



Study of Serum Minerals in Tribal Thalassemic Patients of Udaipur

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Abstract

Background: *Thalassemia is the most common hereditary anemia in human. The most common types of disease are the alpha and beta thalassemia, Thalassaemia are important challenges for tribal populations in Rajasthan. Thalassaemia genes are variably distributed across various tribal populations of Rajasthan. The morbidity varies greatly in different areas of the country due to differential co-inheritance of α -thalassaemia gene and interaction of various epistatic and environmental factors. Though substantial data on prevalence of these disorders exist, there is an urgent need to develop integrated hierarchical core facilities to manage the disease. Newborn screening, genetic counselling, carrier detection, prenatal diagnosis along with management of cases should form the basic infrastructure of thalassemia management. Research in this area should continue focusing on various challenges in care delivery, prevention and basic sciences on interaction of thalassemia with various other infections.*

Aim of study: *To determine serum levels of the Calcium, Phosphorus in thalassemic patients.*

Material and Methods: *The present study sample was collected from the thalassemia care centre in MB Hospital Udaipur and the test was performed in the Central Biochemistry laboratory of Pacific Medical College & Hospital. The Study Design is Prospective Cross Sectional Study. The study done between March 2018 to September 2018. We divide our 40 samples into 20 cases and 20 as control group.*

Statistical Analysis: *for statistical analysis independent t-test and Pearson correlation test was used.*

Result: *Maximum no. of patients 15 (75%) belonged to 4-10 years of age group I. Only 5(25% of cases) belonged to 11-14 years of age group II. In thalassemic patients mean serum calcium level is 7.47 ± 0.11 and control group mean serum calcium level is 9.43 ± 0.11 which is significantly (p value < 0.001) Mean phosphorus level in Thalassemic patients is 5.310 ± 0.10 and 3.98 ± 0.10 in control group*

Conclusion: *β - thalassemia is the commonest single-gene disorder in the Indian population 10. 10% of the total world thalassemics are born in India every year11. In our study demonstrate that significantly reduced level of serum calcium, and high phosphorus level in children with thalassemia belong to age group 11-14 years as compared to 4-10 years of age group.*

Keywords: *Calcium, Phosphorus, Thalassemia.*

Introduction

Thalassemia is the most common hereditary anemia in human. This disease was initially described by Cooley and Lee^{1,2}. Almost 150 million people carry the thalassemia gene universally and it is more common in Mediterranean regions than anywhere in the world^{3, 4}. The most common types of disease are the alpha and beta thalassemia, Beta thalassemia major is the most severe form requiring repeated blood transfusions and deferoxamine injections. Although such treatments increase the patients' life span.⁵ As a result of anemia caused in Thalassemia major, patients are pale, fatigue, have slower rate of growth and most significant is the expansion of bone marrow.⁶ This expansion of the bone marrow forces the bones to expand, and develop "Cooley's facies."⁶ Thalassaemic patients show a variety of bone disorders including bone pain, bone deformities, bone age delay, growth failure, reduced bone mass, pathological fractures osteopenia and osteoporosis etc.⁷

Thalassaemia are important challenges for tribal populations in Rajasthan. Thalassaemia genes are variably distributed across various tribal populations of Rajasthan. The morbidity varies greatly in different areas of the country due to differential co-inheritance of α -thalassaemia gene and interaction of various epistatic and environmental factors. Though substantial data on prevalence of these disorders exist, there is an urgent need to develop integrated hierarchical core facilities to manage the disease. Newborn screening, genetic counselling, carrier detection, prenatal diagnosis along with management of cases should form the basic infrastructure of thalassaemia management. Research in this area should continue focusing on various challenges in care delivery, prevention and basic sciences on interaction of thalassaemia with various other infections.

Thus, the primary objective of this study is to delineate the usefulness of Serum Bone profile (Serum Calcium, Serum Phosphorus) in thalassaemic patients.

Methodology

Type of study: Prospective Cross Sectional Study

Place of study: The present study sample was collected from the thalassaemia care centre in MB Hospital Udaipur and the test was performed in the Central Biochemistry laboratory of Pacific Medical College & Hospital.

Sample size: 40 cases

Source of data: The study includes children with thalassaemia from 4 years to 14 years, that requiring frequent blood transfusion and attending outpatient and in-patient department.

Method: Patient undergo blood investigation for serum calcium, phosphorus. Four ml venous blood was collected in a plain vial, aseptically. Results were interpreted using independent t- test by using computerized SPSS system.

Inclusion Criteria: We divide our 40 samples into 20 cases and 20 as control group.

The patients selected for the study were grouped as:

Group-1: Thalassaemic children (1-10year age) include both males and females.

Group-2: Thalassaemic adolescents (10-14year age) It includes, both males and females.

Exclusion Criteria

1. The individuals with metabolic diseases, malnutrition, or histories of consuming vitamins or mineral supplements were excluded from the study.
2. Patient with the following diseases or histories were excluded from the study:
 - Kidney disease
 - Type 2 diabetes mellitus
 - Liver disease
 - Pancreas disease
 - Eating disorder
 - Trace elements medication

