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RESEARCH ARTICLE
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ASSESSMENT OF SERUM FERRITIN LEVEL IN THYROID PATIENTS

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ABSTRACT

Background:
The thyroid gland is an important hormone gland that regulates metabolism, growth, and development in humans. The thyroid gland is a bilobed endocrine gland that secretes two vital hormones: thyroxine (T4) and triiodothyronine (T3). The production and release of these hormones are regulated by the thyroid-stimulating hormone (TSH) from the pituitary gland. Iron is an essential element for the normal functioning of the thyroid gland. In the body, iron is stored in the form of ferritin. Thyroid hormone release is regulated by the amount of iodine in the body.

Objective:
1. To find the correlation of serum ferritin with TSH and FT4 levels in thyroid patients.

MATERIAL And METHODS: This study was performed in 100 Thyroid Patients attending Endocrine OPD in Government Mohan kumaramangalam medical college and hospital and 5ml of venous blood sample will be collected and analysed TSH, FT4, and ferritin in fully automated hormone analyser (Eclia). The statistical analysis was performed using SPSS version 16.

Results: On analyzing the thyroid status and ferritin levels 66% of hypothyroid patient had low ferritin levels which is highly significant (p-value ≤ 0.001). A significant negative correlation was found between TSH and serum ferritin in hypothyroid patients.

Conclusion: This suggests that hypothyroid patients had higher levels of TSH and lower levels of serum ferritin and that there is a negative correlation between TSH and serum ferritin in hypothyroid patients. Hence, the estimation of serum ferritin concentration among hypothyroid patients could be useful in the evaluation of thyroid hormone status.

Keywords: Hypothyroid; hyperthyroid: serum ferritin; thyroid stimulating hormone (TSH); free thyroxine.

Introduction

Thyroid diseases are highly prevalent worldwide, and considered the second most common endocrinal disorders after diabetes[1]. Thyroid hormones produced by thyroid glands regulate many

important metabolic pathways in the body.[2] Thyroid hormones are very important for cell growth, differentiation, metabolism and maintaining the body homeostasis.[3] Thyroxine is synthesized through the oxidative condensation of two diiodotyrosine (DIT) molecules, while triiodothyronine is formed by coupling mono-iodotyrosine and DIT.

Ferritin is an iron storing protein that can be found in body tissues. As a result, changes in ferritin concentrations in the blood reflect thyroid function. Ferritin is the most common type of iron stored in the body. Small amounts of ferritin are secreted into the plasma of the body. In the absence of inflammation, the concentration of this plasma (or serum) ferritin is positively associated with the size of total body iron reserves. A low serum ferritin level indicates that iron stores have been depleted, but not necessarily the severity of the loss as time goes on. Ferritin concentrations fluctuate depending on age and gender. At birth, concentrations are high, then climb for the first two months of life, then diminish throughout childhood.

MATERIAL AND METHODS

This study was performed in 100 Thyroid Patients attending Endocrine OPD in Government Mohan kumaramangalam medical college and hospital and 5ml of venous blood sample will be collected and analysed TSH, FT4, and ferritin in fully automated hormone analyser (Eclia). The statistical analysis was performed using SPSS version 16.Inclusion criteria: patient with hypothyroid, hyperthyroid, EuthyroidExclusion criteria: pregnancy, iron deficiency Anemia,

