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Research Article

THE COMPARISON OF SERUM ZINC LEVELS AMONG THALASSEMIA MAJOR PATIENTS AND NORMAL HEALTHY CONTROLS: A TRANSVERSE STUDY

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Abstract

Objective: The main purpose of this research work is to compare the levels of serum zinc among the patients of TM (Thalassemia Major) & normal healthy controls at Allied Hospital, Faisalabad.

Methodology: We completed this research at Allied Hospital, Faisalabad from May to December 2017. Twenty-five males and thirty-six female patients of thalassemia Major were the part of this research work. DFO (deferrioxamine) treatment carried out for thirty patients & treatment of thirty-one patients carried out with the amalgamation of DFO (deferrioxamine) & DEF (deferiprone). Controls were sixty healthy people with same age & sex. Every patient and control gave two millilitres sample of blood in the state of fasting. The calculation of the cells of blood & serum zinc conducted for both patients and healthy controls.

Results: The average age of healthy controls and patients was 15 ± 5 years. The average level of serum zinc was $68.97 \pm 21.12 \mu\text{g/dl}$, $78.10 \pm 28.50 \mu\text{g/dl}$ & and $80.16 \pm 26.54 \mu\text{g/dl}$ in patients of thalassemia Major with deferrioxamine, TM with deferrioxamine plus deferiprone & healthy controls correspondingly. No significant association was present between healthy controls and patients of TM. Fifty percent of TM with deferrioxamine, more than thirty-eight percent TM with deferrioxamine plus deferiprone & 32.8 percent healthy controls had hypozincemia.

Conclusion: About 50% patients of TM & 33% healthy controls had hypozincemia. The research work displays the less amount of serum zinc is a problem of health in both groups of the participants.

Keywords: TM, Serum ZINC, DFO, DEF, Amalgamation and Hypozincemia.

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INTRODUCTION:

Thalassemia is a most frequent abnormality of the gene in the whole world & anaemia appears as a result of this disease. This disease is widespread in Pakistan & Middle East [1]. The occurrence of the thalassemia minor is from four to ten percent in various areas of Iran [2]. Therapy of TM is the transfusion of blood. The main purpose of therapy is to sustain before transfusion Hb = or >9.5 g/dl.

The transfusion of blood induces the accumulation of iron. Elimination of iron is a treatment method with the help of different drugs to reduce the burden of the iron & progress the survival of patients of thalassemia [3]. Many thalassemia patients have a shortfall of micronutrients [4]. There is no compromise about the shortage of zinc in the patients of TM. Zinc is available in many kinds of eatables as oysters, meat, chicken, peas, beans, nuts & some seafoods [5]. Zinc is a very vital animal in the nutrition of the humans and animals. Zinc is also very important and compulsory for more than three hundred enzymes [6, 7]. Zinc plays an important role in the production of protein, a division of the cell, recovery of the wound & immunity systems. Zinc is fundamental for the perception of the taste [8].

Thousands of people are suffering from the insufficiency of the zinc in the whole world especially in the countries which are under development. The results of insufficiency of zinc are retardation in growth, loss of hair, diarrhoea, and late maturation for sex, lesions in skin and eyes & no feeling of hunger [9].

Late maturation & small stature are the main complications of thalassemia major [10]. Retardation in the growth of some parts of the human body also has a connection with the deficiency of the zinc [11]. Zinc has the property of antioxidant agent in which it prevents the impact of the free iron radicals [12]. The patients of TM are prone to the deficiency of zinc [13].

METHODOLOGY:

We completed this research at Allied Hospital, Faisalabad from May to December 2017. The ethical committee gave the approval for this research work.

The selection of the patients of TM carried out randomly aged from ten to twenty years. One arm comprised thirty TM patients who took DFO with dose of forty milligram per kilogram over eight to twelve hours subcutaneously of at least 5 days per week & the 2nd arm with thirty one patients took average DEF 62 milligram per kilogram daily dose incomplete week separated into 3 doses with minimum 1 hour before meal in addition with DFO forty milligram per kilogram over eight to twelve hours subcutaneously of at least 2-4 days per week.

