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(RESEARCH ARTICLE)

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Serological evaluation will determine a hyperlink between thyroid hormone secretion and hyperthyroidism, along with the prevalence in both sexes

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Abstract

Objective: This research aims to constitute the condition and illuminate its underlying causes and symptoms. This study examined hormone level (TSH, T3, and T4) variations in individuals suffering from hyperthyroidism.

Method: The present study was designed to investigate changes occurring in some hormones in subjects suffering from hyperthyroidism. The total number used was 88 patients and control groups of both genders, males and females. The total number of patients was 50: 35 females and 15 males, while the number of control groups was 38: 25 females and 13 males. The ages of all subjects ranged between 7 years to 74 years. Blood samples were collected to evaluate the level of thyroid hormones like T4, T3, and TSH using the ELISA technique,

Results: The mean serum TSH levels in patients with hyperthyroidism (0.126 ± ±0.02) were significantly lower than the normal control group, with a higher mean of T3 and T4. The mean age of patients with hyperthyroidism is the mean of T4 (125.12 ± ±10.90), while the mean of T3 (5.350 ± 1.02) was also higher than the control group, with a higher percentage of females (70% vs. males 30%).

Conclusion: Thyroid illness is common, affecting women more than males. High thyroid hormone levels in hyperthyroidism activate bodily systems, resulting in symptoms that have an impact on general health.

Keywords: Hyperthyroidisms; TSH; Triiodothyronine; Thyroxine

1. Introduction

The thyroid gland, a minor factor, produces thyroid hormones that regulate metabolism and impact vital functions like development. Triiodothyronine (T3) and thyroxine (T4) are released from the thyroid gland and are important components of the endocrine system [1].

They regulate weight, energy levels, internal temperature, skin, hair, nail growth, and metabolism. A feedback loop system regulates the production and release of thyroid hormones, namely, T4 and T3. The feedback loop is initiated by the hypothalamus, which releases thyroid-releasing hormone (TRH), which in turn triggers the pituitary gland to produce and release thyroid-stimulating hormone (TSH) [2].

TSH causes your thyroid to produce T4 and T3. TSH causes your thyroid to release approximately 80% T4 and 20% T3. The hormone chain reaction regulates a feedback loop, preventing the release of thyroid hormone (TRH) when T3 and T4 levels increase. and resume when they drop, preventing hormonal imbalances [3].

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An overactive thyroid, known as hyperthyroidism, occurs when the thyroid gland generates too many thyroid hormones.
Hyperthyroidism is a medical condition in which the thyroid gland produces and secretes too much thyroid hormones. Hyperthyroidism can be overt or asymptomatic. Overt hyperthyroidism is characterized by low blood (TSH) concentrations and elevated serum concentrations of thyroid hormones: thyroxine, triiodothyronine, or both.

Any abnormalities with your hypothalamus, pituitary gland, or thyroid may result in hormonal imbalances, including T3 and T4 [4]. Hyperthyroidism is a condition in which the thyroid gland produces an abnormally high number of thyroid hormones. Weight loss is often attributed to elevated metabolism, tachycardia, palpitations, and heart rate, possibly due to thyroid hormones [5]. This can lead to excessive sweating, heat sensitivity, muscle tremors, nervousness, and tension. Additionally, bowel movement changes may occur due to faster digestion processes. These symptoms need to be evaluated and linked to laboratory testing [6].

2. Materials and Methods

This study contained two groups of hyperthyroid patients and a control group; all samples were taken from private laboratories in Baghdad from December 2024 until the end of January, and the samples were divided into two groups.

- Patient group: This study included fifty (50) hyperthyroidism individuals. Their ages ranged from 7 to 74 years old, with 35 females and 15 males. Patients are diagnosed depending on the following outcomes: Clinical examinations and serum tests were performed. Thyroid hormones (T3, T4) and TSH.
- Control group: Thirty-eight (38) healthy people aged 20 to 68 (25 females and 13 males) were selected as a control group.

2.1. Specimen Collection

Five milliliters of venous blood were taken from both patients and controls. Slow aspiration of the venous blood sample with a syringe to prevent hemolysis, with a tourniquet applied above the anterior. All grossly hemolytic samples were discarded, and new samples were collected. The samples were placed in clean disposable tubes, left at room temperature for 30 minutes to allow for clotting, and then centrifuged for 20 minutes at 5000 runs per minute to obtain the blood serum.

2.2. Estimation of TSH, T3, and T4

The TSH (thyroid-stimulating hormone), T4, and T3 hormones are tested. It was calibrated utilizing laboratory procedures to test the number of hormones (T3, T4, and TSH) in blood serum via the ELISA kits and attained from (CTK, Germany).

