Journal for Research in Applied Sciences and Biotechnology

www.jrasb.com

ISSN: 2583-4053

Volume-1 Issue-4 || October 2022 || PP. 90-94

https://doi.org/10.55544/jrasb.1.4.11

Estimation of LH, FSH, Prolactin, Ferritin and Vitamin B12 of Hypothyroid Women in Kirkuk City/Iraq

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www.jrasb.com || Vol. 1 No. 4 (2022): October Issue

Received: 05-09-2022	**Revised:** 26-09-2022	**Accepted:** 06-10-2022

ABSTRACT

Thyroid diseases are among the commonest endocrine disorders. It effects growth, embryonic development, reproduction, tissue differentiation, maturation and metabolism, this research aimed to study gonadal dysfunction in hypothyroid womens, included serum levels of FSH, LH, prolactin, Ferritin and Vitamin B12 with thyroid hormones, blood sample was collected from women age ranged between (15-49) years 65 of them had hypothyroidisim and they were under hormonal treatment, while 10 of the samples were healthy control, The results Showed a significant difference in Serum levels of T3, T4, TSH, LH, FSH and Prolactin, while there was a significant decrease in Vitamin B12 Levels ($P \leq 0.027$) in hypothyroid patients under hormonal treatment compared to control group, we concluded that circulation thyroid hormone showed a significant effect of serum levels of LH, FSH, Prolactin and Vitamin B12,While no effects shows on serum ferritin.

Keywords- LH, FSH, Prolactin, Ferritin, Vitamin B12, Hypothyroid Women.

I. INTRODUCTION

The thyroid gland is a vital butterfly shaped endocrine gland its one of the largest of the endocrine glands, located immediately below the larynx on each side of and anterior to the trachea, normally weighing15 to 20 grams in adults. The thyroid secretes two major metabolic hormones, thyroxine and triiodothyronine commonly called T4 and T3, respectively. Both of these hormones profoundly increase the metabolic rate of the body[1,2].

Hypothyroidism is a common endocrine disorder with reduced production of thyroid hormones. It is a common disease with different frequency in different countries. It is characterized biochemically by a reduction in serum T3 and T4 levels that result in an increase in serum thyroid stimulating hormone (TSH) concentration[3,4]. Women are affected more than men[5]. Hashimoto thyroiditis is an autoimmune disease that destroys thyroid cells by cell and antibody-mediated immune processes. It is the most common cause of hypothyroidism in developed countries [6,7]. The effects of thyroid hormones on the impaired function of reproductive and to great extent is thought to be due to changes in TSH level, whose secretion overlaps with FSH, LH and prolactin and thus it may have overlapping function [8].

LH works along with FSH and they are both stored in the anterior segment of the pituitary gland – pea-sized endocrine gland sitting at the base of the brain. Their secretion is stimulated by gonadotropin-releasing hormone (GnRH) secreted by the hypothalamus into the pituitary via the hypophyseal portal system, FSH stimulate the growth of ovarian follicles , LH works to assist FSH in follicle stimulation and it also the imperative role of stimulating ovulation and release of the ovum this proceses result in formation of corpus luteum which is a small yellowish has hormone secreting structure that is formed from the remainder of the sac/follicle that once held the developing ovum. It functions in releasing large amounts of progesterone and small amounts of estrogen, which are critical to implantation and preparation for pregnancy [9,10].

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Prolactin (PRL) is a polypeptide hormone secreted mainly from the anterior pituitary gland, but it is also produced in the mammary epithelium, endothelium, neurons, decidua and immune system cells, Hyperprolactinaemia has been associated with various autoimmune diseases, particularly systemic lupus erythematosus (SLE), rheumatoid arthritis (RA), Sjogr en's syndrome, systemic sclerosis, type 1 diabetes mellitus (DM), Addison's diseases, Hashimoto's thyroiditis and Graves' disease[11] The most common organ affected by autoimmunity is the thyroid gland[12].

