranian blood transfusion organization since Jan 2004 up to Jan 2005. All patients tested for CBC, FBS, 2hr BS, HbAlC, liver and renal function, and endocrine disease. Initially, reports of adenoidal experiments as well as other associate parameters were provided via medical folders.

**Results**: Four hundreds and thirty-seven patients enrolled in this study, the diabetes found in 28 patients (5.4%). There was no relationship between sex and the kind of Thalassemia. In patients with Thalassemia intermedia, the mean of age was 34.7 ± 1.4 years and the mean of ferritin was 893.2 ± 122.4 Mg/dl. and patients with Thalassemia major, were 27.1 ± 0.3 years and 1678.8 ± 87.5. Mg/dl respectively the mean of age and ferritin in two groups of Thalassemia intermedia and Thalassemia major had significant difference while the mean of ferritin in diabetic and non-diabetic groups had no significant difference.

**Conclusion**: We can conclude According to previous studies considering endocrine abnormalities in thalassemic patients, that our data is just like others.

**Keywords**: diabetes, thalassemia intermedia, thalassemia major



## Introduction

Thomas Cooley (1) recognized the Thalassemia as a clinical entity in 1925. The Thalassemia is a heterogeneous syndrome in anemia family (2). This syndrome has been identified as a deficient synthesis of one or more of the polypeptide chains of the normal human hemoglobin (3). The Thalassemia is classified into three groups based on clinical severity, (4) including thalassemia major, thalassemia intermedia and thalassemia minor. Today thalassemia can be classified Based on type of synthesis defect in globin chain or chains (5). The best characterized disorders are α and ß thalassemia (6). The most severe form of ß thalassemia is thalassemia major, which is transfusion dependent, and Results in a life-limiting complication such as iron overload (7).

The Thalassemia occurs particularly in a high frequency into a broad belt extending from the Mediterranean basin through the Middle East, Indian subcontinent, Burma and Southeast Asia (8).

About 3% of the world's populations carry ß thalassemia genes (9). The ß thalassemia affects a significant segment of population in certain areas of the world (10). Alterations in migration patterns have changed the geographic distribution of this disease and have made it a worldwide health problem (11).

Treatment consist multiple blood transfusions that elicit a complication called iron overload (12). Over the course of past 2-3 decades, hyper-transfusion therapy has significantly increased the life expectancy, and improved the life quality of these patients (13). At the same time, there has been an increase in the frequency of this therapy complications caused by the iron overload (14). One of the Iron overload toxic effects is over endocrine glands (15). Even in carefully managed patients, endocrine disturbances may develop videlicet the growth retardation, hypogonadism, insulin dependent diabetes mellitus, hypothyroidism and hyperparathyroidism (16). Endocrine complications in major thalassemic patients in developing countries may be frequent due to suboptimal iron chelation (15). Lately, desferrioxamine has been used as a chelating agent in an attempt to prevent the complications such as tissue damage ensued from iron deposition (3).

In this study, we wanted to consider the prevalence of diabetes in major ß- thalassemic patients in Iran during Jan 2004 – Jan 2005. In other words, we wanted to search the percentage of Thalassemic patients and simultaneous diabetes in Iran.

## Patients and Methods

### *Place*

The study was conducted at adult Thalassemic clinic and Ali-Asghar children's Hospital, Tehran Iran. This clinic belongs to the Iranian Blood Transfusion Organization. The Iranian Blood Transfusion Organization committee approved this study.

### *Patients*

The Data was collected from patients during Jan 2004 – Jan 2005. All of patients had transfusion dependent ß thalassemia. Written informed consent obtained from patients or legal guardians for all cases. We ordered all of convenient parameters to consider endocrine abnormalities. These parameters were Biochemistry, Liver and Renal function tests, Endocrine tests, CBC and ferritin. In all cases, we determined the type of their Thalassemia, sex, age, duration of blood transfusion, the unit or units of blood transfusion per month and Sexual Mutation Rate (SMR).

### *Statistical analysis*

Statistical analyses performed using one-sample Kolmogorov-Smirnov, student t-test, Chi-Square, Fisher exact test, one-way ANOVA test in SPSS11.5 Computer software. The p-value less than 0.05 considered statistically significant.