Observation

Table No.1: Age Distribution of control cases

Age	No. of cases	Percentage
4-10	16	80
11-14	04	20

Table No.2: Age Distribution of Thalassaemic Patients

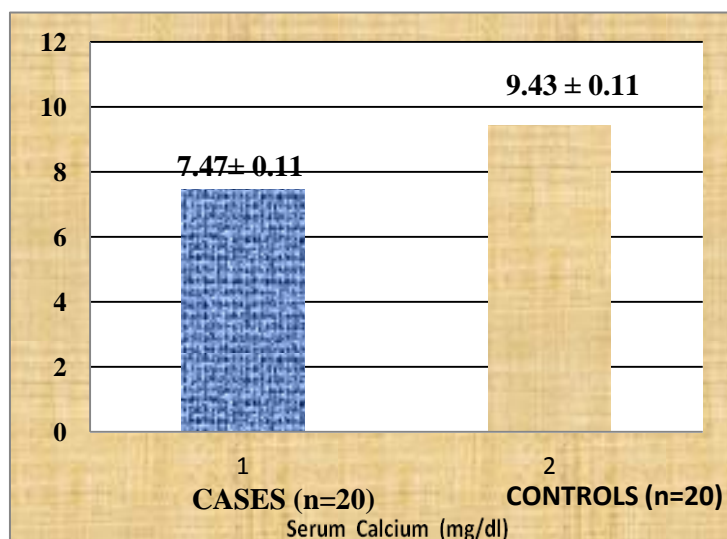
Age	No. of cases	Percentage
4-10	15	75
11-14	05	25

Table No. 3: Frequency of Blood Transfusion

Frequency	No. of cases	Percentage
1 unit / month	15	75
1.5 unit/ month	2	10
2 unit/ month	3	15

Table No.4: Laboratory Parameters in the Thalassaemic Patients and Controls

Variable	Cases (n=20)	Controls (n=20)	Significance
Serum calcium (mg/dl)	7.47±0.11	9.43±0.11	HS
Serum phosphorus (mg/dl)	5.310±0.10	3.98±0.10	NS



Graph 1 showing serum calcium level in both cases and control group

Table No.5: Serum Calcium Level in Thalassaemia Patients

Serum calcium level	No. of patients	Percentage
≤ 6 mg/dl	0	0
6.1-7 mg/dl	5	25
7.1-8 mg/dl	11	55
8.1-9 mg/dl	4	20
>9 mg/dl	0	0

Table No.6: Serum Phosphorus Level in Thalassaemia Patients

Serum phosphorus level	No. of patients	percentage
< 5 mg/dl	5	25
5-5.9 mg/dl	12	60
6-6.9 mg/dl	3	15
≥ 7mg/dl	0	0

Result

Maximum no. of patients 15 (75%) belonged to 4-10 years of age group I. Only 5(25% of cases) belonged to 11-14 years of age group II. In thalassaemic patients mean serum calcium level is 7.47±0.11 and control group mean serum calcium level is 9.43±0.11 which is high significant (p value <0.001) Mean phosphorus level in Thalassaemic patients is 5.310±0.10 and in control group it was 3.98±0.10.

No correlation was observed between serum calcium and phosphorus level in Thalassaemic patients and this was assessed by using person correlation.

Discussion

β- thalassaemia is the commonest single-gene disorder in the Indian population⁸. 10% of the total world thalassaemics are born in India every year⁹. Certain communities in India, like Tribals, Sindhi, Gujarati, Punjabi, and Bengali, are more commonly affected with beta thalassaemia, the incidence varying from 1 to 17%¹⁰

The study was done by Abolfazl Mahyar et al¹¹ in 2010, in this study, all children under 12 years affected by beta thalassaemia major (40 patients) were evaluated for serum zinc and copper levels in Qazvin thalassaemia center (Qazvin, Iran) in 2007. The mean concentrations of serum zinc and copper levels were 67.35±20.38 and 152.42±24.17 µg/dl respectively. Twenty-six (65%) of thalassaemic patients had zinc concentration under 70 µg/dl (hypo-zincemia). None of the thalassaemic children had copper deficiency. No significant correlation between serum zinc level with age, weight, height, body mass index, duration of blood transfusion, desferrioxamine dose and ferritin level was observed in thalassaemic patients (P=0.3).

The early investigated done by El-Adham K. Eithar et al.¹² in 2013. This study aims at investigating serum zinc, calcium and ferritin levels in children with thalassaemia major. 40 children with thalassaemia major attending the Hematology Clinic of Cairo University Children's

Hospital with age range 6-17 years were enrolled in this study. There was positive correlation between serum calcium and height ($P < 0.001$), positive correlation between serum ferritin and age ($P = 0.047$) and negative correlation between serum calcium and age ($P = 0.009$).

The study was done by Laila M. Sherief et al.¹³ in 2014, this study estimated levels of vitamins A, C, E, B12, folic acid, total homocysteine (tHcy), and methylmalonic acid (MMA) along with trace elements, zinc, copper, and selenium in Beta-thalassemia-major patients. This study included 108 patients with Beta-thalassemia-major and 60 age and sex matched healthy children. There was a significant decrease of vitamins A, C, E, and B12 and trace elements zinc, copper, and selenium in thalassemic patients as compared to controls. tHcy and MMA were significantly elevated in patients. No significant correlations were found between the serum levels of the studied vitamins and trace elements as regards age, frequency of transfusion, duration of transfusion, and serum ferritin

In our study total Mean calcium level is 8.1280 ± 0.86 , mean phosphorus level is 5.46 ± 0.875 and mean parathormone level 29.7 ± 19.59

Our study demonstrated that significantly reduced level of serum calcium, and high phosphorus level in children with thalassemia who belonged to age group 11-14 years as compared to 4-10 years of age group.

Conclusion

In the present study following conclusions were derived these were:

1. In Thalassemic patients serum calcium level is 7.47 ± 0.11 and in control group 9.43 ± 0.11
2. In Thalassemic patients serum phosphorus level is 5.310 ± 0.10 and in control group 3.98 ± 0.10

Conflicts of Interests: None

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