

# STUDY OF SOME BIOCHEMICAL PARAMETERS, HORMONES AND CLINICAL MARKERS FOR THYROID PATIENTS IN ALNAJAF ALASHRAF GOVERNORATE

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## Abstract:

The preceding work has been centered on the investigation of thyroid hormone within the serum of 109 patients with thyroid diseases between the ages of 12 and 50 years old, as well as 114 healthy persons of the same age and gender who served as the control group for the entirety of this clinical investigation. Included in this work are the measurement the levels of thyroid hormones TSH, T3, T4 in the serum of patients and the control group by employing the enzyme-linked fluorescence assay (ELFA) technique on the Minividas equipment. It was determined by the findings that there were thyroid disorders, which were divided into two distinct categories.

- 1- When comparing patients with hypothyroidism to patients with hyperthyroidism, it was observed that patients with hypothyroidism exhibited a substantial increase ( $p < 0.01$ ) in their serum TSH levels, while patients with hyperthyroidism exhibited a significant decrease ( $p < 0.01$ ) in their TSH levels and a significant increase ( $p < 0.01$ ) in their T3 and T4 levels.
- 2- When the body mass index was evaluated for both the patients and the control group, it was found that four-fourths of the patients with hypothyroidism were overweight, whereas Patients with hyperthyroidism were underweight in 60% of cases.

**Key word:** Thyroid hormones, Obesity, Body Mass Index.

## 1.Introduction:

Thyroid gland is a part of body's endocrine system .It is the largest organ specialized for endocrine function in human body . It is a butterfly – shaped gland.<sup>(1, 2)</sup> The inside side of the neck is where the organ is situated attached to the larynx and the trachea by laying against and around them.<sup>(3,4)</sup> The lateral lobes extended along the sides of the larynx, reaching the level of the middle of the thyroid cartilage. Each lobe resides in a bed between the trachea and larynx.<sup>(5)</sup> It produces a hormone ( thyroid hormone ) which is involved in growth and metabolism. <sup>(6)</sup> The thyroid gland has a substantial blood supply, with a blood flow of approximately 5 millilitres per gramme.<sup>(7)</sup>

On microscopically examination , the thyroid gland is found to consist of series of follicles, the secretory units of the gland which contain an amorphous material called colloid which is mainly composed of thyroglobulin ( Tg ) [ an iodinated glycoprotein consists of two identical peptide chains ( M. wt 330.000 Daltons ) ] .<sup>(8)</sup> It is hydrolyzed in the cell to release thyroid hormone .<sup>(9)</sup>

## 2.Materials and Methods:

### Patients and control groups:

#### Sampling and Subject Collections:

Five (ml) venous blood samples were collected from each subject by venpuncture , placed in plane tube (no anti coagulant ) left for (15 min ) at room temperature , then centrifuged at ( 3000 r.p.m ) for (10 min ) to get the serum , which is stored at (-20°C) . The present study was conducted in the Diabetes Mellitus and Endocrinology Centre located in Alsader Medical City, which is located in Najaf. The serum of ( 109 ) subjects their age range ( 12–50 ) years , ( males , females ) were collected and enrolled in this study. They have been classified into three groups as summarized in table (1). All patients with thalassemia, diabetic were excluded and excluding the test during the days (12–16) from cycle period to avoid the mid cycle maximum and to standardize the result. The host information of all patients were summarized in table (1).

**Table (1) groups of thyroid diseases patients**

Groups	Group name	No. of Male	Age (years)	No. of Female	Age (years)	Total
1.	Hypothyroidism patients	25	12-45	49	14-50	74
2.	Hyperthyroidism patients	15	15-48	20	27-46	35
3.	Control group	37	13-48	77	15-50	114

### Biochemical tests:

#### 1. Method for determining the body mass index:

In order to determine the values of the body mass index, the following equation was utilised:

$$\text{Body Mass Index} = \text{Weight (kg)}/\text{Height (m}^2\text{)}$$

#### 2. Determination of total protein in the serum of Hypothyroidism, Hyperthyroidism and Control samples (by Lowry method).