3. Results

Serum TSH, T3, and T4 levels were measured in hyperthyroidism and control groups. Patients with hyperthyroidism have significantly lower mean serum TSH levels (0.126 ± ±0.02) compared to the control group (1.721 ± ±0.20) (table 1). Additionally, patients with hyperthyroidism have significantly higher mean T3 levels (5.350 ± ±1.02) compared to the control group (1.893 ± ±0.09). Patients with hyperthyroidism have considerably higher mean blood T4 levels (125.12 ± ±10.90) compared to normal controls (108.80 ± ±5.26) Table 1. Table 2 shows the mean age of patients with hyperthyroidism (36.60 ± ±3.38) and the mean age of the control group (36.56 ± ±3.18). Table 3 shows the distribution of the study sample based on hyperthyroidism, with 30% males and 70% females. The study used serum samples.

Table 1 Comparison between control and patient group in hormone

Group	**Mean ± SE**		
	T3 (nmol/L)	**T4 (nmol/L)**	**TSH (nmol/L)**
Control	1.893 ±0.09	108.80 ±5.26	1.721 ±0.20
Patients	5.350 ±1.02	125.12 ±10.90	0.126 ±0.02
P-value	0.0015	0.184	0.0001

Table 2 Comparison between control and patient groups in Age

Group	Mean ± SE of Age (year)
Control	36.56 ±3.18
Patients	36.60 ±3.38
T-test	9.336 NS
P-value	0993
NS: Non-Significant.	

Table 3 Distribution of sample study according to gender in patients with hyperthyroidism

Gender	No	Percentage (%)
Male	15	30
Female	35	70
Total	50	100 %
P-value	---	0.0001 **
** (P≤0.01).		

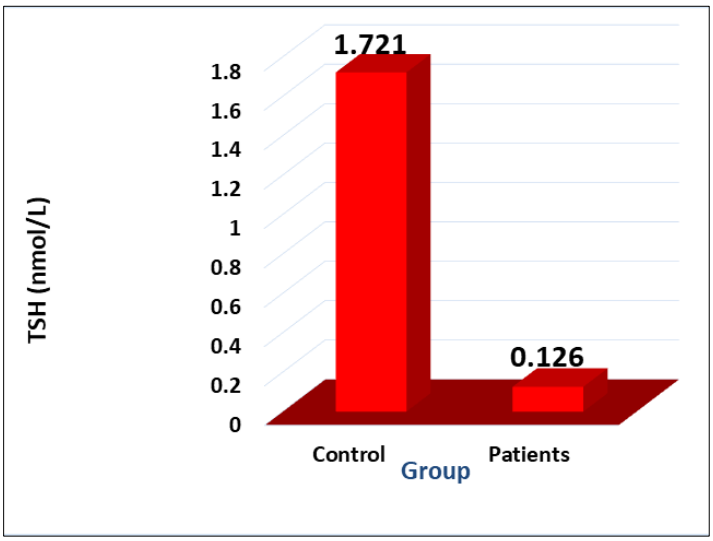

Figure 1 Comparison between control and patients Group TSH (nmol/L)

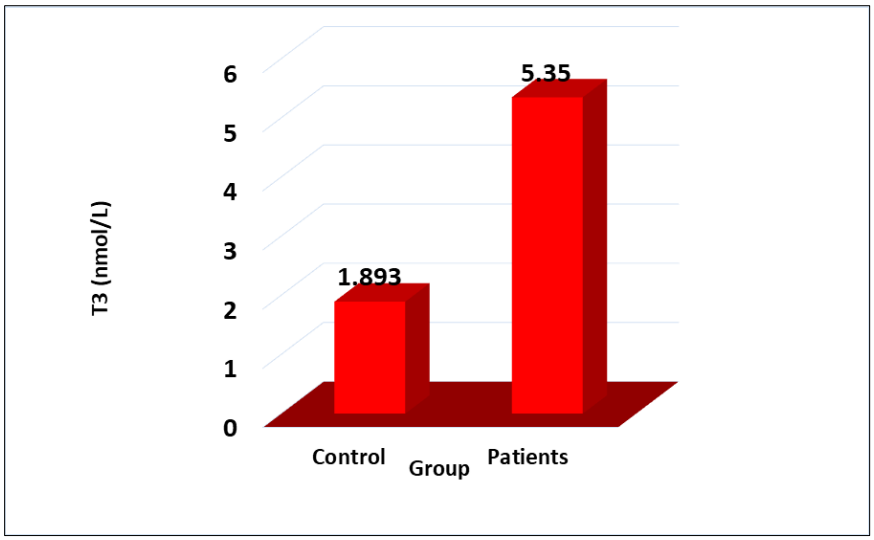

Figure 2 Comparison between control and patients Group T3 (nmol/L)

