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Research Article

Comparison between mean serum ferritin levels and mean serum TSH levels in patients of beta thalassemia major

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ABSTRACT

Objective: To compare mean serum ferritin levels with mean serum TSH levels in patients of beta thalassemia major.
Material and methods: This cross sectional study was conducted at Department of Pediatric Medicine, Govt. Kot Khawaja Saeed Hospital Lahore from January 2017 to June 2017. Total 66 patients with Patients with β thalassemia major were selected.
Results: Mean age of the patients was 8.73 ± 2.569 years and means duration of blood transfusion was 7.88 ± 2.622 years, mean serum TSH was 3.8085 ± 2.281 µIU/ml, mean serum ferritin was 3087.64 ± 1.625 ng/dl. Negative correlation between serum TSH and serum ferritin level was noted which was statistically insignificant (r = -0.014, P= 0.911).
Conclusion: Results of this study revealed that there is negative correlation between serum TSH and serum ferritin levels which was statistically insignificant. Results of this study also showed insignificant difference between mean serum TSH and mean serum ferritin levels of male and female patients was observed.

Key words: Iron overload, β thalassemia major, Serum ferritin level, Correlation, TSH

INTRODUCTION

The thalassaemias are a heterogeneous group of disorders with a genetically determined reduction in the rate of synthesis of one or more types of normal haemoglobin polypeptide chain. In β thalassaemia the inadequate production of b chain leads to a reduction in the amount of Hb-A in the red cells.[1,2]

Patients with talassemia Major require multiple blood transfusions. Frequent blood transfusion can lead to iron overload which may result endocrine dysfunction.[3-5] Iron can deposit in vital organs such as heart, thyroid, gonad, and pituitary. One of the endocrinopathy is hypothyroidism. Hypothyroidism classify to subclinical hypothyroidism that TSH level is only modestly elevated and free T4 level remains in normal range. Primary hypothyroidism is characterized by an elevated TSH level and decreased (low) T4. Secondary or central hypothyroidism characterized by decreased T4 and low TSH.[5,6]

Garadah TS et al.[7] in their study reported that higher serum TSH levels of the patients of β thalassemia major correlated positively with the levels of serum Ferritin (r=0.34, p=0.014) implying the link between the two. Some studies conducted in the south Asian region demonstrate that prevalence of hypothyroidism in β thalassemia major varies according to the region, quality of management and treatment protocols, thus questioning the link between hypothyroidism and iron overload.[8]

The purpose of this study is to find out the correlation between serum Ferritin levels and serum TSH levels. Results of this study may guide us for the early management of hypothyroidism in blood transfusion dependent Beta Thalassemia Major Patients.

OPERATIONAL DEFINITIONS

β thalassemia major:

Patient was labelled as patient of β thalassemia major when Hb<7gm/dl,microcytichyochromic anemia on peripheral blood picture and have >70% HbF on hemoglobin electorpholysis with hepatosplenomegaly(on clinical basis).

Mean serum ferritin level:

It was measured in ng/dl.

Mean TSH level:

It was measured in μIU/ml.

METHODS AND MATERIALS

This cross sectional study was conducted at Department of Pediatric Medicine, Govt. Kot Khawaja Saeed Hospital Lahore from January 2017 to June 2017. Total 66 patients with Patients with β thalassemia major were selected.

Inclusion Criteria

1. Patients with β thalassemia major as per operational definition.
2. Patients on blood transfusion from last 5 years.
3. Age between 6 to 15 years.
4. Both male and female.
5. Patients taking 1-3 transfusions/month.

Exclusion Criteria

1. Patients undergoing bone marrow transplant
2. Previous history of any chemotherapy or radiotherapy.
3. Any history of goiter.
4. Any history of thyroxine intake.
5. H/O drug or alcohol abuse.
6. Patients with severe hepatic, renal or CVS dysfunction.
7. Any history of malignancy.