#### 3. The determination of the levels of TSH, T3, and T4 in the Serum of Patients & Controls by using ELFA technique on the Minividas Instrument.

### Statistical analysis

In the home computer, minitab, megastatistical, and SPSS for excel were utilised in order to carry out the analysis of the data. The findings were presented in the form of the mean plus the standard deviation. A p-value of less than 0.05 was employed as the threshold for statistical significance.

### 3. Results and Discussion:

#### 3.1 The age range of patients and control group:

Patients and control group are classified according to their age range as shown in table (3–1).

*Table (3–1) A breakdown of the patients and the control group according to their specific age range.*

range of ages (Year)	Individual Patients No.	Patients %	Control group No.	Control group %
10-19	10	9.18	13	11.4
20-29	11	10.09	21	18.4
30-39	34	31.19	22	19.3
40-50	54	49.54	58	50.9
Total	109	100	114	100

Table (3–1) revealed that the majority of patients were between the ages of forty and fifty years old and then in the age range between (30–39) years , it was clear that the patients in the age range between ( 10–19 ) and (20–29) were the least.

These results agree with Ludgate M. et al. they showed in study revealed that: Thyroid disorders are more common in older adults in the age > 40 years compared with younger age groups. (10,11)

### 3.2. Thyroxin T4, Triiodothyronine T3 & Thyroid stimulating Hormone TSH Level in Patients & Control Group.

Table (3–2) showed the hormonal levels with minimum and maximum value to each hormonal level.

**Table (3–2) TSH, T3, and T4 levels in the serum of patients; these levels with thyroid disorders.**

Groups	No.	TSH (μIU/ml) Mean±Sd.	Std. Error	T3 ( nmol / ml ) Mean±Sd.	Std . Error	T4(nmol / ml) Mean ± Sd.	Sd. Error	P. Value
Control	114	1. 8517±1.0097	0.094	1. 988 ±0.96	0.09	87. 58 ±18.33	1.71	
Hyper Thyroidism	35	0.062±0.0422	0.007	8.727 ±16.61	2.8	105. 5 ± 36. 75	6.21	P< 0.01
Hypo Thyroidism	74	21.616±19.93	2.3	1.416 ±0.78	0.09	58. 93 ± 29. 19	3.39	P< 0.01

Depending on findings that are presented in the table (3–2) the those who suffer from thyroid disorder can be classified into 2 groups: "GroupA" individuals who suffer from hyperthyroidism, their average T3,T4 increased levels compared to the control group a significant increase in T3 value compared to control [ (8.727 ± 16. 61) , ( 1. 988 ± 0. 96) ] (n mol/ml) according to the results, the T4 value likewise demonstrated a considerable increase in comparison to the control group [ (105. 5 ± 36.75) , (87. 58±18. 33) ] (n mol/ml) respectively and TSH level less than control group a significant decrease compared to control[(0.062 ±0.0422) , (1.8517±1.0097)] (μIU/ml) respectively.

"Group B" patients with hypothyroidism the mean T4,T3 levels were less than control group a significant decrease in T3 value compared to control [(1.416 ± 0.78) , (1. 988 ± 0. 96)](n mol/ml) respectively, and also shown a statistically significant reduction in T4 value in comparison to the control [(58. 93 ± 29. 19), (87. 58±18. 33 )] (n mol/ml) respectively and TSH

level more than control, a significant increase in TSH value compared to control [ (21. 616 ± 19. 93), (1. 8517±1. 0097)]( μIU/ml) respectively. These results have an agreement with Braverman, lavado, Grossman and Stockigt ,they were found hypothyroidism characterised by an increase in TSH production that is approximately fifteen to twenty times higher than that of the control and T4 concentration were low, but T3 levels were increased and T4 The presence of high quantities is indicative of hyperthyroidism, while the presence of low levels is suggesting Because internal pituitary TSH secretion is controlled by negative feedback from serum thyroid hormone concentrations, hypothyroidism, or low TSH in the context of increased thyroid hormones, makes sense.<sup>(12-13)</sup>