Every patient gave his consent to participate in this research work after knowing the purpose of the study. A questionnaire with data about the parameters of demography, type of iron chelator medicine being utilized, current infection, type of hepatitis, utilization of the supplements of zinc & completion of the hydroxyurea carried out for every patient. Patients with severe infection, fever, users of zinc supplements & patients of hepatitis were not the part of this research work. The group of controls was the normal healthy people. Two millilitres blood drained from every participant. Centrifugation conducted at three thousand rpm for ten minutes. After that serum was frozen at seventy-degree centigrade.

Carl Zeiss Jena model was in use for the measurement of serum zinc. The cutoff value of 70µg/dl was in use for serum zinc, the sample below this value was regarded low [14]. Hypozincemia was separated into four groups depending upon the amount of the zinc. SPSS software was in use for the analysis of the collected information. Maximum values were available in averages.

RESULTS:

The average level of serum zinc was 68.97 ± 21.12 µg/dl in the patients of thalassemia major treated with DFO. The average level of zinc in the patients of thalassemia major treated with DFO plus DEF was 78.10 ± 28.50 µg/dl. The average level of serum zinc in the healthy controls was 80.16 ± 26.54 µg/dl. About fifty percent thalassemia major with DFO, 38.7% thalassemia major with DFO plus DEF and 32.8% in the healthy controls had hypozincemia. The rate of the hypozincemia in all three groups in accordance with gender is available in Table – I.

Table – I: Frequency of percent hypozincemia in two groups of patients and normal population by gender

Type	Male	Female
Thalassemia Major with DFO	66.70	42.90
Thalassemia Major patients with DFO+ DEF combination protocol	40.00	37.50
Normal control	26.50	41.70

