Austin Journal of Endocrinology and Diabetes

Open Access

Austin Publishing Group

Research Article

# Comparison of Oral Iron Chelation Therapy Versus the Injectable Once for the Decrease Some Endocrinopathy in β-Thalassemia Major Patients

**Khoshkbarforooshan M[1], Setoudeh A[1], Mohsenipour R[1], Safari A[2], Kompani F[2] and Rostami P[1]***

[1]Division of Endocrinology and metabolism, Tehran University of Medical Sciences, Iran

[2]Division of Hematology and oncology, Tehran University of Medical Sciences, Iran

***Corresponding author:** Parastoo Rostami, Division of Endocrinology and metabolism, Tehran University of Medical Sciences, Iran

**Received:** December 05, 2017; **Accepted:** January 02, 2018; **Published:** February 16, 2018

**Abstract**

**Objective:** Blood transfusion and iron chelators are necessary for the survival of patients with β-thalassemia but endocrinopathies due to iron overload can decrease the life expectancy in these patients. Moreover, the injectable iron chelators lead to discomfort and poor compliance among the patients compared the oral one.

**Material and Methods:** Seventy two patients with β-thalassemia major from April 1997 to August 2017 at the Children's Medical Center Hospital in Tehran, Iran, enrolled to this study. Patients were divided into two groups according to the type of chelator. Group1 (39 patients) received oral iron chelator while the group2 (33 patients) received the injectable once.

**Result:** Seventy two patients, 51% female and 49% male were evaluated. The mean age of the patients was 20.4±5.9 years. Prevalence of IGT, DM and clinical and subclinical hypothyroidism were 17.94%, 5.1%, 17.4%, and 25.64% in group 1 and 18.1%, 9.02%, 24.5% and 24.3% in group 2 respectively. There was no case of hypoparathyroidism and twenty patients had no endocrine complications.

**Conclusion:** The lack of a difference in the incidence of some endocrinopatheis between the two groups (injectable and oral iron chelator) offered use of painless and high compliance oral iron chelator instead of injectable once.

**Keywords:** Endocrine complication; β-thalassemia major; Iron chelator; Deferiprone; Deferoxamine

## Introduction

β-thalassemia major is a hereditary hemoglobinopathy due to defect in the production of β-globulin chain. The most common manifestations of disease are anemia and hepatospelenomegaly (due to extramedullary hematopoiesis). The mainstay of treatment of the β-major thalassemia is frequent blood transfusion that leads to iron overload in the critical organs include; liver, heart and endocrine glands [1,2]. Iron chelators for attenuated of iron overload in body are used in two ways: injectable (subcutaneous deferoxamine) and recently oral once (Deferiprone; L1). Deferiprone is well inserted into the cell and removes iron, so is more effective than defroxamine in reducing endocrine complications and cardiac iron overload [3,4]. Endocrinopatheis is one of the most common complications due to iron overload and approximately, 60% patients have at least one endocrine organ involvement [5]. There are a few studies compare efficacy of oral and injectable iron chelator for decrease endocrine complications in β-thalassemia major patients. Here, we compared some endocrinopathies include: IGT (impared glucose tolerance), DM (diabetes mellitus), hypoparathyroidism (clinical and subclinical) and hypothyroidism in the patients with β-thalassemia major who received oral chelators against the injectable once.

## Patients and Methods

Seventy two patients with homozygote β-thalassemia major were included to this study. The patients were treated at the Children's Medical Center Hospital, Tehran, Iran, from April 1997 to August 2017. B-thalassemia major was diagnosed in the early of life by standard methods of peripheral blood smear and hemoglobin electrophoresis. Individual characteristics and type of used iron chelator were collected in the specific questionnaire. All of the patients were divided into two group 1(received oral iron chelator; Deferiprone or L1) include; 39 patients (38.46% male and 61.53% female) with age average of 19.5 years and group 2 (received injectable iron chelator; deferoxamine) include; 33 patients (60.6% male and 39.3% female) with mean age of 21.3 years. Deferiprone therapy was started 6 to 65 months (mean 29.9 ± 11.2 months) after receiving deferoxamine therapy from early age. The endocrine functions were evaluated for all the patients before and after of Deferiprone therapy. Fasting plasma glucose levels 110-125 mg/dl or 140-199 mg/dl after OGTT (oral glucose tolerance test 2 hours) was considered IGT (impaired glucose tolerance). Fasting blood glucose levels greater than 126 mg/dL or OGTT more than 200 mg/dl or presence of the symptoms of diabetes and plasma glucose concentrations greater than 200 mg/dL, were regarded to have




**Citation:** Khoshkbarforooshan M, Setoudeh A, Mohsenipour R, Safari A, Kompani F and Rostami P. Comparison of Oral Iron Chelation Therapy Versus the Injectable Once for the Decrease Some Endocrinopathy in β-Thalassemia Major Patients. Austin J Endocrinol Diabetes. 2018; 5(1): 1058.