**Table(3-3) Distribution of patients in accordance with their gender identity**

Group	Female	Female %	Male	Male %	Total	Total %
GroupA: Hyperthyroidism	20	57.1%	15	42 . 9 %	35	33.11
Group B: Hypothyroidism	49	66.2%	25	33 . 8 %	74	67.89
Total	69		40		109	100

As shown from table (3–3) the majority of patients were in hypothyroidism (67.89%) more than hyperthyroidism (33.11%) ,its clearly noticeable that the female patients are more than male patients (57.1%),(42.9%) respectively within group A , and the same with group B (66.2%)for female patients more than male patients ( 33.8 % ) , these results agree with H. Jack Baskin, Burrow GN, Jackson IM, Surks and feryal R. They were It was discovered that hypothyroidism is more prevalent than hyperthyroidism. Furthermore, it was discovered that women have a significantly higher risk of hypothyroidism than men since they have a ratio of more than five to one and eight times more common in women than men in hyperthyroidism.<sup>(14-15)</sup>

This could be explained by the surroundings or the kind of nutrition that is prevalent in Iraq, as indicated by the data that was discovered at iraq's Ministry of Health's statistical department of bio and health (statistically guidance 2009). The quantity of patients who have thyroid disorder was higher in hypothyroidism than in hyperthyroidism, and the number of female patients was higher than the number of male patients. Additionally, the number of patients in Iraq's north and center was higher compared to those in the south.<sup>(16)</sup>

**3.3. The Body Mass Index (BMI) range:**

One metric that is connected to body fat is the body mass index. Additionally, it forecasts the emergence of health issues linked to being overweight. These factors make BMI a popular tool among medical professionals.<sup>(17,18)</sup> Individuals who have a BMI 25 to 29 are considered overweight ; those with a BMI of 30 to 39 are considered obese ; above 40 is considered extreme obesity ;and those who have a BMI below 20 are at increased risk.

**Table (3–4) Distribution of patients according to body mass index (kg/m<sup>2</sup>).**

BMI(Kg/m <sup>2</sup> )	Classes	Hyperthyroidism		No Hypothyroidism	
		No.	%.	No.	%.
<20	<b>under weight</b>	21	60 %	10	13.5 %
20 - 24.9	<b>normal weight</b>	6	17.1 %	3	4 %
25 - 29.9	<b>Over weight</b>	3	8.6 %	33	44.5 %
≥ 30	<b>Obesity</b>	5	14.3 %	28	38 %
<b>Total</b>		35	100 %	74	100 %

for problems associated with poor nutritional status.<sup>(19-20)</sup> From table (3–4) it is clearly notice that The majority of people diagnosed with hypothyroidism were suffering from obesity and obesity (44.5 %), (38 %) respectively while the patients with under and healthy weight were the least (13.5%), (4%) respectively , While in hyperthyroidism most patients were considered to be underweight (60 %), and the overweight patients were the least ( 8.6% ) and obese and healthy patients have the percentage (14.3%) ,(17.1%) respectively this percentage of hypothyroidism and hyperthyroidism in agreement with Larsen and the others; Those who suffer from hyperthyroidism may have weight loss, whereas those who suffer from hypothyroidism may experience weight gain. <sup>(21, 22)</sup>

**Conclusion:**

- 1- The classification of the patients with thyroid disorders were depending upon TSH levels neither T3 nor T4 levels as:
  - a- Hypothyroidism in patients who were with low T3 and T4 levels and elevated TSH values.
  - b- Hyperthyroidism in patients who were with low TSH levels and high T3 and T4 levels, compared to control levels of TSH, T3 and T4 levels .
- 2- Patients with thyroid disorders made up the bulk of the population in hypothyroidism (67.89%) more than those with hyperthyroidism (33.11%), and in females (66.2%) with age (40-50) years more than in males (33.8%).
- 3- A significant proportion of people diagnosed with hypothyroidism were overweight (44.5%) then with obesity (38%), Although patients with hyperthyroidism were assumed to be underweight, the majority of them were overweight (60%).

**Recommendations:**

- 1-study the binding and determined kinetic thermodynamic parameters of Gonadal hormones with its Antibodies in tissue of patients with goiter.
- 2- Study the Gonadal hormones levels & its Antibodies binding
- 3- Purification the Gonda hormones from sera of patients with thyroid disease.