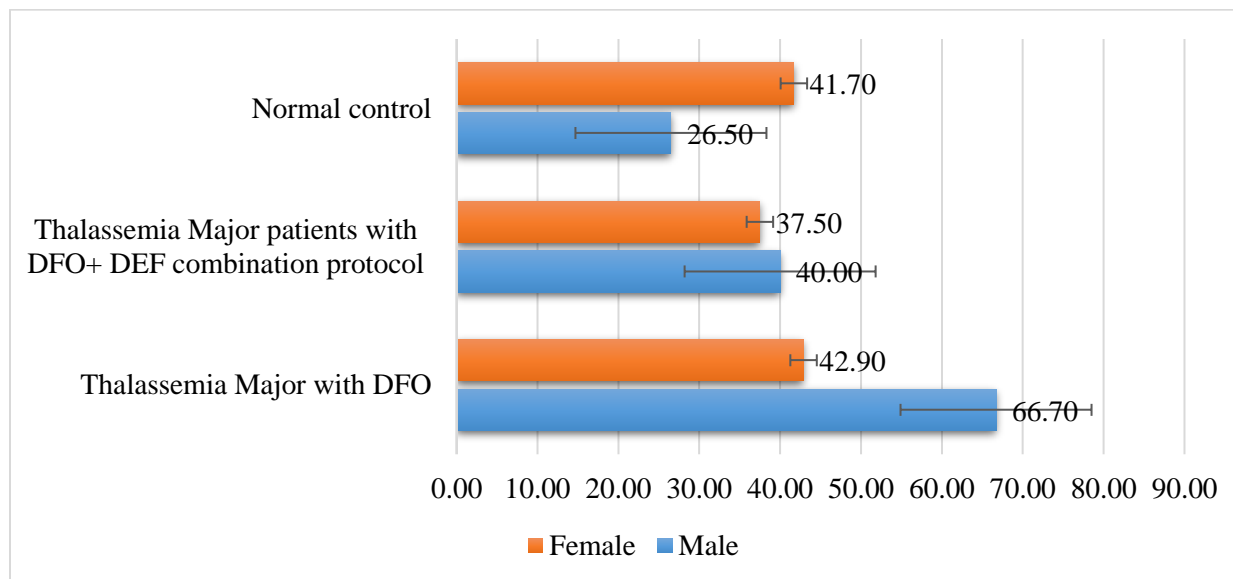
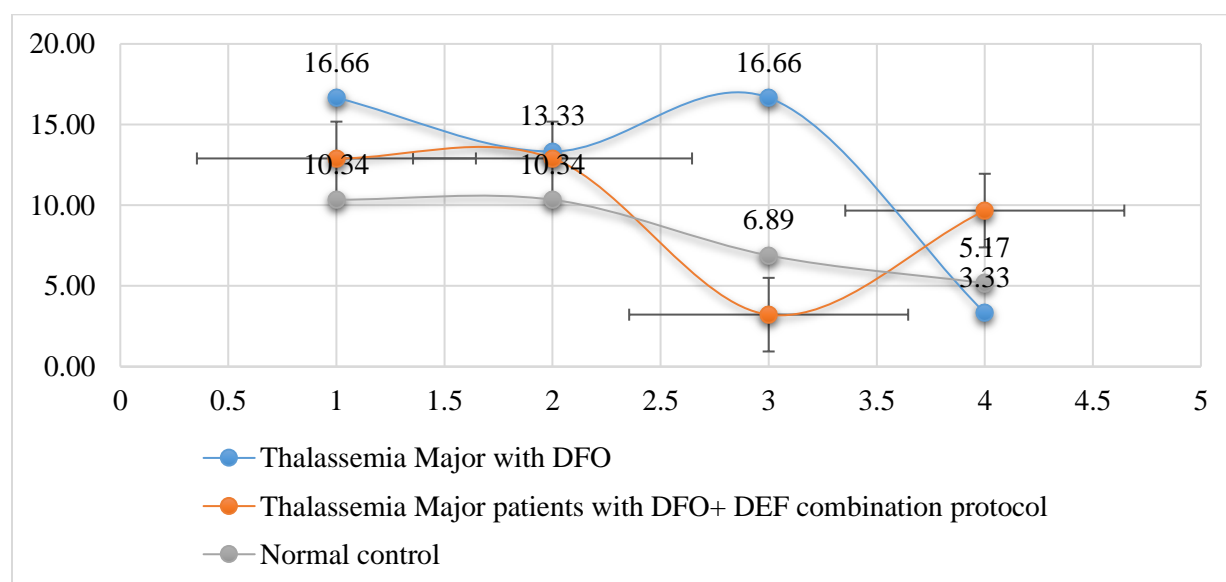
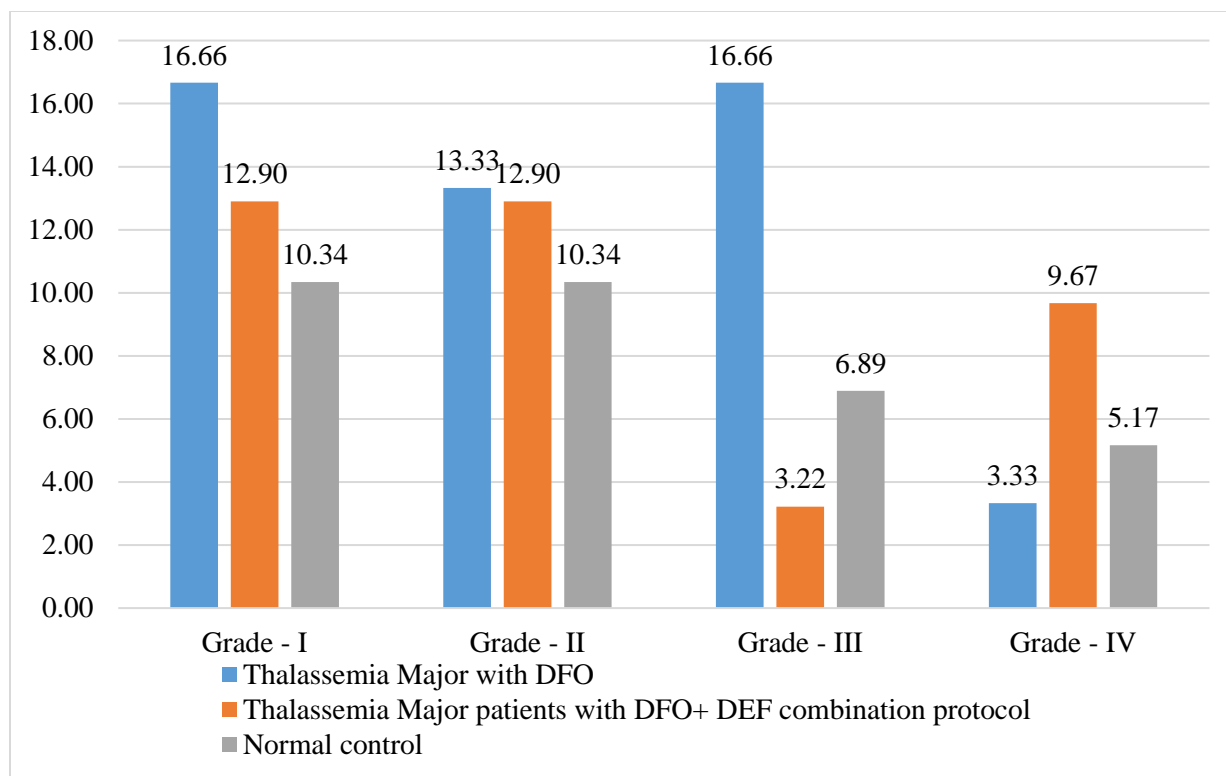