Vitamin B12 (Copalamin) is a water soluble vitamin as part of the B-complex group of B vitamins obtained from animal sources such as liver, meat, eggs, milk and its derivatives [13]. Mammals, humans included, are not able to synthesize Vitamin B12 but a highly modulated absorption ability and transport through body fluids prevents any possible shortage even after many years of no intake [14

Vitamin B12 (vit-B12) deficiency has been reported frequently in autoimmune thyroid patients [15]. This association is probably due to impaired absorption of vit-B12 by atrophic gastritis and/or pernicious anemia associated with autoimmune thyroid disease [16] Atrophic gastritis is seen in 35–40% of autoimmune thyroid diseases [17

Ferritin is an ubiquitous protein [18,19] involved in the storage and management of iron - an essential micro-nutrient for almost all living systems. The protein occurs in abundance in the cytosol and mitochondria, where it helps maintaining the performance of critical biochemical reactions [20,21] and balance oxidative stress processes, ferritin is therefore mainly internal in most systems, but can sometimes be a secreted enzyme[22] and can thus be used to manage balance of iron both intra- and extracellularly, which can protect from deleterious excess of iron uptake, but also from viral and bacterial infections[23]. Beard and his assistant showed that ferritin effects the metabolism and activity of thyroid hormone[24]

II. MATERIALS AND METHODS

The present study was conducted on 75 women age ranged (15-49) years 65 of them were had hypothyroidisim, while 10 as control group, the samples were collected from private laboratories in Kirkuk city in the period between September 2021 until February 2022.

The Patients were diagnosed by senior physician through the symptoms and according to the T3 and T4 and TSH values in the serum. We excluded the patients under treatment, patients had Thyroid cancer, kidney or liver disease.

The blood was drown and the serum was separated and stored in the Refrigerator at 8-2 C° until completing the collection of the samples.

We used a full auto analyzer called Beakman coulter access 2 to determine the parameter included in this study, this device works on the principle of Immunefluorescence assay system to evaluate the levels of T3, T4, TSH, LH, FSH, Prolactin, Ferritin and Vitamin B12.

Statical Analysis

Data were analyzed using spp statistics 21.0 (Chicago, Inc., USA). The results are given as mean ± standard deviation, T test was used to compare two group between cases and controls. The Pearson correlation coefficient was used to calculate among the study parameters. A p value less than 0.05 was considered significant.

III. RESULTS AND DISCUSSION

The results showed a significant increase in serum TSH levels (P<0.001) and a significant decrease in serum levels T4 (P ≤ 0.001) and T3 (P≤0.011) in hypothyroid patients compared to control group as shown in Table 1

Table 1: Serum Levels of T3, T4, TSH in Hypothyroid patient in comparison to Controls.

Prameters	Control	Hypothyroid	P-Value
	Mean ± SD		
TSH(µIU/MI)	1.82±0.09	17.11±2.07	<0.001
T4(nmol/L)	118.61±2.33	91.00±3.43	0.001
T3(nmol/L)	1.67±0.02	1.45±0.03	0.011

These findings agreed with [25] and [26] and also with [27] Chin and his assistants estimated that the raising of TSH levels in hypothyroid patients would be a compensative response to counteract the decrease levels of THs trying of hypothalamus to acquire into a homeostasis [28].

The Anterior pituitary gland produces TSH after it is induced by TRH from the hypothalamus. This production depends on Thyroid hormone levels in circulation. Because of the inverse correlation between TSH and THs levels or the negative regulatory relationship between Thyroid Hormones and the pituitary gland, this hormone is considered a sensitive indicator for Thyroid function in clinical diagnosis because it influence by small alteration in T4 concentration. [29]

The results showed a significant increase in serum levels of LH (P ≤ 0.01), FSH (P ≤ 0.003) and Prolactin (P ≤ 0.027) in hypothyroid in patient in compared with control group as shown in Table 2

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Table 2: Serum Levels of LH, FSH, Prolactin in Hypothyroid patient in comparison to Controls.

Parameter	Control	Hypothyroid	P-value
	Mean ± SD		
LH (IU/**L**)	7.25±0.44	13.44±2.12	0.01
FSH (IU/L)	4.54±0.19	10.24±1.79	0.003
Prolactin (IU/L)	20.46±0.69	29.06±3.99	0.027

The results of LH is agreed with previous studies [25], [30] [31] While it does not agree with AL-jaff results who is recorded a decrease in the LH hormone levels in hypothyroid patients compared to the control group[32].

The reason of this increase is due to the increase of serum levels of TRH in hypothyroid patients that's lead to an increase in the LH Releasing Hormone which leads to increasement in LH levels [33].

The results of FSH in present study agreed with [25][31][34], While it does not agreed with Al-Jaff results who is recorded a decrease in the FSH hormone levels in hypothyroid patients compared to the control[32].