RESULTS

Figure 1: Proportion of ferritin levels among study participants

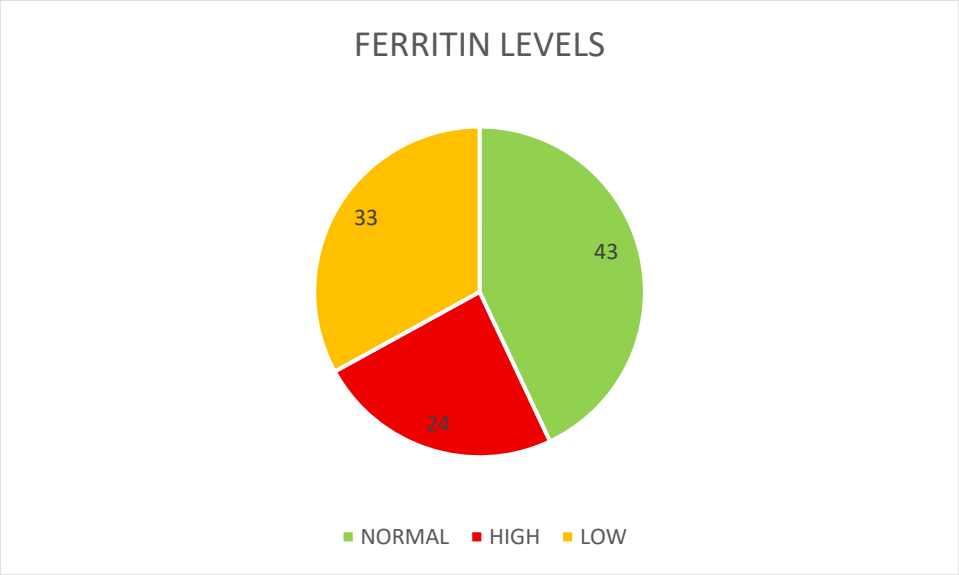


Table 1: Comparison of Thyroid status with Ferritin levels

Status		Ferritin			P value
		High	Low	Normal	
	Hyperthyroid	22 44.0%	0 0.0%	28 56.0%	0.0001
	Hypothyroid	2 4.0%	33 66.0%	15 30.0%	
Total		24 24.0%	33 33.0%	43 43.0%	

On analysing the thyroid status and ferrtin levels 66% of hypothyroid patient had low ferritin levels which is highly significant with a p value of 0.0001

Table 2 : Correlation Ferritin And FT4

		FT4ngdl	Ferritin ngml
FT4ngdl	Pearson Correlation	1	0.286**
	Sig. (2-tailed)		.000
	N	100	100
Ferritin ngml	Pearson Correlation	0.286**	1
	Sig. (2-tailed)	.000	
	N	100	100

There is a weaker correlation between FT4 and Ferritin with r value of 0.286 with a significant p value of 0.001.