Data Collection Procedure:

Blood samples were drawn from the patients before they undergo their current scheduled transfusion. Mean serum Ferritin and mean serum TSH levels were determined by chemiluminescence method on hormone analyzer Cobas e 411 by Roche in the laboratory. All patients were given same standard treatment. All the data was recorded on the specially designed Performa.

Data analysis

Data was analyzed using SPSS version 22. Quantitative data like age, duration of blood transfusion, TSH, Ferritin levels and qualitative data like gender was analyzed. Mean and standard deviation was calculated for quantitative data like age and duration of blood transfusion. Frequency and percentages were calculated for analysis of qualitative data like gender. Pearson correlation coefficient was calculated for mean serum TSH and mean serum Ferritin levels. Effect Modifiers like age, duration of blood transfusion and gender were controlled by Stratification. Post Stratification T test was applied. P value ≤ 0.05 was considered as significant.

RESULTS

Mean age of the patients was 8.73 ± 2.569 years and mean duration of blood transfusion was 2.91 ± 1.389 years, mean serum TSH was 3.8085 ± 2.281 μIU/ml, mean serum ferritin was 3087.64 ± 1.625 ng/dl.

Table 1 showing relation of serum TSH level with serum ferritin. The Pearson correlation test showed that the level of serum TSH decreased with increasing serum ferritin levels. This negative correlation was statistically insignificant (r = -0.014, P= 0.911).

Mean serum TSH in male and female patients was 3.820 ± 2.219 μIU/ml and 3.787 ± 2.442 μIU/ml respectively. Comparison of mean serum TSH between male and female patients was done and insignificant (P = 0.956) difference between mean TSH of male and female patients was noted. (Table 2)

Mean serum ferritin levelin male and female patients was 3296.44 ± 1752.368 ng/dl and 2697.26 ± 1301.453 ng/dl respectively. Comparison of mean serum ferritin levelbetween

male and female patients was done and insignificant (P = 0.155) difference between serum ferritin levelof male and female patients was noted.

Patients were divided into two age group, age group 6-10 years and age group 11-15 years. Mean serum TSH in age group 6-10 years was 3.688 ± 2.151 µIU/ml and in age group 11-15 years was 4.186 ± 2.690 µIU/ml. But the difference between mean TSH of both age groups was statistically insignificant with p value 0.451. (Table 3)

Patients were divided into two age group, age group 6-10 years and age group 11-15 years. Mean serum ferritin levelin age group 6-10 years was 3005.90 ± 1587.091 ng/dl and in age group 11-15 years was 3343.06 ± 1766.621 ng/dl. But the difference between serum ferritin levelof both age groups was statistically insignificant with p value 0.474.

Division of patients according to duration of blood transfusion was done and two groups were made 1-3 year group and 4-5 years group. Mean TSH in 1-3 year group was 3.676 ± 2.116 µIU/ml in 4-5 years group mean TSH was 4.350 ± 2.897 µIU/ml. insignificant (P = 0.343) difference between the mean TSH of both group was noted. (Table 4)

Division of patients according to duration of blood transfusion was done and two groups were made 1-3 year group and 4-5 years group. Mean serum ferritin level in 1-3 year group was 3089.09 ± 1587.259 ng/dl in 4-5 years group mean serum ferritin levelwas 3081.69 ± 1839.551 ng/dl. Insignificant (P = 0.988) difference between the mean serum ferritin level of both group was noted.

Table 1: Correlation of serum TSH with serum ferritin

	TSH (µIU/ml**)**	
	Pearson correlation (r)	P-value
serum ferritin (ng/dl)	-0.014	0.911

Table 2: Comparison of mean TSH and mean serum ferritin level between male and female patients

Gender	**n**	**Mean** (µIU/ml)	**Std. Deviation**	**P Value**
Mean TSH level				
Male	43	3.820	2.219	0.956
Female	23	3.787	2.442	
Mean serum ferritin level				
Male	43	3296.44	1752.368	0.155
Female	23	2697.26	1301.453	

Table 3: Comparison of mean TSH and serum ferritin level between different age groups