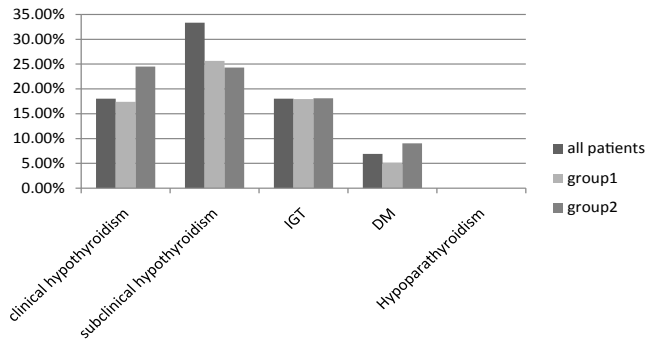


**Figure 1:** Prevalence of endocrine complications.

**Table 1:** Characrtistic demographic and ferritin level.

| Patients / Variable | All patients | Group1 | Group 2 | P-Value |
|---|---|---|---|---|
| Mean age (year) | 20.4±5.9 | 19.5±3.2 | 21.3±4.1 | 0.211 |
| Male (%) | 49 | 38.46 | 60 | 0.137 |
| Female (%) | 51 | 61.53 | 39.3 | 0.937 |
| Mean ferritin (ng/ml) | 2681.8±1362 | 2556±1173 | 2841.4±1344 | 0.374 |

diabetes mellitus [6]. Hypoparathyroidism was defined as low serum calcium, high serum phosphate and low PTH. Clinical or subclinical hypothyroidism was defined according to Evered criteria [7].

## Results

Seventy two patients with homozygote β-thalassemia major (51% female and 49% male) with the mean age 20.4±5.9 years completed the study. There was no significant relationship between age, sex and among the patients (Table 1). On the one hand there was no statistically significant relation between serum level of ferritin and endocrine complications and on the other hand, ferritin level was similar in two group (PV>0.05). Prevalence of IGT, DM, clinical and subclinical hypothyroidism were 18.05%, 6.9%, 18.05% and 33.33% in all β-thalassemia patients and 17.94%, 5.1%, 17.4% and 25.64% in group 1 and 18.1%, 9.02%, 24.5%, 24.3% in group 2 respectively (Figure 1). There was no case of hypoparathyroidism and twenty patients had no endocrine complications.

## Discussion

Before 1987, defreoxamine (subcutaneous iron chelator) was the only iron chelator [8]. Because of high price and the discomfort of daily injection of defreoxamine, the compliance is poor among the patients. The accessibility of deferiprone (oral iron chelator) ameliorated the acceptance of treatment. Although deferiprone less effective than deferoxamine for eliminating of iron from the some organs such liver, but can dramatically remove iron from the endocrine glands [9]. In our study approximately 70% of patients had one endocrine disorder and subclinical hypothyroidism was the most endocrinopathy among the patients [10]. However, clinical hypothyroidism and DM were more common in group 2 than group1 but this difference was not statistically significant, so the incidence of endocrinopathies was similar in both groups in our study [1]. The serum ferritin level was higher in group2 but there was no statistically significant as well, so there was no superiority between the two iron chelator in reduction iron overload [5]. It was very interesting to us that none of the patients had hypoparathyroidism and there were no endocrine disorder in twenty patients. Improving care of patients with β-thalassemia major may be effective in reducing endocrine side effects.

In conclusion, although our research showed that the oral iron chelator can be effective as a safe and convenient treatment instead of injectable once but further studies should be carried out in this resect.

This research did not receive any specific grant from any funding agency in the public, commercial or not-for-profit sector.

## References

1. Chung-Hsing Wang, Kang-Hsi Wu, Fuu-Jen Tsai, Ching-Tien Peng, Chang-Hai Tsai. Comparison of oral and subcutaneous iron chelation therapies in the prevention of major endocrinopathies in b-thalassemia major patients. Hemoglobin. 2006; 30: 257–262.
2. Rostami P, Hatami G, Shirkani A. Endocrine complications in patients with major β-thalassemia. Iranian South Med J. 2011; 4: 240-245.
3. Farmaki K, Tzoumari I, Pappa C. Oral chelators in transfusion dependent thalassemia major patients may prevent or reverse iron overload complications. Blood Cells Molec Dis. 2011; 47: 33–40.
4. Anderson LJ, Wonke B, Prescott E, Holden S, Walker JM, Pennell DJ. Comparison of effects of oral deferiprone and subcutaneous desferrioxamine on myocardial iron concentrations and ventricular function in beta-thalassaemia. Lancet. 2002; 360: 516–520.
5. Aydinok Y, Darcan S, Polat A, Kavakli K, Nigli G, Coker M, et al. Endocrine complications in patients with β-thalassemia major. J Trop Pediatr. 2002; 48: 50–54.
6. American Diabetes Association. Classification and diagnosis of diabetes. Diabetes Care. 2017; 40: 11–24.
7. Evered DC, Ormston BJ, Smith PA, Hall R, Bird T. Grade of hypothyroidism. BMJ. 1973; 1: 657-662.
8. Kontoghiorghes GJ, Aldouri MA, Sheppard L. I-2-dimethyl-3-hydroxypyrid-4-one an orally active chelator for treatment of iron overload. Lancet. 1987; 1:1294–1295.
9. Piga A, Roggero S, Salussolia I, Massano D, Serra M, Longo F. Deferiprone. Ann N Y Acad Sci. 2010; 1202: 75–78.
10. Gulati R, Bhatia V, Agarwal SS. Early onset of endocrine abnormalities in beta- thalassemia major in a developing country. J Pediatr Endocrinol Metab. 2000; 13: 651–656.