Table-2 displays the rate of the seriousness of hypozincemia in two groups of thalassemia major & healthy controls. We find no significant association

between levels of zinc of any group. Low level of zinc in both groups of thalassemia major is dominants in males as compared to females.

Table – II: Percent of the severity of hypozincemia in thalassemia major patients and normal group

Type	Grade - I	Grade - II	Grade - III	Grade - IV
Thalassemia Major with DFO	16.66	13.33	16.66	3.33
Thalassemia Major patients with DFO+ DEF combination protocol	12.90	12.90	3.22	9.67
Normal control	10.34	10.34	6.89	5.17



DISCUSSION:

There are many factors which cause deficiency of zinc in thalassemia major as hyperzincuria, drugs of the iron chelator, and less zinc-enriched food. Folic acid has the ability to reduce the absorption of zinc when intake of zinc is very less. Some other aspects which affect the levels of serum zinc in normal people as bad dietary habits, factors of

geography & ethnicity [15 – 17]. The transfusion of the blood on a regular basis can decrease the hyperzincuria. Rea concluded that hypertransfusion has the ability to decrease the zinc shortage in thalassemia major [18]. Soomro displayed that sixty-nine percent of cirrhotic patients had hypozincemia [19].

In the patients of TM with an injury of the liver, the discharge of somatomedin C is very less. The supplementation of the zinc may enhance the creation of somatomedin C from the liver of the patients of thalassemia major [20, 21]. The average level of serum zinc was close to each other in all three groups. We did not get any significant association between the condition of serum zinc in 2 TM patients and healthy controls because about 32.8% members of healthy controls had the deficiency of zinc. We predicted low zinc level in the patients of thalassemia major but 32.8% healthy controls were also suffering the same problem.

Hypozincemia is a problem of nutrition in the province of Khuzestan [22]. In other research work, authors concluded 35% to 65% deficiency of zinc among the healthy children & adolescents living in Iran [23].

Stefano in 1997 displayed the low zinc level in the patients of TM which is considered a complication with DFO [24]. Some other research works also gave confirmation of these findings [25, 26]. Some studies had just opposite results [11, 27]. A research work proved that the transfusion of the blood is very important than the injection of Desferal [25]. Bekheirnia concluded that the rate of hypozincemia in the patients of thalassemia major very high as compared to this case study but he confirmed the high occurrence of hypozincemia in male participants of his research work [28].

Moafi concluded the occurrence of shortage of zinc much lower than the percentage mentioned in our study [29]. Rea, Donna & Mehdizadeh discovered that the average amount of the serum zinc was very high in the patients of TM [11, 18, 30]. The outcomes of this research work are comparable with the findings of some other research works [28, 30] & contrary to someones [11, 31]. A future study in different areas of Pakistan should be carried out to confirm the findings of this research work.

CONCLUSION:

In this research work, the rate of fewer amounts of zinc level inpatients of TM & healthy controls was significant. The casework displays that with a regular indication of the supplements of zinc is dubious, but the measurement of serum zinc at regular intervals is suggested.

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