

**Research Article**

**ASSESSMENT OF SERUM FERRITIN LEVEL AND EFFECT OF IRON CHELATION, LEVEL OF HEMOGLOBIN AND LIVER PROFILE IN THALASSEMIA MAJOR PATIENTS AT TERTIARY CARE HOSPITAL IN WESTERN INDIA**

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**ABSTRACT**

Thalassemia major is a genetic disease characterized by a reduced ability to produce hemoglobin. 150 registered patients in blood bank ranging from age group between one year to fifteen years were studied for their well being status. S.Ferritin was  $2300 \pm 400$  ng/mL (Mean  $\pm$  S.D) before chelation and reduced up to  $400 \pm 120$  ng/mL (Mean  $\pm$  S.D) after starting of Iron chelating drug deferassirox. The levels of other parameters were increased before chelation therapy however reduced after chelation therapy such as, hemoglobin level was  $7.4 \pm 0.4$  gm/dl (Mean  $\pm$  S.D) Serum bilirubin was  $2.2 \pm 0.5$  mg/dl (Mean  $\pm$  S.D) and serum enzymes SGPT level was  $150 \pm 50$  IU/L (Mean  $\pm$  S.D), SGOT  $120 \pm 40$  IU/L (Mean  $\pm$  S.D) and Alkaline phosphatase was  $300 \pm 25$  IU/L (Mean  $\pm$  S.D). Iron overload subsequently reduced in these patients after long run which reduced morbidity and mortality both.

**Keywords:** Thalassemia Major, Iron Chelation, Deferrasirox, Haemoglobin Level, Liver Profile

**INTRODUCTION**

The thalassemias are the most common genetic disorder on a worldwide basis (Borgna *et al.*, 2005). The highest prevalence of thalassemia is in Mediterranean, Central Africa and South East Asia (Baxi *et al.*). The incidence of thalassemia is very high, with over 30 million people carrying the defective gene due to abnormal production of hemoglobin. Iron overload causes Serum Ferritin level to be raised in thalassemics. Effect of Iron chelating agent was quite good in Thalassemia major patients as a therapeutic agent. Deferrasirox, oral iron chelator in adjusted doses (20-40 mg/kg day) reduced S.Ferritin level on long run (HO *et al.*). Continuous hemolysis going on by splenomegaly causes reduced hemoglobin Level. Iron –overload induced and transfusion induced hepatitis causes liver enzymes S.bilirubin, SGOT, SGPT, S. Alkaline Phosphatase to be raised as reported in literature (Buchanan *et al.*, 1977; Hilkovitz *et al.*, 1961; Rigano *et al.*, 1994).

The aim of present work was to study the general well being status of thalassemic patients and to reduce mortality by decreasing iron overload by giving them iron chelating drug Deferrasirox dose 20-40 mg/kg/day for years

**MATERIALS AND METHODS**

One hundred and fifty thalassemia major patients coming for regular blood transfusion at the blood bank, S.R.G. Hospital (a tertiary care hospital of western India) and Jhalawar Medical College Jhalawar (Rajasthan) were randomly recruited to participate in this study during the period January 2011 to December 2013. Their age ranged between 10 months to 15 years. Patients hemoglobin level, No. of blood transfusions, liver function tests in the form of S.Bilirubin (Kapian *et al.*, 1987), SGPT, (Brendley *et al.*, 1972), SGOT (Tietz 1986), Alkaline Phosphatase (Henry *et al.*, 1974S) and S. Ferritin (Cazzala *et al.*, 1985) for iron-overload were carried out by commercial kit method. Effect of oral iron chelating agent (Deferrasirox) was studied by estimation of serum Ferritin level on Immunoassay analyzer-Maglumi-1000) by chemiluminescence method. By giving them iron chelating drug Deferrasirox dose 20-40 mg/kg/day.

## Research Article

Analysis of S.bilirubin, SGPT, SGOT and Alkaline Phosphatase was studied on Fully autoanalyser MIURA 200.

## RESULTS AND DISCUSSION

### Results

In the present study majority of patients were having their hemoglobin level of  $7.4 \pm 0.4$  gm/dl (mean  $\pm$  S.D.). Patients were requiring packed red cell transfusions at every 30-45 days interval. The mean  $\pm$  S.D. level of serum transaminases in the form of SGPT and SGOT were evaluated in multitransfused patients which were found to be  $150 \pm 50$  IU/L and  $120 \pm 40$  IU/L respectively and Alkaline Phosphatase was  $300 \pm 25$  IU/L which reduced after iron chelation as given in table 1. The mean  $\pm$  S.D level of total Serum bilirubin was  $2.2 \pm 0.5$  mg/dl in multitransfused thalassemic patients which reduced after chelating drug given.

