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Research Article

**LEVEL OF SERUM ZINC IN PATIENTS SUFFERING FROM  
THALESSEMIA MAJOR AND ITS COMPARISON WITH  
SERUM ZINC LEVEL OF HEALTHY POPULATION****Wania Ashfaq, Zara Amjad, Aqsa Rahat**  
Faisalabad Medical University Faisalabad**Article Received:** February 2020**Accepted:** March 2020**Published:** April 2020**Abstract:**

**Objective:** This research work carried out to provide the comparison of level of serum zinc between the patients suffering from TM (Thalassemia Major) and normal healthy population at Allied Hospital Faisalabad.

**Methodology:** A sum of 25 male and 36 female patients suffering from Thalassemia Major were the participants of this research work. Out of total 61 patients, treatment of 30 patients carried out by Deferoxamine and treatment of 31 patients carried out with the combination of deferoxamine and DEF (Deferiprone). We also selected 60 healthy persons with age and gender match in the group of healthy population. We obtained two milliliter blood from every participant of both groups in condition of fast. Count of complete blood and serum zinc carried out for the participants of both groups.

**Results:** The average age of the patients and participants of normal group was  $15.0 \pm 5.0$  years. Average level of serum zinc was  $68.97 \pm 21.12 \mu\text{g/dl}$ ,  $78.1 \pm 28.5 \mu\text{g/dl}$  and  $80.16 \pm 26.54 \mu\text{g/dl}$  in patients of Thalassemia Major with deferoxamine, Thalassemia Major with deferiprone plus deferoxamine and participants of healthy population group correspondingly. There was no important association between all three groups. However, 50.0% Thalassemia Major patients with deferoxamine, 38.70% Thalassemia Major patients with deferoxamine plus Deferiprone and 32.80% participants of normal group were present with hypozincemia.

**Conclusion:** Approximately 40.0% to 50.0% patients of Thalassemia Major and 1/3<sup>rd</sup> of healthy population was present with hypozincemia. This research work conclude that low serum zinc level is a serious health issue in the patients of Thalassemia Major as well as normal healthy population of the region.

**KEY WORDS:** Serum, Zinc, Thalassemia Major, Deferoxamine, Deferiprone, Hypozincemia, Blood Count.

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**INTRODUCTION:**

One of the most common genetic abnormality is thalassemia in whole world which can lead to profound anemia. This complication is much common in the regions of Middle East and subcontinents [1]. Our country Pakistan is located on the corner of the thalassemia zone and our country has more than 20 thousand patients of Thalassemia Major. The rate of incidence of thalassemia minor is approximately 4.0% to 10.0% in various regions of our country [2]. Treatment of Thalassemia Major is the transfusion of blood. The main objective of this therapy is to maintain the pre-transfusion hemoglobin equal or greater than 9.50 g/dl. The transfusion of blood induced the accumulation of the iron. The elimination of the iron is a strategic therapy, iron chelator medicines as DEP, deferoxamine and deferasirox decrease the burden of iron and improve the survival rate of the patients suffering from thalassemia [3]. Majority of the patients of this disease must suffer the deficit of micronutrients [4].

There is shortage of data about the deficiency of zinc in the patients of Thalassemia Major. Zinc is present in extensive variety of foodstuff as red meat, beans, nuts, seafood, grains, dairy products, and low in green vegetables, tea, coffee and fruits [5]. Zinc is vital element of nutrition for humans and it is also essential for more than three hundred enzymes [6, 7]. Zinc performs a crucial role for the perception of taste, and it is also strong antioxidant [8]. There are millions of people in the world who are suffering from the deficiency of zinc in the whole world particularly in the countries which are under development. There are some symptoms of the deficiency of zinc as retardation in growth, loss of hair, diarrhea, and delayed maturation for sex, impotence, abrasions of skin and eyes and hunger loss [9]. Late puberty and small stature are a serious issue of Thalassemia Major patients [10]. Some part of the retardation of the growth has association with the deficiency of zinc [11]. Zinc with the property of antioxidant can restrict the impacts of iron free radicals whereas its load is much high in the patients of Thalassemia Major [12]. Patients of thalassemia are prone to deficiency of zinc [13].

**MATERIAL AND METHODS:**

Ethical Committee of the hospital gave the permission to conduct this research work. This transverse research work carried out in the period of six months from January 2019 to June 2019 in Allied Hospital Faisalabad. So, we selected two groups of patients suffering from Thalassemia Major with an

average age of  $15.0 \pm 5.0$  years with a range from 10 to 20 years. There were 30 patients in one group (Equal from both genders) who were getting Deferoxamine dose of 40.0 mg/kg over 8 to 12 hours subcutaneously for at least 5 nights in a week and other group contained 31 patients in which 15 were males and 16 were females who were under treatment with daily dose of Deferiprone 62.0 mg/kg (with a range from 35 to 80) complete 7 days of week, separated into 3 doses minimum one hour before taking diet along with deferoxamine 40.0 mg/kg (with range from 20 to 50) over 8 to 12 hours subcutaneously at least 2 or 4 days in a week.

