

# Evaluation of Serum Ferritin Levels in Patients of Primary Hypothyroidism at RIMS, Ranchi Jharkhand

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**Abstract:** *Introduction:* ferritin is an iron storage protein found in almost all of the body tissue. Low serum ferritin is one of the most overlooked causes of low thyroid function. Serum ferritin levels also have been reported to be altered in patients with thyroid disease. *Objectives:* To evaluate serum ferritin levels in hypothyroid patients and compare it with control individuals. *Materials and Method:* 50 patients and 50 control samples were taken. Serum was separated and serum ferritin and serum TSH levels were estimated by chemiluminescent microparticle immunoassay method on ABOIT ARCHITCTi1000SR IMMUNOASSAY machine. *Results:* Serum ferritin levels were found to be significantly reduced in patients with hypothyroidism compared to normal subjects. *Conclusion:* Hypothyroidism is associated with low serum ferritin levels. The estimation of serum ferritin may help in understanding the diagnosis and monitoring of hypothyroid patients.

**Keywords:** Primary hypothyroidism, TSH, serum ferritin, thyroid

## 1. Introduction

Thyroid gland disorders are the second most abundant endocrinal disorders after diabetes. Several minerals and trace elements such as iron, iodine, zinc and selenium are essential for normal thyroid hormone metabolism. Selenium and zinc appear to be involved in thyroid conversion. Selenium is a component of the deiodinase enzyme. It also protect the thyroid gland from damage by excessive iodine exposure. Iron deficiency impairs thyroid hormone synthesis. Low serum ferritin is one of the most overlooked causes of low thyroid function ( 1 ). Thyroid peroxidase is a membrane bound glycosylated hemoprotein that play a key role in the biosynthesis of thyroid hormones. This enzyme is responsible for the oxidation of iodine and binding of iodine to tyrosyl residue of thyroglobulin ( organification ). Iron deficiency has been reported to impair the body's ability to make its own thyroid hormone, which could increase need for thyroid medication. Several groups have documented an association between T<sub>3</sub> levels and ferritin expression. Although the cause of the T<sub>3</sub> induced increase in the serum ferritin levels in humans is unknown. These links between T<sub>3</sub> and the regulation of ferritin expression suggest that a positive correlation exist between the levels of T<sub>4</sub>/T<sub>3</sub> and ferritin in the serum. In our country, the prevalence of both iron deficiency anemia and hypothyroidism are higher than other developed country.

Iron deficient person were diagnosed by serum ferritin level. Thus it has been suggested that serum ferritin measurement could be useful for the evaluation of thyroid hormone action on peripheral tissue ( 2 ).

## 2. Material and Method

This study was carried out in the department of biochemistry, Rajendra institute of medical science, ranchi, Jharkhand from period of august 2016 to july 2017. 50 patients and 50 control sample were taken.

The study subjects comprised of two group, which include: Cases group comprising of 50 newly diagnosed patients of primary hypothyroidism. The diagnosis was based on decreased serum T<sub>3</sub>, T<sub>4</sub> and increased serum TSH levels. Patients was diagnosed and confirmed by the clinicians based on free T<sub>3</sub> ( normal value: 2.4- 4.2 pg/ml ), free T<sub>4</sub> ( normal value: 0.7- 1.44 ) and TSH ( normal value: 0.34- 4.25  $\mu$ IU/ml ) levels of the patients ( 3 ).

Control group comprising of 50 healthy individuals in similar age and sex matched as cases having normal thyroid profile.

Pregnancy, paediatric age group < 18 years, renal disorders, hepatic disorder, secondary causes of hypothyroidism, patients on drugs for treatment of hypothyroidism and PCOS patients were excluded from the study.

## 2.3 Thyroid and ferritin assay

Thyroid and ferritin assay was done by chemiluminescent microparticle immunoassay method on ABOIT ARCHITCT I 1000SR IMMUNOASSAY machine.

## 3. Results

Among the 50 subjects, 30 were females and 20 were males. Mean +/- SD of ages of cases and controls were 43.70 +/- 9.20 and 42.40 +/- 12.47 respectively.

### 3.1 Statistical analysis

**Table 1:** Age distribution in cases and controls:

	Control	Cases
No of subject	50	50
Age ( years ) Mean +/- SD	42.40 +/- 12.47	43.70 +/- 9.20

**Table 2:** comparison of levels of TSH and Ferritin between cases and controls:

	Cases ( N= 50 )		Control (No=50)	
	Mean	SD	Mean	SD
TSH ( $\mu$ IU ml )	11.14	4.24	2.59	1.21
Ferritin ( ng/ml )	12.30	4.94	48.10	15.60

**Table 3:** Results of ferritin between cases and controls:

Group	Mean	SD	P value
Cases	12.30	4.94	< 0.001
Controls	48.10	15.60	

Table 3 depicting the mean serum ferritin levels were significantly decreased in case as compared to controls. This difference is statistically significant.

**Table 4:** Pearsons Correlations

Parameters	Cases	
	R value	P value
FERITIN vs TSH	0.597	0.069

Table 4 depicting the pearsonscorrelations between serum ferritin and serum TSH. The difference between two variable is statistically insignificant.

#### 4. Discussion

The present study shows that there is a state of low ferritin levels in patients with hypothyroidism. Some studies carried out in animals and human have indicated that iron deficiency is related to impaired thyroid functions. Some studies have suggested that  $T_3$  levels to normal limit after iron treatment but recovery of iron deficiency anemia by blood transfusion did not change  $T_3$  and  $T_4$  levels ( 4,5,6 ). It is observed that TSH levels was elevated in cases as compared to controls, suggesting that depletion of iron stores may decrease serum  $FT_4$  and  $FT_3$  levels. TPO is a glycosylated hemoprotein that has a key role in the biosynthesis of thyroid hormones. This enzyme is responsible for the oxidation of iodide and binding of iodine to tyrosyl residue of thyroglobulin. Same TPO catalyzes coupling as well as organification. This hypothesis is supported by observation that the same drug that inhibit iodide oxidation also inhibits coupling ( 7 ). Thyroid has a definit role in development and maintenance of body homeostasis. It has been suggested that thyroid hormone regulate ferritin expression. In the absence of iron , the IRP binds to IRE in the 5' untranslated region of TfR mRNA stabilizes the mRNA and prevent its degradation. In iron replete states, the reverse holds.

#### 5. Conclusion

Our studies shows there was decreased levels of serum ferritin in hypothyroid patients compared to normal individuals. The presents study indicates the profound influence of serum ferritin/ body iron on thyroid hormone synthesis and vice versa.

#### References

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