## Results

After Examining 437 β- thalassemic patients, 58 patients had the thalassemia intermedia and 379 patients had the thalassemia major. About patients with the thalassemia intermedia, 34(58.6%) were male and 24(41.4%) were female, but about patients with the thalassemia major, 211(55.7%) were male and 168(44.3%) were female. (Table1 and figure1)

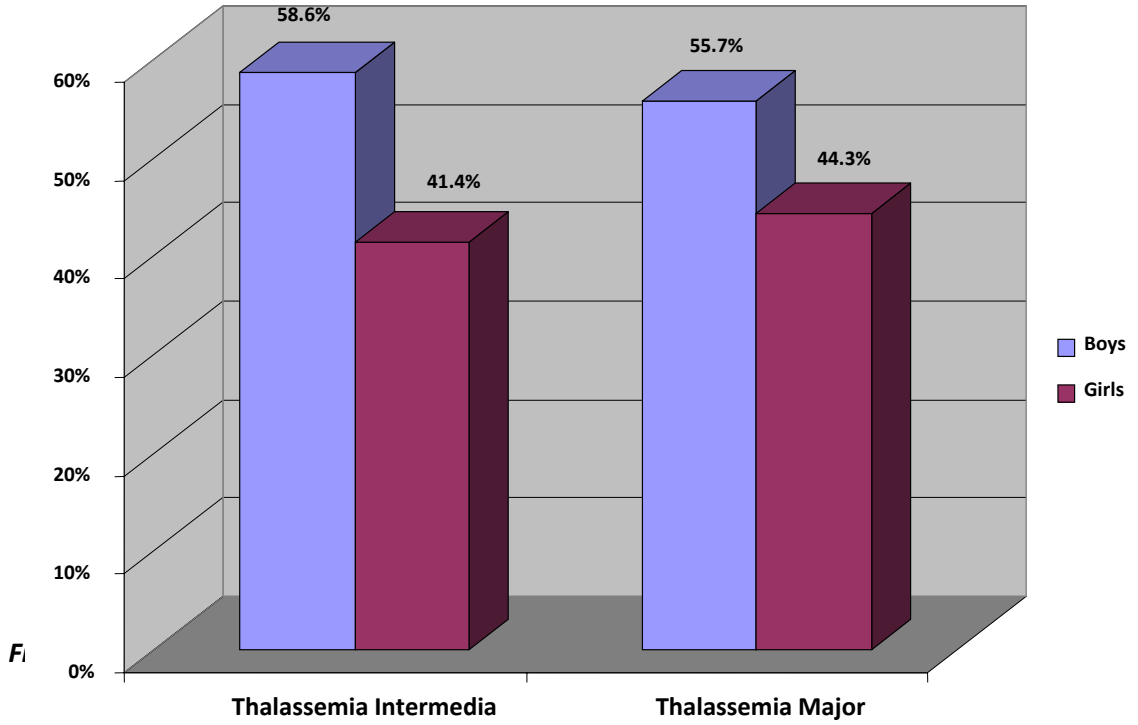
There was no relationship between sex and the kind of thalassemia.

Regarding patients with the thalassemia intermedia, the mean of age was 34.7 ± 1.4 years and the mean of ferritin was 893.2-± 122.4 Mg/dl. While for patients with the thalassemia major, it was 27.1 ± 0.3 years and 1678.8 ± 87.5.Mg/dl respectively the mean of age and ferritin in two groups had significant difference (P value = 0.00) (figure2)

The blood transfusion units used in patients with the thalassemia intermedia were 1.64 ± 0.4 us and in patients' with the thalassemia major were 1.58 ± 0.4 us. There was no significant relationship for blood transfusion units between these two groups (P=0.09)

***Table 1**: Sexual frequency in considered patients*

| Percent | Number | Sex |
|---|---|---|
| 56.1% | 245 | **Male** |
| 43.9% | 192 | **Female** |
| 100% | 437 | **Total** |




In 437 patients with Thalassemia, 28 (5.4%) had diabetes who, 96% of them were in-group of patients with the thalassemia major.

The mean ferritin level of diabetic group was significantly different in comparison with non-diabetic group. Furthermore the mean of blood transfusion units per year, showed a meaningful difference while comparing the of ore mentioned groups (table 2)

## Conclusion

In this study, the blood transfusion unit was not significantly different between patients with the thalassemia major and thalassemia intermedia. The mean of ferritin was not significantly different between diabetic and non-diabetic groups while, the blood transfusion unit was significantly differents between these two groups. The data may show the negative effects of blood transfusion units on diabetes emergence thalassemic patients the Symptoms of endocrine abnormalities are more prevalent in major thalassemic patients due to iron overload.

The Data of this study showed that 28(5.4%) of patients had diabetes while 96% of them had a simultaneous thalassemia major.

