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Serum Ferritin Correlated With Deficiency of Serum Vitaminb12 and Folic Acid in Thalassemia

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Abstract
Objective: *To measure level of deficiency of serum vitaminB12 and folic acid its correlation with serum ferritin in Thalassemic patient.*
Material and Methods: *The study of investigations were done in the Pediatricdepartment of Rajendra Institute of Medical Science, Ranchi. Fifty children of Thalassemia included in study group while fifty normal children in control group. Estimation of levels of folic acid,vitaminB12 and serum ferritin.*
Result: *The analysis of Thalassemia group compare with healthy control group show significantly low (p<0.001)values. The statistical study of Thalassemia group with healthy control groups how significantly lowvaluesof(p<0.001) serumfolicacid,vitaminB12levelwhileraisedvaluesof serumferritin studygroups. Significantnegativelycorrelatedtoserumferritinwithvitamin B12&folicacidinThalassemiamajorgroup.Our studyfound significant correlation offer ritinandvitamin B12& folicaciddeficiencyin Thalassemia.*
Conclusion: *The study found a significantly lower values of folic acid,vitaminB12 and higher values of ferritin level of Thalassemia patient. Biochemical evaluation of these parameters is important in Thalassemia patients of paediatric group. In upcoming time, it was require to study the furthermore mechanismofrelationship between ferritin,vitaminB12,folicacidinthesepatients.*

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I. Introduction

Thalassemia is autosomal inherited recessive disorder cause by impaired synthesis of globin chain and impairment produce alter hemoglobin production (Hb)[1]

Thalassemia is the common genetical disorder in worldwide, affecting approximate 200 million people around the world. The yearly incidence evaluated of symptomatic individual is 1 in 100,000 in world and 1 in 10,000 in the European country. However, many populations are lacking, particularly in areas of the world known or expected to be heavily affected **2**.

Around5%populationofworldwith aglobinvariant,just1.7%have alpha ,beta Thalassemia trait. β – Thalassemia is most common genetically transmitted hematological disorder in Indian children**4**.

α-Thalassemia is results of deficient or absence synthesis of α globin chain, lead to excess β-chain. Synthesis of α globin is regulated by two gene on each chromosome16. Beta Thalassemia is results of deficient or absence synthesis of β globin chain, lead to excess α-chain. Synthesis of β globin isregulatedbyonegeneoneachchromosome11[5]**.**

Diagnosis of Thalassemia is based on severe anemia accompanied by the characteristic sign of massive ineffective erythropoiesis, profound microcytosis, hepatosplenomegaly, characteristic blood smear which is ring shaped in appearance & elevated level of HbF, HbA_2 or both. Patient required prolonged hyper transfusion therapy to maintain a packed cell volume at least 27–30 % so that erythropoiesis is suppressed. In severe cases splenectomy may be done for survival.

Ferritin is a protein with weight 450 kD which consists of 24 subunits present in all type of cell[6].Measurement of serum ferritin level in patients for study of iron for anemia. The measure serum ferritin level have straight correlation with total quantity of iron store in body including cases of anemia in chronic disease.[7]

In our study there is correlation between ferritin and level of vitaminB12,folicacid withβ-thalassemiapatient.

II. Materials And Methods

Fifty children of Thalassemia included in study group while fifty normal children in control group. Estimation of levels of folic acid,vitaminB12 and serum ferritin were made in autoanalyzer.
Inclusion criteria were include normal liver and kidney functions test.
Exclusion criteria include use of medication which induce iron chelation such as iron chelating agent therapy, phenytoin, carbamazepine, antifolates, theophylline and diabetes mellitus, carcinoma, anemia excluded from research.

III. Results

Our study show,Thalassemic patient has raise ferritin level in comparison with normal healthy control. Study group show deficient values of serum folic acid and vitamin B12 levels with mean value of 3.71±1.17 ng/mL and 163.6±31.31 pg/mL respectively is compare with control group were 11.02±3.84 ng/mL and 439.3±127.6 pg/mL (P<0.001) while concentration of ferritin is higher with mean value of 2144.7±330.799 ng/mL in study group is compare with control group was 198.9±66.95 and was statistically highly significant (p<0.001).