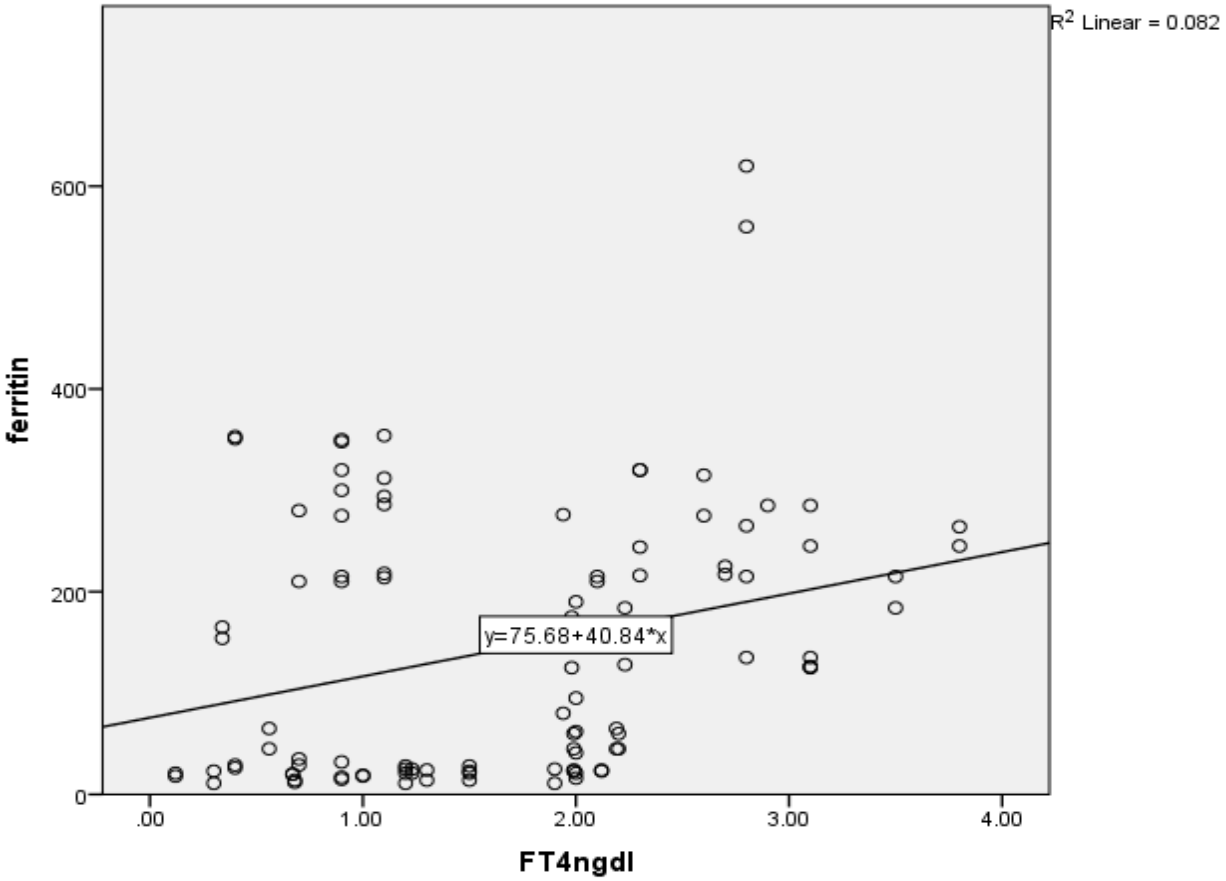
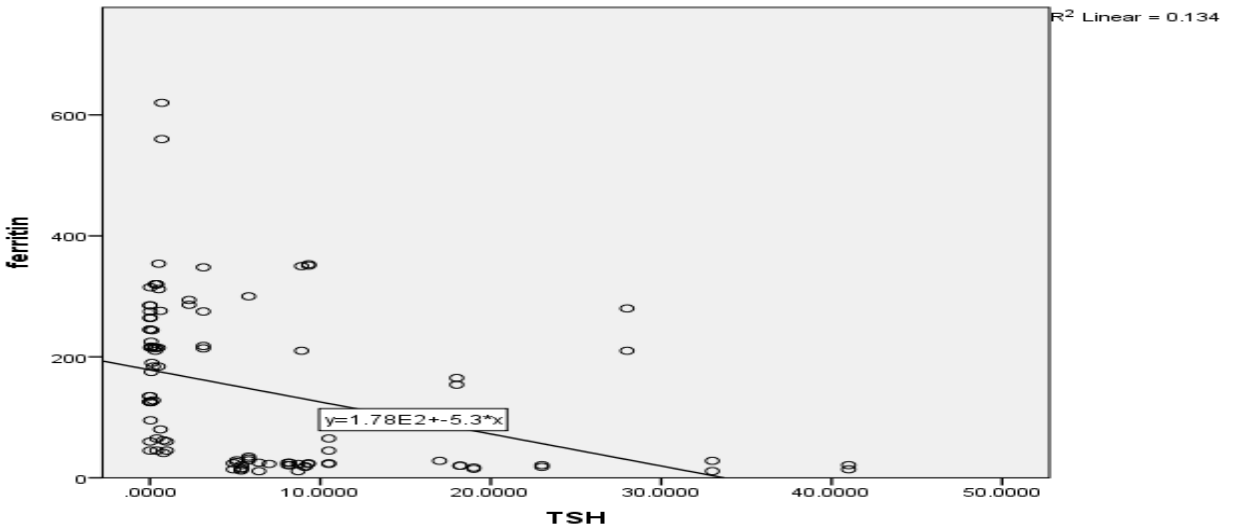


Table :3 Correlation Ferritin and TSH

		ferritinngml	TSH
Ferritinngml	Pearson Correlation	1	-0.367**
	Sig. (2-tailed)		.000
	N	100	100
TSH	Pearson Correlation	-0.367**	1
	Sig. (2-tailed)	.000	
	N	100	100

There is a moderate negative correlation between TSH and Ferritin with r value of -0.455 with a significant p value of 0.001.
As TSH levels increases, ferritin levels tend to decrease significantly.



DISCUSSION

Increased ferritin levels are commonly due to multiple causes such as acute or chronic inflammation, alcohol consumption, liver disease, renal disease, malignancy and thyroid dysfunction while ferritin levels are decreased in iron deficiency, excess menstruation, conditions that affect intestinal absorption of iron and any internal bleeding[4.] Iron deficiency can lead to decreased production of thyroid hormones as iron is an important constituent of TPO enzyme which involved in the iodization of tyrosine residues and formation of T3 and T4. This can result in an enlargement of thyroid gland[5].