We took the consent from every patient and their kin after describing them the main purpose of this research work. Every patient filled the questionnaire including the data about the characteristics of demography, type of iron chelator medicines being utilized, present infection, infections of HBV or HCV, utilization of supplement for zinc and hydroxyurea. Patients suffering from other infections or diseases at this time were not included in this research work. We selected 60 participants in the groups of population. We took two milliliter blood from every participant of the research work. The measurement of the serum zinc carried out by atomic absorption device. A cutoff level of 70.0  $\mu\text{g/dl}$  was utilized for serum zinc, specimens below 70.0  $\mu\text{g/dl}$  were considered as low or with hypozincemia [14]. Because of zinc level, we separated the hypozincemia into 4 stages: 1 through 4, 60.0-70.0  $\mu\text{g/dl}$  (1), 50.0-60.0  $\mu\text{g/dl}$  (2), and 40.0-50.0  $\mu\text{g/dl}$  (3) and less than 40.0  $\mu\text{g/dl}$  (4). We used the SPSS V.20 for the statistical analysis of the collected information.

**RESULTS:**

The average level of serum zinc was  $68.970 \pm 21.120$   $\mu\text{g/dl}$  (with a range from 21 to 107) in the patients of Thalassemia Major having Deferoxamine treatment. Patients of Thalassemia Major having Deferoxamine plus Deferiprone treatment were present with the level of serum zinc as  $78.10 \pm 28.50$   $\mu\text{g/dl}$  (with a range from 27 to 146). The average level of serum zinc was  $80.16 \pm 26.54$   $\mu\text{g/dl}$  (with a range from 25 to 146) in the participants of healthy population. About 50.0% patients of Thalassemia Major having Deferoxamine treatment, 38.70% Thalassemia Major patients having Deferoxamine plus Deferiprone treatment and 32.80% healthy population were present with hypozincemia. The rate of occurrence of hypozincemia in all 3 groups with respect to gender distribution is present in Table-1.

**Table-I: Frequency of Percent Hypozincemia in Patients and Normal Healthy Population by Gender**

Type	Percent of hypozincemia	
	Male	Female
Thalassemia Major with deferoxamine	66.70%	42.90%
Thalassemia Major patients	40%	37.50%
With Deferoxamine + Deferiprone Combination Protocol Normal Group	26.50%	41.70%

Table-2 states the rate of occurrence of hypozincemia's severity in 2 groups of Thalassemia Major patients and group of healthy population. This research work found no important association between level of serum zinc between both groups of patients and group of healthy population ( $P > 0.050$ ). Low level of serum zinc in both groups of Thalassemia Major patients was highly prominent in male gender as compared to female patients, but in group of healthy population it was present as vice versa.

**Table-II: Percent of Severity of Hypozincemia in Thalassemia Major Patients and Normal Group**

Type	Percent of Severity of hypozincemia			
	I	II	III	IV
Thalassemia Major with Deferoxamine	16.66%	13.33%	16.66%	3.33%
Thalassemia Major patients	12.90%	12.90%	3.22%	9.67%
with deferoxamine+ Deferiprone combination protocol Normal Group	10.34%	10.34%	6.89%	5.17%

### DISCUSSION:

There are many factors contributing to the deficiency of zinc in the patients of Thalassemia Major. In general public, dietary habits, factors of geography and ethnicity can impact the level of serum zinc and these factors can have impacts on patients of Thalassemia Major [15-17]. Rea stated that hyper-transfusion can prevent the deficiency of zinc in the patients of Thalassemia Major [18]. The patients of thalassemia with liver cirrhosis or fibrosis may have some low level of serum zinc. Soomro displayed 69.0% patients of liver cirrhosis were present with hypozincemia [19]. In the patients of thalassemia with the injury of liver, release of somatomedin-C is very low. The supplementation of zinc may enhance the creation of somatomedin-C from liver of the patients of Thalassemia Major [20, 21]. Hypozincemia much like the deficiency of anemia due to iron deficiency requires to be considered as nutritional issue in our region [22]. In other research work, it was discovered that 35.0% to 65.0% deficiency of zinc in the healthy children in our region. In year of 1997, Stefano stated the low zinc level in the patients of thalassemia which is issue with deferoxamine [20]. Some other research works also confirmed these findings. But many other research works have different opposite views

[11]. Bekheirnia stated that the rate of occurrence of hypozincemia in the patients of Thalassemia Major was much high as compared to findings of this current research work (85.50% vs 50.0%). Much consistent with the findings of this research work, they also discovered more incidence of hypozincemia in male gender [2]. Moafi stated the prevalence of deficiency of zinc in the patients of Thalassemia Major as 10.0%, which was much low as compared to the findings of this current research work [9].

Rea, Donma and Mehdizadeh discovered that average level of serum zinc was much high in the group of thalassemia. Those research works showed that deficiency of zinc in the patients of thalassemia who were on continuous transfusions of blood was uncommon and they stated that routine supplementation of the zinc is not important for the patients of Thalassemia Major [11, 18]. Some research works are consistent with these findings, but some research works are completely opposite to these research studies.

### CONCLUSION:

In this current research work, the level of serum zinc in 2 groups of Thalassemia Major patients and participants of healthy population was much low and

it was considerable. This finding concludes that though routine indication of the supplement of zinc in the patients of Thalassemia Major is questionable, however, there is recommendation of the periodic measurement of level of serum zinc.

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