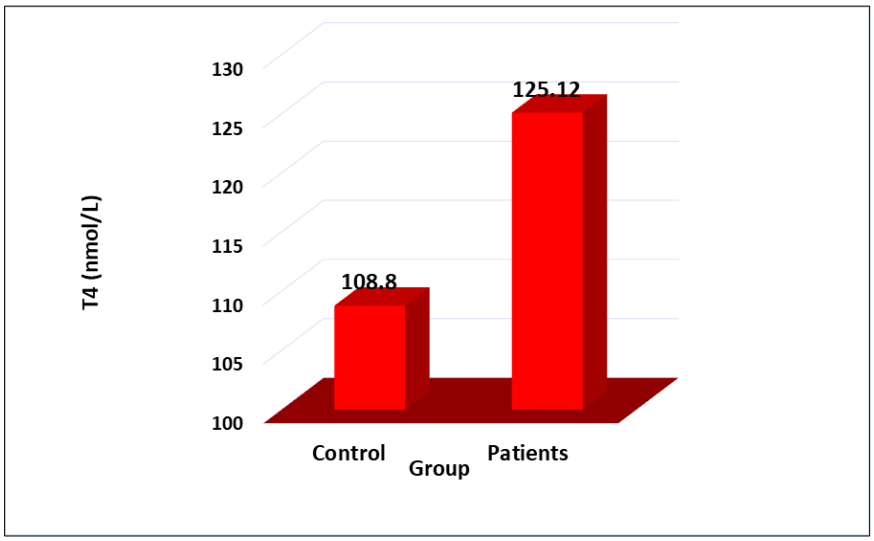

Figure 3 Comparison between control and patients Group T4 (nmol/L)

4. Discussion

The current investigation of this work focuses on hyperthyroidism in both males and females who are connected with such a problem and control groups.

4.1. Demographic Characteristics

In this study, there were 88 individuals with hyperthyroidism and control groups, comprising both male and female patients. The control groups consisted of 50 patients, 35 women and 15 men, with 38 women and 13 men in each. The study found no significant difference ($p>0.01$) in age between patients with hyperthyroidism (36.30±3.38) and controls (36.56±3.18). Women with hyperthyroidism had a greater incidence rate (70%) compared to men (30%). Women are more likely to develop hyperthyroidism due to hormonal changes, particularly estrogen, and an immunological predisposition [7]. Women are more likely to suffer from autoimmune disorders like Graves' disease. Thyroid dysfunction is influenced by hormonal changes that occur throughout puberty, menstruation, pregnancy, postpartum, and menopause. Genetic and environmental influences may also play a role. Stress and metabolic changes may also have a role [8]. These findings are congruent with that of Amtul Quddous Latif et al. [9]. Females had a mean age of 37.30 ± 12.65 years, compared to 38.84 ± 16.02 years for males. Females had a higher prevalence of hyperthyroidism than males (22% vs. 14%).

4.2. Level of thyroid hormone

As demonstrated in Figures 1, 2, and 3, the patient group in this study had considerably higher T3 and T4 levels and lower TSH levels in both males and females compared to the control group. The majority of the indications of hyperthyroidism in this study are due to excess T3 and T4 production with low TSH levels. There are various explanations and causes for this occurrence. The existence of anti-thyroid autoantibodies in the bloodstream is the first plausible explanation for these findings [10]. This autoimmune disorder causes the body to produce antibodies against normal thyroid antigens. These antibodies are produced by immune-competent plasma cells [11]. The antibodies bind to TSH receptors, initiating and increasing T3 and T4 synthesis and secretion despite a drop in TSH levels due to the negative feedback mechanism imposed by T3 and T4 on the pituitary and hypothalamus axis [12]. However, antibodies that replace TSH and compete for binding with TSH receptors activate several TSH-stimulated biochemical mechanisms, including the activated iodide transport mechanism, thyroperoxidase enzyme, thyroglobulin synthesis, reuptake of stored thyroglobulin, and then secretion of T3 and T4 [13][14]. The second explanation for the rise in T3 and T4 synthesis over time is the presence of solitary or multiple thyroid nodules caused by the hyperplasia of specific follicular cells, resulting in enhanced iodide uptake over surrounding tissues. As a result, T3 and T4 levels are raised, whereas TSH secretion is suppressed in the surrounding tissues [15][16]. These findings are consistent with Noor et al. [17]. Patients with hyperthyroidism had significantly higher T3 and T4 levels ($p \leq 0.01$) than the control group, whereas TSH levels decreased significantly ($p \leq 0.01$).

5. Conclusion

The current study indicated that thyroid-related disorders are relatively common conditions that affect a considerable proportion of the population, with women being more afflicted than men. When thyroid hormone levels rise, as they do in hyperthyroidism, most of the body's systems become more active, causing various symptoms that affect general health and well-being.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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