Table-1: Coefficient of correlation between serum ferritin and folic acid & between serum ferritin and vitaminB12 in β- thalassemia patients (Group A).

r value: Pearson's coefficient of correlation
*Negative r value means negative correlation between the concerned parameters.† p value < 0.001 means highly significant. Pearson's correlation coefficient was calculated between the concerned parameters.
There was strong negative correlation between serum ferritin and vitamin B12 levels in these study subjects (r= - 0.7277, p < 0.001).

Fig no. 1- Graph showing Pearson Coefficient correlation between serum ferritin and vitamin B12 levels in these study subjects

Biochemical parameters (n=30)	r*	p†
Ferritin and Folic acid	-0.198	< 0.001
Ferritin and Vitamin B12	-0.7277	< 0.001

There was a strong negative correlation was observed between serum ferritin and folic acid (r= - 0.198, p < 0.001), indicates high level of significance.

Hence with increasing level of serum ferritin, there was corresponding decrease in the levels of serum vitaminB12 and folic acid.
Scatter plots representing correlation between serum ferritin and vitamin B12, and between serum ferritin and folic acid in β- thalassemia patients have been shown in Figure 1 , 2 respectively.
Our studies showed that serum ferritin level of Thalassemia patient were much higher than normal healthy control. Highly significant decreased folic acid level was observe in the paediatric age group compare to control group.Our study indicate folic acid deficiency in Thalassemia subject. There was also deficiency of vitaminB12 seen in study group as compare with control group. Mean concentration of vitaminB12 decline and was highly significant in thalassemic group. Ourobservationsare supportedbypreviousstudies.

IV. Discussion

This was in accordance to study given by Amit Kumar Mishra et al (2013) indicating that age of patient at time of diagnosis in Thalassaemia ranges from 10 months to 2 1⁄2 years with a mean of 1 year and 4 months.[8]

According to a study by Crayn et al (2002), the most important PBF findings of vitaminB12 and folic acid deficiency are macrocytic RBCs and hypersegmented neutrophils[9] . This increase size of RBC may be masked by microcytosis of co-existing iron deficiency or Thalassemia. So normal MCV levels may be seen in up to one-thirds of the patient with vitaminB12 deficiency[10].

The negative relationship between serum ferritin and vitamin B12 may be due to increased synthesis of HbA2 in thalassemia patients[11].

A study by Tamagnini GP et al (1983) also illustrated vitamin B12 deficiency in patients of beta thalassemia[12].

A study by Silva A et al with similar findings support our results[13]. Another study demonstrated salutary effect of folate administration in beta thalassemic patients[14].

This was in accordance to study given by Bandhyopadhyay et al(2013) patients show the increased serum ferritin levels even in younger age group. They observe that in 1-5 years age group average serum ferritin was 1750 ng/ml, and this increased to 3650 ng/ml in 11-15 years older patients[15]

Cunningham et al (2004) reported that average serum ferritin level of beta thalassemic patient in North America is 1696 ng/ml[16]. However, Choudhary VP t al(2004) reported mean serum ferritin level in India to be 6723 ng/ml[17] even higher in our study.

V. Conclusion

The study found a significantly lower values of folic acid, vitaminB12
and higher values of ferritin level of Thalassemia patient. Biochemical evaluation of these parameters is important in Thalassemia patients of paediatric group. In upcoming time, it was require to study the further more mechanism for relationship between ferritin, vitaminB12, folic acid in these patient. However, therapy can be given to minimize further complication of vitaminB12 & folic acid deficiency. The trouble of poverty, low education and inadequate provision of health care are the main stumbling block in adequate treatment of Thalassemic patients of iron overload were the major complication by which the cause for morbidity and mortality in Thalassemia occurs.

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