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Original Research Article

To estimate Serum phosphorus in thalassemia patients for proper management with less morbidity

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Abstract

Background & Methods: The aim of the study is to estimate Serum phosphorus in thalassemia patients for proper management with less morbidity. Patient underwent blood investigations for serum calcium, phosphorus and Parathormone. Four ml venous blood was collected in a plain vial, aseptically. Serum Parathormone was estimated using two sites labelled antibody radio-immunoassay.
Results: Maximum number of patients 83 (42% of cases) had serum Phosphorus level <5 mg/dl. 51 (26 % of cases) had serum Phosphorus 5-5.9 mg/dl. 49 (24% of cases) had serum Phosphorus 6-6.9 mg/dl and 17 patients had serum Phosphorus >7mg/dl. Mean phosphorus level was 5.1457±0.65 and 6.2±0.91 in group I and group II respectively which shows significant (p value <0.001) high level in group II. This shows that with increasing age serum phosphorus level is also increasing in thalassemia patients.
Conclusion: Our study shows that mostly thalassemia cases are diagnosed at 6 month to 12 months (44.5% of total cases) of age group. With increasing age patients also had high level of phosphorus. Mean phosphorus level 5.1457±0.65 and 6.2±0.91 in 4-10 years age group and 11-14 years age group respectively which shows significant (p value <0.001) high level in 11-14 years age group.

Keywords: Serum, phosphorus, thalassemia & morbidity.
Study Design: Observational Study.

1. Introduction

In multiple transfused and under transfused thalassemic patients with increased gastrointestinal iron absorption, the serum ferritin levels correlates well with total body iron stores[1]. Accumulation of haemosiderin granules appear to cause release of hydrolytic enzymes from lysozymes that are toxic to the cell. Cell damage occurs as a result of iron related catalysis leading to oxidation of membrane components[2]. Iron overload has resulted in growth failure, hypogonadism, diabetes and hepatic disease.
Each unit of blood provides 200mg of elemental iron. The calculated daily acquisition of iron in the transfusion dependent child averages 8-16mg of iron, given a dose of 250-500 ml of red blood cells every month[3]. Amount in excess of 500mg/kg of iron must be administered before organ toxicity occurs. Toxicity begins when the load of iron in a particular tissue exceeds the tissue or blood binding capacity and joins a mobile or free pool. This occurs by

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middle to late teen years. Patients must accumulate about 3-4 g of iron, equivalent to serum ferritin of 500 micrograms/litre before starting chelation therapy[4].
The infants with thalassemia are born normally. Anaemia is minimal during the initial months of life. Clinical manifestations usually emerge by the second six months of life. They usually present with pallor, irritability, cachexia, growth retardation, abdominal distension due to organomegaly and jaundice[5]. Facial and skeletal changes develop later. Features of ineffective erythropoiesis include expanded medullary spaces, extra-medullary haematopoiesis and huge caloric need. Pallor, haemosiderosis and jaundice may combine to produce greenish brown complexion[6].

2. Material and Methods

This Prospective Cross Sectional Study was conducted in the Department of Paediatrics of a tertiary health centre in central India on 200 patients. Patient should undergo blood investigation for serum calcium, phosphorus and Parathormone. Four ml venous blood was collected in a plain vial, aseptically. Serum Parathormone was estimated two sites labelled antibody radio-immunoassay.

INCLUSION CRITERIA
Thalassemia patients included in the study are:
Children aged 4-14 years who require regular packed red blood cell transfusions.

EXCLUSION CRITERIA
Having some renal disease.
Malabsorption syndrome.
On long term anticonvulsant therapy.
Taking vitamin D and calcium supplementation.

3. Result

TABLE NO. 1: AGE AT DIAGNOSIS

Age	No. of cases	Percentage
<6 month	49	24.5
6-11 month	89	44.5
12-60 month	47	23.5
> 60 month	15	7.5

Maximum number of patients 89 (44% of cases) diagnosed at age of 6 month to 11 month. 47 (23.5 %) diagnosed at 12 month to 60 month. 49 (24.5%) diagnosed at less than 6 month of age.

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TABLE NO. 2: FREQUENCY OF BLOOD TRANSFUSION

Frequency	No. of cases	Percentage
1 unit / month	139	69.5
1.5 unit/ month	25	12.5
2 unit/ month	36	18
> 2 unit / month	00	00

Maximum number of patients 139 (69.5% of cases) received only 1 unit of blood transfusion/month to maintain Hb level >9 gm/dl. 36 (18 % of cases) patients received 2unit/month and 25 (12.5 %) patient received 1.5 unit/ month to maintain Hb level >9 gm/dl. No patient received >2 units/ month.

TABLE NO. 3: SERUM PHOSPHORUS LEVEL IN THALASSEMIA

Serum Phosphorus Level	No. of Patients	Percentage
< 5 mg/dl	83	42
5-5.9 mg/dl	51	26
6-6.9 mg/dl	49	24
≥ 7mg/dl	17	08

Maximum number of patients 83 (42% of cases) had serum Phosphorus level <5 mg/dl. 51 (26 % of cases) had serum Phosphorus 5-5.9 mg/dl. 49 (24% of cases) had serum Phosphorus 6-6.9 mg/dl and 17 patients had serum Phosphorus >7mg/dl.

TABLE NO. 4: SERUM PHOSPHORUS LEVEL IN THALASSEMIA ACCORDING TO AGE GROUP

Serum Phosphorus Level	Group I	Percentage	Group II	Percentage
< 5 mg/dl	72	36%	12	06%
5-5.9 mg/dl	44	22%	08	04%
6-6.9 mg/dl	24	12%	24	12%
≥ 7mg/dl	00	00	16	08%

Mean phosphorus level is 5.1457±0.65 and 6.2±0.91 in group I and group II respectively which shows significant (p value <0.001) high level in group II. This shows that with increasing age serum phosphorus level increases in thalassemia patients.

4. Discussion

In total 200 cases, mean calcium level is 8.4571±0.685 and 7.36±0.75 in group I and group II respectively, which is significantly (p value <0.001) low in group II. Mean phosphorus level is 5.1457±0.65 and 6.2±0.91 in group I and group II respectively which shows significant (p

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value <0.001) high level in group II, which shows that with increasing age in thalassemia patient's serum calcium level decreased and serum phosphorus level increased[7].
A number of possible mechanisms have been described to be responsible for glandular damage through iron overload. These include free radical formation and lipid peroxidation resulting in mitochondrial, lysosomal and sarcolemmal membrane damage, and a number of surface transferrin receptors in the cell, and the ability of the cell to protect itself against inorganic iron[8].

5. Conclusion

Our study shows that mostly thalassemia cases are diagnosed at 6 months to 12 months (44.5% of total cases) of age group. With increasing age patients also had high level of phosphorus. Mean phosphorus level 5.1457±0.65 and 6.2±0.91 in 4-10 years age group and 11-14 years age group is respectively which shows significant (p value <0.001) high level in 11-14 years age group.

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