

Comparing the Concentrations of Thyroid Stimulating Hormone and Thyroid Hormone in Females with Hypothyroidism and Hyperthyroidism in Iraq

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Abstract

The endocrine system of the body includes the thyroid gland. It is the largest organ in the human body that performs endocrine functions. The thyroid gland is crucial for healthy body development during childhood and adolescence. It takes in iodine from the diet and releases iodine-containing thyroid hormones. **Methods:** Between October 2021 and February 2022, 25 females with hyperthyroidism and 25 females with hypothyroidism of similar age underwent standard medical examinations at the Endocrinology and Diabetes Clinic of AL-Sadder Medical City in the Al-Najaf Al-Ashraf governorate of Iraq.

Results: When compare to patients with hypothyroidism, the findings showed a considerable rise in T3 and T4 levels in the sera of patients with hyperthyroidism. As opposed to patients with hypothyroidism, patients with hyperthyroidism had a highly significant drop in TSH in their sera, according to the TSH data ($P < 0.001$).

Conclusion: When compare to patients with hypothyroidism, the level of T3 and T4 in the sera of patients with hyperthyroidism significantly increased, according to the measurements of T3, T4, and TSH for the two study groups. When compare to patients with hypothyroidism, the TSH readings for patients with hyperthyroidism showed a highly significant drop in TSH in their sera ($P < 0.001$).

Keywords: TSH, T3, T4, Hypothyroidism and Hyperthyroidism.

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INTRODUCTION

The endocrine system of the body includes the thyroid gland. It is the largest organ in the human body that performs endocrine functions. It is also a butterfly-shaped gland, The thyroid gland is a large organ that is firmly attached to the front of the throat, close to the voice box (Aboud *et al.*, 2011). The thyroid gland is crucial for healthy body development during childhood and adolescence, It takes in iodine from the diet and releases iodine-containing thyroid hormones, which assist control the body's metabolism (Khalifa *et al.*, 2019). All of its activities, including maintaining the body's core temperature and the catabolism of proteins, fats, and carbohydrates in every cell (Hassan *et al.*, 2020). Iodide, thyroid peroxidase (TPO), thyroglobulin, and hydrogen peroxide are necessary for the manufacture of thyroid hormones (H₂O₂). The sodium/iodide symporter (NIS) transports iodine into the thyroid in the inorganic form, where it is then oxidized by the TPO-H₂O₂ system and used to iodinate tyrosyl residues in thyro-globulin (AL-Msaid and AL-Sallami, 2018). Triiodothyronine (T3) and thyroxine (T4) are shaped by link of iodinate tyrosyl intermediates in the TPO-H₂O₂ system, which are then hydrolyzed and released into the bloodstream, Because of the interdependence of these

processes, faults in any one of the parts can affect the secretion or production of thyroid hormones (Williams, 2003). Thyroid disorders are amongst the greatest prevalent endocrine disorders in the world, second only to diabetes. According to reports, there are 2.5–4.7 cases of hyperthyroidism per 1000 females (Winkler *et al.*, 2019). Women are affected around ten times more frequently than men, In northeast England, the condition affects roughly 1/1000 women per year (Urbanek and Zuo, 2021). Similar rates are also observed in Scandinavia, Japan, and the USA, There is a lot of hypothyroidism (Li *et al.*, 2020). In the Wickham study, the prevalence was 1.5% for women and fewer than 1% for men. New follow-up data point to a persistent risk of thyroid failure, particularly in the presence of thyroid autoantibodies that are positive. There are around five times as many women as men (Lazarus and Obuobie, 2000). On the other side, hyperthyroidism is defined as the thyroid gland producing and/or secreting abnormally high levels of thyroid hormones, Thyrotoxicosis is a medical condition caused by the impact of elevated thyroid hormone levels in the tissues, and it has systemic clinical signs (Kumari *et al.*, 2020). Every time a TSH level is below normal, hyperthyroidism should be taken into consideration as a probable ailment (Reddy *et al.*, 2017). Pituitary adenomas, Pituitary-Resistance to Thyroid Hormone

(PRTH), Grave's disease, trophoblastic disease, toxic adenomas, and multinodular goiter are all symptoms of "True Hyperthyroidism" (secondary hyperthyroidism), which is defined by increased TSH and TH levels (Al-Msaid and AL-Sallami, 2018). TSH and TH levels that are repressed, inflammatory thyroid conditions, ectopic thyroid illness, and exogenous thyroid excess are "other" kinds of hyperthyroidism, Approximately 1.2% of people in the US have hyperthyroidism (Ron *et al.*, 1989). The majority of these cases—roughly half—have clear symptoms, whereas the other half do not, Women experience it between two and ten times more frequently, Over 60-year-olds are more likely to get the condition (Eva *et al.*,2003). Dementia and cognitive decline are slightly increased by subclinical hyperthyroidism (Pasqualetti *et al.*, 2015). Although hypothyroidism is additional shared in women than in men, its frequency ranges from 0.3% to 0.4% (Maus *et al.*, 2008). In Iraq, toxic and nontoxic goiters are present in roughly 25% and 30% of women, respectively, while hypothyroidism is seen in around 14.5% of women (Al-Ramahi *et al.*, 2012).the Aim of the study: Thyroid stimulating hormone (TSH) and thyroid hormone concentrations were assessed in this study.