Serum Ferritin level to assess iron overload in these patients was also carried out and found to be in the mean  $\pm$  S.D value of  $2300 \pm 400$  ng/mL and reduced after chelating therapy mentioned in table 1. Oral iron chelator in form of deferasirox was given to patients as per adjusted dose of 20-40 mg/kg/day and level of S.Ferritin was measured serially, which reduced upto  $300 \pm 120$  ng/mL (mean  $\pm$  S.D.) in course of time (duration up to 2 years after therapy) (Table 1. Levels of Hemoglobin, Ferritin, Bilirubin, SGOT, SGPT and Alkaline Phosphatase before and after chelation therapy in Thalassemia major patients

**Table 1: Levels of hemoglobin, ferritin, bilirubin, SGOT, SGPT and Alkaline phosphatase before and after chelating therapy in Thalassemia Major patients**

Parameter	before chelation	after chelation	Normal Value
S.Ferritin	$2300 \pm 400$ ng/mL	$300 \pm 120$ ng/mL	300- 450 ng/mL
Hemoglobin	$7.4 \pm 0.4$ gm/dl	$8.2 \pm 0.4$ gm/dl	12.-14.5 gm/dL
S.bilirubin(Total)	$2.2 \pm 0.5$ mg/dl	$1.6 \pm 0.2$ mg/dl	0.6-10-.2mg/dl
SGPT	$150 \pm 50$ U/L	$90 \pm 30$ U/L	5-50 U/L
SGOT	$120 \pm 40$ U/L	$100 \pm 20$ U/L	5-50 U/L
S.Alkaline Phosphatase	$300 \pm 25$ IU/L	$150 \pm 30$ IU/L	100-600 IU/L

### Discussion

In present study oral iron chelator (Deferassirox) reduced iron overload in thalassemia major patients and they may now have better life span as compared to past. The efficacy of Deferrasirox was evaluated in a large phase -3 study which randomized patients to receive deferassirox concluding that drug at a dose of 20-40 mg/kg/day reduced iron overload and that dose was highly dependant on the mean iron intake. Survival and complication free survival of patients with thalassemia major continue to improve especially for female patients born shortly before or after the availability of iron-chelation. Similar results were reported by Borgna-Pignatti (2005) and Rugolitto *et al.*, (1994) and Roberts *et al.*, (2005). According to Ho *et al.*, (2013) and reasons for administering deferassirox in daily regimes were to improve adherence and lower the incidence of neutropenia and agranulocytosis.

However it has been estimated that 45 million carriers of thalassemia major in India and about 15,000 infants with homozygous thalassemics are born every year which constitutes about 10% of the total thalassemics born in the world. In our study S.bilirubin level, SGPT, SGOT etc. were quite high and hemoglobin was low before iron chelation; however after chelation therapy it was observed reduced level of these parameters which matched perfectly with study done by Mohammad and Ahmad Alavian-Ghavanini (1998). However the effectiveness of long term intensive iron chelation therapy progressively increases in splenectomised patients while it decreases appreciably in courses of treatment in the non splenectomised ones (Pubmed, 1982).

Compared to placebo, deferrioxamine significantly iron-overload. The number of deaths at 12 years follows up and evidence of reduced end –organ damage was less for desferrioxamine than placebo. When

### **Research Article**

desferrioxamine was compared to deferiprone or a different desferrioxamine schedule, there were no statistically significant differences in measures of iron overload (Roberts *et al.*, 2005). In present study Deferrasirox chelating therapy reduced Iron overload in Thalassemia Major patients and its results have been found better long lifespan as compared to the past.

### **Conclusion**

In present study we conclude that before chelation therapy S.Ferritin and Liver function test (S.bilirubin, SGPT, SGOT, and S.Alkaline Phosphatase) were high but after giving chelation these found to be reduced to decrease due to addition of iron chelating drug (deferrasirox) in daily regime of patients and S.bilirubin,SGOT,SGPT,S.Alkaline phosphatase decreased when patients have started this drug.  
reduced

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