Age Group	**n**	**Mean** (µIU/ml)	**Std. Deviation**	**P Value**
mean TSH level				
6-10	50	3.688	2.151	0.451
11-15	16	4.186	2.690	
Mean ferritin level				
6-10	50	3005.90	1587.091	0.474
11-15	16	3343.06	1766.621	

Table 4: Comparison of mean TSH and serum ferritin level for duration of blood transfusion

Duration of blood transfusion	**n**	**Mean** (µIU/ml)	**Std. Deviation**	**P Value**
Mean TSH level				
1-3	53	3.676	2.116	0.343
4-5	13	4.350	2.897	
Mena ferritin level				
1-3	53	3089.09	1587.259	0.988
4-5	13	3081.69	1839.551	

DISCUSSION

Thyroid hormones are important for the proper development, differentiation and metabolism of cells. Thyroid dysfunction has been reported in a number of studies on thalassemia patients. A wide range of pathogenic mechanisms may be involved. Tissue chronic hypoxia and iron overload have a direct toxic effect on the thyroid gland[9]. High concentrations of labile plasma iron and labile cell iron may lead to the formation of free radicals and the production of reactive oxygen species resulting in cell and organ damage[10]. In severe iron overloaded thalassemic patients the anterior pituitary may also be damaged and regulatory hormonal secretion (LH, FSH, and TSH) may be disrupted[11]. Organ siderosis (liver, cardiac and skeletal muscle, kidney) may affect specific receptors, which regulate thyroid hormone action and convert T4 to the bioactive T3.

In present study mean age of thalassemic patients was 8.73 ± 2.569 years, mean serum TSH was 3.8085 ± 2.281 µIU/ml, mean serum ferritin was 3087.64 ± 1.625 ng/dl.

In one study Malik et al[12] mean age of thalassemic patients was 7.6 ± 2.5 years which is comparable with our study. Similar mean age (7.65 ± 3.61) of thalassemic patients was also reported by Karim et al[13] in their study.

In present study male patients were 65% and female patients were 35%. Similar results were reported by Karim et al[13] in their study.

Solanki et al[14] reported mean serum TSH and mean serum ferritin as 7.14±9.04 and 2927.40±783.39 which is comparable with the findings of my study.

In present study negative correlation was noted between serum TSH and serum ferritin which was statistically insignificant (r = -0.014, P= 0.911). Solanki et al[14] also reported that there was no correlation between serum TSH and serum ferritin level (P-value= 0.38).

Farooq MS et al[15] also reported negative correlation between serum ferritin and serum TSH which was statistically insignificant.

Garadah TS et al[16] in their study reported that higher serum TSH levels of the patients of β thalassemia major correlated positively with the levels of serum Ferritin (r=0.34, p=0.014) results of this sudy are not supporting my study. Eshragi et al[4] also reported a Correlation between TSH and serum ferritin level which was not significant (p=0.584)

In present study mean serum TSH in male and female patients was 3.820 ± 2.219 µIU/ml and 3.787 ± 2.442 µIU/ml respectively. Comparison of mean serum TSH between male and female patients was done and insignificant (P = 0.956) difference between mean TSH of male and female patients was noted.

Farooq MS et al[15] mean serum TSH in male and female patients as 3.67± 0.69 and 4.73± 1.20 and the different statistically insignificant p value 0.143. Findings of this study are comparable with our findings.

In present study mean serum ferritin levelin male and female patients was 3296.44 ± 1752.368 ng/dl and 2697.26 ± 1301.453 ng/dl respectively and insignificant (P = 0.155) difference between serum ferritin levelof male and female patients was noted. Irshaid et al[17] reported serum ferritin level in male and female patients as 2699 ± 858 and 2412 ± 750 which is comparable with my study.

CONCLUSION:

Results of this study revealed that there is negative correlation between serum TSH and serum ferritin levels which was statistically insignificant. Results of this study also showed insignificant difference between mean serum TSH and mean serum ferritin levels of male and female patients were observed.

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