Thyroid hormone synthesis is effected by low ferritin levels (an indicator of body's iron stores). Decreased ferritin levels impact the production of thyroid hormones and also the process by which the dormant thyroid hormone T4 is transformed into the active thyroid hormone T3. The liver is the primary organ involved in this conversion, which needs enough iron to occur[6].

In this study, subjects were divided into three groups based on their thyroid hormone values - hypothyroid, hyperthyroid, euthyroid. The hypothyroid group had significantly higher levels of TSH compared to the euthyroid group, High TSH levels were found to contribute to increased inflammation and decreased antioxidant potential of ferritin which is associated with iron in hypothyroid patients [7].

Our study found that both male and female subjects with hypothyroidism had significantly lower levels of fT4, which is consistent with previous studies conducted by Sahana and Kruthi [8], and Sachdeva et al.

Similar observations were recorded by various researchers[9, 10]. The presence of hypothyroidism causes decrease gut absorption of iron, leading to its decreased levels, as a consequence of reduced levels of digestive acids/ enzymes or due to associated autoimmune conditions like celiac disease[11].

On analyzing the thyroid status and ferrtin levels 66% of hypothyroid patient had low ferritin levels which is highly significant with a p value of 0.0001. There is a weaker correlation between FT4 and Ferritin with r value of 0.286 with a significant p value of 0.001. There is a moderate negative correlation between TSH and Ferritin with r value of -0.455 with a significant p value of 0.001. As TSH levels increases, ferritin levels tend to decrease significantly.

Conclusion

In this study the hypothyroid patients had higher levels of TSH and lower levels of serum ferritin and that there is a negative correlation between TSH and serum ferritin in hypothyroid patients. Hence, the estimation of serum ferritin concentration among hypothyroid patients could be useful in the assessment of thyroid hormone status. Further studies should be done to analyze serum ferritin levels before and after thyroid hormone therapy,

References

1. Sachdeva A, Singh V, and Malik I, et al. Association between serum ferritin and thyroid hormone profile in hypothyroidism. Int J Med Sci Public Health 2015 ;(4):863–865. DOI: 10.5455/ijmsph.2015.24012015174.
2. Takamatsu J, Majima M, Miki K, et al. Serum ferritin as a marker of thyroid hormone action on peripheral tissues. J Clin Endocrinol Metabol 1985;61(4):672–676. DOI: 10.1210/jcem-61-4-672.
3. Unni Krishan AG, Menon UV. Thyroid disorders in India. An epidemiological perspective. Indian J Endocrinol Metab 2011;15(Suppl 2):78–81. DOI: 10.4103/2230-8210.83329.
4. John W Adamson. 19th edition Harrison's principles of Internal Medicine "iron deficiency anaemia and other hypoproliferative anaemia" chapter 126 page 625-30
5. Carvalho DP, Dupuy C. Thyroid hormone biosynthesis and release. Mol cell Endocrinol 2017;(458):6–15. DOI: 10.1016/j.mce.2017.01. 038.
6. Krishnamurthy HK, Reddy, S, Jayaraman V, et al. Preliminary. Association of serum ferritin levels and thyroid hormones.2023;13(3):68–79. DOI: 10.4236/ojcd.2023.133007.
7. Prabhu PS, Cheriyan S, Sulaiman L. A comparative study of serum ferritin and thyroid stimulating hormone (TSH) levels in hypothyroid and Euthyroid subjects. Int J Clin Biochem Res 2022;9(3):250-3.
8. Zhou Q, Xue S, Zhang L, Chen G. Trace elements and the thyroid. Front Endocrinol (Lausanne) 2022; 13:904889. https://doi.org/10.3389/fendo.2022.904889
9. Dahiya K, Verma M, Dhankhar R, Ghalaut VS, Ghalaut PS, Sachdeva A. Thyroid profile and iron metabolism: mutual relationship in hypothyroidism. Biomed Res.2016; 27 (4): 1212-15.
10. Nageshwari A, G.Kavitha. To evaluate the influence of ferritin on thyroid hormones in second trimester antenatal cases in Perambalur district.2019; 6(1):30-34.
11. Jason WH, Stephen FH, Rajasehkar R, Govind B, Peter HRG.Anemia in celiac disease is multifactorial in etiology. Am J Hematol. 2007; 82: 996 -1000