MATERIALS AND METHODS

This study was carried out in the Center of Endocrinology and Diabetes in AL-Sadder Medical City in Al-Najaf Al-Ashraf governorate through the retro between November 2021 to February 2022.

This study was conducted on 25 women with hyperthyroidism and 25 women with hypothyroidism, who were attending Center of Endocrinology and Diabetes in AL-Sadder Medical City for their monthly monotonous medical examination with similar age. Physicians diagnosed the patients according to clinical examination. The assortment criteria for the subjects were base on a questionnaire. The concentration of both T3, T4 and TSH they were measured at the center by VIDAS system.The questionnaire was envisioned to elicit info on the subject's age, duration of disease, smoking habits, medical usage, and any other ailments.

STATISTICS ANALYSIS

One-way ANOVA became used to examine the imply values of the groups. Then, Student-t-take a look at become used to decide the distinction between corporations. A p fee < zero.05 changed into taken into consideration statistically significant. Statistical analyzes have been done the usage of the SPSS® statistical software package (SPSS for Windows version thirteen.0, SPSS Inc., Chicago, Illinois, USA). All consequences are spoken as imply and general deviation (mean ± SD).

THE RESULTS

Table (3-1) shows the age distribution of the patients groups. The results revealed that there was no important changes in age of patients with hyperthyroidism in comparison with the Hypothyroidism patients (P>0.05). While the results of BMI revealed that there was a highly significant differences in BMI of patients with hyperthyroidism in comparison with the Hypothyroidism patients (P <0.001).

Table (3-1): Age and BMI of Patients with Hyperthyroidism and Hypothyroidism

	Hyperthyroidism N=25	Hypothyroidism N=25
Age Range (years)	15 – 66	14 – 58
Mean ± S.D	40.4 ± 15.753	39 ± 14.248
BMI (Kg/m2)	24.392 ± 7.466	34.503 ± 10.429

Descriptive parameter were obtainable in Table (3-2), which show the level of T3, T4 and TSH for two studied group. The results exposed a important increase in levels of T3 and T4 in sera of patients with hyperthyroidism when comparing with patients with hypothyroidism. While the results of TSH revealed a highly significant decrease in TSH in sera of patients with hyperthyroidism when comparing with patients with hypothyroidism ((P< 0.001).

Table (3-2): levels of T3, T4 and TSH for Hyperthyroidism and Hypothyroidism groups

	N	Hyperthyroidis m	Hypothyroidis m	P. valu e
T3 (nmole/m l)	2 5	3.202 ±1.924	0.840± 0.440	P < 0.00 1
T4 (nmole/m l)	2 5	162.974 ± 59.593	50.757± 20.024	P < 0.00 1
TSH (nmole/m l)	2 5	0.054 ± 0.017	23.6469±12.64 8	P < 0.00 1

DISCUSSION

TSH is the most sensitive and unique elegance I biochemical test for checking thyroid characteristic (Amanda *et al.*, 2020). A confirmatory test with loose T4 and overall serum T3 may be completed for excessive suspicion of thyrotoxicosis or for further evaluation of an ordinary TSH degree. Some laboratory protocols add loose T4 and total T3 whilst the initial TSH is low to keep away from next phlebotomy.

The high prevalence rate of thyroid disorders around the world and also in Iraq seem to associate with iodide deficiency, other factors such as environmental

contamination and genetic defect should be more effect. Then the governments in most countries have policy to use iodizing salt, also starting in Iraq since 1990 (Faisal, 2010). Thyroid diseases are additional familiar in ladies mainly amid puberty and menopause, and ladies are extra vulnerable to the chondroprotective impact of iodine lack (Santin and Furlanetto, 2011). These epidemiological studies advised a function for girl hormones along with estrogen in the pathogenesis of thyroid ailment. Oestrogen has a well-known to have unintended result on thyroid gland by cumulative the thyroxin compulsory globulin and its need with thyroid hormone in hypothyroid women [32,33] (Ben *et al.*, 1989; Arafah, 2001).

The results of this study were originate to be coincided with findings of numerous other studies, which reported that the incidence of hypothyroidism in females is additional. In addition, recent study on 300 patients' thyroid dysfunction was present in 68% females and elderly population had more incidences (Senthil *et al.*, 2015).

CONCLUSION

The levels of T3, T4 and TSH for two studied groups revealed a significant increase in levels of T3 and T4 in sera of patients with hyperthyroidism when comparing with patients with hypothyroidism. While the results of TSH revealed a highly significant decrease in TSH in sera of patients with hyperthyroidism when comparing with patients with hypothyroidism ($P < 0.001$).

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