This increase in serum levels of FSH hormone is due to a decrease in levels of inhibin B hormone that regulates the levels of FSH in the blood and prevent it from an increasement [35].

The results as shown in Table 2 agreed with [31] and [36] whom recorded an increasment in prolactin levels in hypothyroid patient compared to control group, this increasment is due to high levels of TRH in hypothyroid stimulates the lactotrophs in pituaitry gland which leads to rise its level in the blood [37

Whin we studied the level of vitamin B12 the results shows a significant decrease in Vitamin B12 level ($P \leq 0.027$) in hypothyroid patients compared to control group as shown in Table 3.

Table 3: Serum Levels of Vitamin B12 in Hypothyroid patient in comparison to Controls.

Parameter	Control	Hypothyroid	P-value
	Mean ± SD		
Vitamin B12 (pg/ml)	427.5±12.59	344.7±19.98	0.027
Ferritin (ng/mL)	22.03±2.22	20.02±1.95	0.37

This findings agreed with [38] and [39] whom recorded a decreasement in Vitamin B12 levels in hypothyroid patients compared to control group and there is no results disagreed with this findings, the cause of Vitamin B12 deficiency in hypothyroidisim is due to the malabsorption of Vitamin B12 in hypothyroid patient [40], Jaya and his assistant found that 1/3 of hypothyroid patient had antibody against parietal cell that secreted intrinsic factor which help to well absorb the Vitamin B12[41].

Our findings did not record a significant difference in the serum ferritin levels in hypothyroid patients (P=0.37) compared to control group as shown in the Table 4.

The results of ferritin results agreed with [42],[43], the cause of ferritin decrease in hypothyroid patients is due to decreased gene expression of ferritin [44,45].

The Table 4 showed that there is a positive strong significant correlation between T3 hormone and T4 hormone and a strong negative significant between T3 hormone and TSH hormone, The T4 correlated positively strong significant with T3 hormone, TSH had a negative strong significant correlation with T3 hormone, and FSH levels correlated positively strong significant with LH hormone.

Table 4: Correlation between the study parameters

Parameters		T3	T4	LH	TSH	FSH	Prolactin	B12	Ferritin
T3	Pearson Correlation		.535**	.073	-.343-**	.164	-.067-	.044	.035
	Sig. (2-tailed)		.000	.565	.006	.194	.601	.729	.786
	N		64	64	64	64	64	64	64
T4	Pearson Correlation	.535**		-.029-	-.085-	.077	-.114-	.167	.127
	Sig. (2-tailed)	.000		.822	.505	.546	.369	.187	.316
	N	64		64	64	64	64	64	64
LH	Pearson Correlation	.073	-.029-		-.002-	.780**	-.159-	.060	.062

ISSN: 2583-4053
Volume-1 Issue-4 || October 2022 || PP. 90-94
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	Sig. (2-tailed)	.565	.822		.988	.000	.209	.636	.629
	N	64	64		64	64	64	64	64
TSH	Pearson Correlation	-.343-**	-.085-	-.002-		.019	.040	-.216-	-.068-
	Sig. (2-tailed)	.006	.505	.988		.882	.753	.087	.594
	N	64	64	64		64	64	64	64
FSH	Pearson Correlation	.164	.077	.780**	.019		-.162-	.005	.157
	Sig. (2-tailed)	.194	.546	.000	.882		.202	.969	.215
	N	64	64	64	64		64	64	64
PRO	Pearson Correlation	-.067-	-.114-	-.159-	.040	-.162-		.021	.087
	Sig. (2-tailed)	.601	.369	.209	.753	.202		.872	.496
	N	64	64	64	64	64		64	64
B12	Pearson Correlation	.044	.167	.060	-.216-	.005	.021		.236
	Sig. (2-tailed)	.729	.187	.636	.087	.969	.872		.060
	N	64	64	64	64	64	64		64
FERR	Pearson Correlation	.035	.127	.062	-.068-	.157	.087	.236	
	Sig. (2-tailed)	.786	.316	.629	.594	.215	.496	.060	
	N	64	64	64	64	64	64	64	

***. Correlation is significant at the 0.01 level (2-tailed).*

IV. CONCLUSION

Circulating thyroid hormone showed a significant effect (Increase) on the serum levels of LH, FSH, Prolactin, and it showed a significant effect (Decrease) on Vitamin B12 levels, while it does not appear any significant effect on serum levels of Ferritin.

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