**References:**

- 1) Martin, D. W.; Mayes, P. A; Rod well , V. W. ( 2005 ). Harper's ,Review of Biochemistry, Former title : " Review of physiological chemistry "; 24<sup>th</sup> ed , Lange Medical publications, Los Altos , California.



- 2) Kenneth A., Woeber, MD. ,(2000) . “ Update on the Management of Hyperthyroidism and hypothyroidism ”; Archives of family Medicine ; 9 : 743.
- 3) Yalcin B. , Ozan H . ( feb 2006 ) . " Detailed investigation of the relationship between the inferior laryngeal nerve including laryngeal branches and ligament of Berry " . Journal of the American College of Surgeons 202 (2) : 291 -6. 2005 .09.025.PMID.
- 4) Lemaire, David ( 2005 ) , Retrieved on 19 January (2008). " Medicine - Thyroid anatomy", topic 532.
- 5) Edwin L. Kaplan ; ( 2002 ) . " The Thyroid and its Diseases " C. V. Mosby; 8ed. Vol. 2 .
- 6) Jones ,I.M.; (2008) . " Thyroid Disease " , Australian prescriber. Vol. (31) No. 6 .
- 7) Greenspan F. S. and Gardner D. G. ; (2001) ; “ Basic and Clinical Endocrinology ” ; 6<sup>th</sup> ed. ; Mc Graw Hill; pp. 202 New York.
- 8) Braverman L. and Utiger R. ; (2000); “ Werner and Ingbar’s , The Thyroid ; A fundamental and clinical text book ” ; 8<sup>th</sup> ed. ; Philadelphia : Lippincot ; p.269.
- 9) Luis C. Junquera and Jack J. Kanski ; (1995) ; “ Basic ed. Histology; 8<sup>th</sup> ed. ; California ; Lange; p.399.
- 10) Ludgate M. , Crips M ., and Lance C. , "Thyroid Disorders" ( 1998) ; 8: 411-423 .
- 11) Iham A.A. (2005): "Study of the Biochemical parameters and some tumor markers in the sera of patients with thyroid gland disorders and thyroid carcinoma " M. Sc. thesis college of science , Al - Mustansiryah University.
- 12) Braverman ,L. E. (1996). Evaluation of thyroid status inpatients with thyrotoxicosis .Clin . Chem . 42 (1) : 174-178,
- 13) Stockigt. J. (2003): "Assessment of thyroid function: towards an integrated laboratory-clinical approach", Clin. Biochem. Rev.: Vol. 24 November: 109-122,
- 14) H. Jack Baskin , MD. Mace ; ( 2006 ) . American Association of Clinical Endocrinologists " Endocrine practice " Vol. 8, N0. 6 Amended version .
- 15) Surks MI, Ocampo E. (2006); " Sub clinical thyroid disease". Am J Med ; 100:217-223.
- 16) Statically guide ( 2009 ) . " Ministry of health, Iraq. Statically Department of health & bio " .
- 17) Moran, L. J. ; and Norman , R. J. (2002) : " The obese patient with infertility : a practical approach to diagnosis and treatment " Nut. Clin. Care , 5(6) : 290-7 .
- 18) Vikram, N. K. ; Pandey , R. M. ; Misra, A. ; Sharma, R. ; Devi , R.; and Khanna , N. ( 2003 ) : " Non obese ( body mass index < 25 kg/m<sup>2</sup> ) Asian Indians with normal waist circumference have high cardiovascular risk " .
- 19) Landi zuccala, et al. , Gambassi et al. , (1999) " BMI & Important problem related to nutrition".
- 20) National Institutes of health,(2006).
- 21) Simon, H.(2008) . Hypothyroidism . University of Maryland Medical Center.
- 22) Larsen PR, Davies TF, Hay ID. ( 1998 ): The thyroid gland. In: Wilson JD ,Foster DW , Kronenberg HM, and Larsen PR, Text book of Endocrinology. 9<sup>th</sup> ed. Philadelphia: WB Saunders Co.