Karamifar et al, in 2003, had considered 150 major ß thalassemic patients in the age range of 10-22 years, about the endocrine abnormalities. They showed that 7.3% of their patients had diabetes problems. The relatively high frequency of endocrine dysfunction found in this study can be a result of poor disease control and management in early life when irreversible tissue damage occurs due to iron overload. These findings reinforce the

***Table 2**: comparison of ferritin and blood transfusion between the diabetic and non-diabetic groups*

| | Diabetic group | Non-diabetic group | P- value |
|---|---|---|---|
| mean of ferritin | 1912.5 ± 487.1 | 1553.7 ± 78.4 | 0.2 |
| mean of blood transfusion (unit) | 18.38 ± 1.2 unit | 16.15 ± 0.2 | 0.04 |

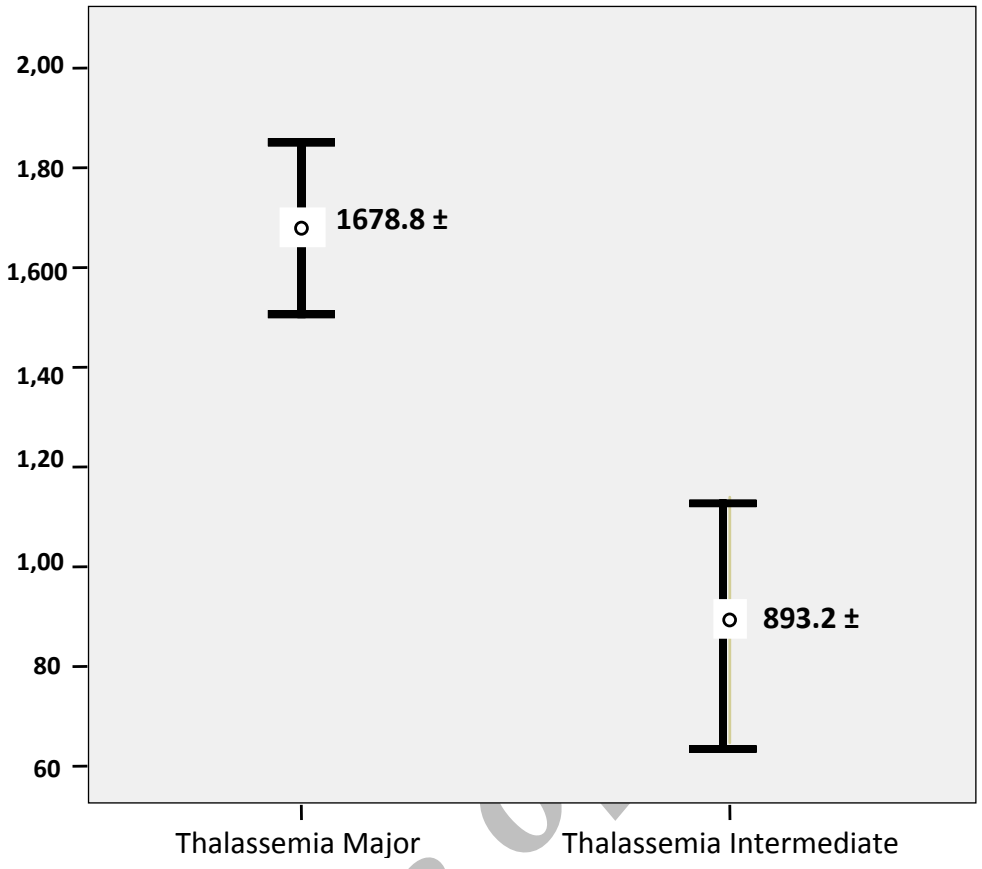



***Figure 2**: The mean ferritine level in patients with the thalassemia major and intermedia. 86% of patients with the thalassemia intermedia gained desferrioxamine while 98.3% of patients with the thalassemia major gained it. There was a significant relationship for gaining desferrioxamine between these two groups of thalassemia intermedia and thalassemia major (P=0.01)*

regular follow-up importance of major β-thalassemic patients for early detection and management of associated complications (4).

In another research by De Sanctis in 2002, 4.9% of 1861 major β-thalassemic patients had a simultaneous insulin dependent diabetes mellitus (12).

Raiola et al. in 2003 had found that only one out of 18 Thalassemia patients had insulin dependent diabetes mellitus. this data supports a need for vigilant follow-up of thalassemic patients before and after transplantation, in order to treat endocrine dysfunctions at the appropriate age (14).

Gulati et al, in 2000 had considered the endocrine abnormalities in 84 major thalassemic patients in developing countries who, 7.9% of them had simultaneous diabetes. They concluded that Thalassemic patients in developing countries may be at risk for endocrine deficiencies at younger ages (15).

According to our data and previous researches in other countries considering the endocrine abnormalities in thalassemic patients, we concluded that our data is just like others. Absolutely there is a need for regular follow-up of β-thalassemic patients for early detection and management of associated complications especially endocrine abnormalities. By this way, the prevalence of endocrine abnormalities can be decreased in future.

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