

Prevalence of Thyroid disorders in Nasiriya City, Iraq

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Abstract— Thyroid disorders are the second biggest endocrine problem in society after diabetes. Environmental and genetic factors lead to the development of thyroid disorders. So this study was designed to determine the prevalence of thyroid disorders in Nasiriya City. One hundred-twenty subjects of both genders were involved in this study 80 of whom were patients, and 40 were healthy people. A blood sample and personal information were collected from all. The levels of thyroid hormones were estimated by the Cobas e411 electrochemiluminescence immunoassay (ECLI). The study found that the incidence of females was more than males (77.5%, 22.5%) and the ratio was 3.4:1. The results showed hypothyroidism disorder was more prevalent than hyperthyroidism and (83.64%) of hypothyroidism were female, and only (16.36%) were male, also (64%) of hyperthyroidism were female while male represented only (36%) of them. The majority of patients were aged 35-46 years. The results indicated that (43.75%) of patients had a family history, (26.25%) were diagnosed with hypothyroidism, and (17.5%) were diagnosed with hyperthyroidism. It was concluded that thyroid disorders, especially hypothyroidism, constitute a serious concern for public health, and middle-aged people and females were the categories most susceptible to thyroid disorders.

Keywords— Thyroid disorders, TSH, T3, T4, Nasiriya city
Key

I. INTRODUCTION

Thyroid dysfunctions are the most common endocrine disorder in the world, second only to diabetes mellitus. Thyroid disorders are primarily conditions that affect the amounts of thyroid hormones that are produced [1]. Thyroid hormones are essential for normal growth, development, and metabolic processes. An imbalance of thyroid hormones can lead to either hypothyroidism or hyperthyroidism [2].

Hypothyroidism is a global endocrine disorder that is readily diagnosed and managed but potentially fatal in

severe cases if untreated [3]. The prevalence of hypothyroidism has increased to affect a significant portion of the global population [4]. Worldwide, iodine deficiency remains the foremost cause of hypothyroidism. We can classify hypothyroidism according to the location of dysfunction as primary (thyroid gland dysfunction), secondary (Pituitary dysfunction), or tertiary (hypothalamic dysfunction) [5]. Primary hypothyroidism is up to 8-9 times more common in women than in men, and the prevalence increases with age, with a peak incidence between the ages of 30 and 50 [6]. The most common symptoms of hypothyroidism include dry skin, cold sensitivity, fatigue, muscle cramps, voice changes, constipation, heavy menstrual periods, and weight gain, but the clinical presentation can include a wide variety of symptoms that differ with age, sex, and time between onset and diagnosis [7]. Diagnosing hypothyroidism involves biochemical tests, and is classified as overt primary hypothyroidism when the TSH levels in the serum are over the standard and the T4 in a free form is lower than the standard value [8].

Hyperthyroidism is caused by an excess of thyroid hormones, which results in a hypermetabolic state. The symptoms of thyrotoxicosis often include anxiety, emotional lability, weakness, tremor, palpitations, heat intolerance, increased perspiration, and weight loss despite a normal or increased appetite. Hyperthyroidism is diagnosed based on clinical symptoms and confirmed with biochemical tests. The abnormalities on the thyroid hormone test result are suppressed TSH levels, elevated T4 and T3 levels, and imaging techniques including ultrasound and iodine uptake scans [9].

According to what was explained previously, the study was designed to determine the prevalence of thyroid disorders in Nasiriya City.

II. PATIENTS AND METHODS

A. Design of Study



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The study comprised 80 thyroid dysfunction patients of both genders who visited the Diabetes and Endocrinology Centre in Thi Qar between October 15, 2022, and February 15, 2023. In addition, 40 healthy people. The age group was (10-55). The diagnosis of the condition was based on the results of the biochemical examination, in addition to the role of the physician in confirming the diagnosis. Patients were classified into two main groups based on the levels of hormones: The hypothyroidism group and the Hyperthyroidism group.

B. Methods

Five milliliters of blood from patients and healthy people were taken, and placed in a clot-activator tube. Then, samples were centrifuged at 5000 rpm for 15 minutes to collect serum. Serum TSH, FreeT3, and FreeT4 levels in thyroid dysfunction patients and healthy people were evaluated by using Cobas e411 Electro Chemiluminescence Immunoassay (ECLI).

C. Statistical Analysis

The results have been displayed as a mean \pm standard deviation (SD). P-values < 0.01 were interpreted as highly significant. T-test, one-way ANOVA, and Chi-square were used. Microsoft® Excel 2010 was used to create the graphs.

III. RESULT AND DISCUSSION

The description of the investigated groups is shown in Figure (1). This study included 120 samples; 80 patients suffering from thyroid dysfunction. who were classified into two groups: the first group includes 55 (68.75%) hypothyroidism patients, and the second group includes 25 (31.25%) hyperthyroidism patients. In addition, 40 (31.25%) are healthy people. According to the results, the highest proportion of hypothyroidism patients (68.75%) over the proportion of hyperthyroidism patients (31.25%), these results agree with two other studies [1],[10].

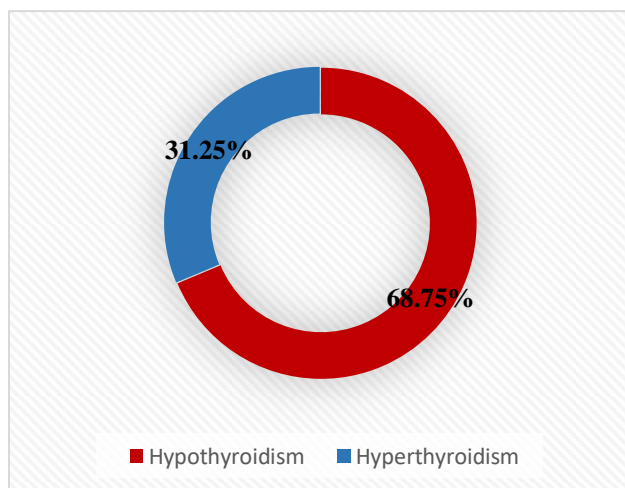


Figure (1): Distribution of Healthy People and Patients According.

The prevalence of thyroid disorders depends on various factors such as age, sex, geography, and iodine intake. Geographical distribution of thyroid disorders showed that the highest rates were observed in iodine-deficient areas,

low iodine intake is associated with signs of insufficient thyroid hormone production and frequent occurrence of hypothyroidism [11].

Table (1): Characteristics of Study Groups.

Parameters		Patients N=80	Healthy people N=40	P-value
Age (years) Mean \pm SD		39.1 \pm 11	38.50 \pm 11.82	0.652 ^{NS} T-test = 0.268
Sex	Male	18(22.5%)	12(30%)	0.371 ^{NS}
	Females	62(77.5%)	22.78 \pm 2.97	
BMI Mean \pm SD		25.57 \pm 4.992	23.19 \pm 3.316	0.00 ^{**} T-test = 3.102
Family History (FH)	FH ⁺	35 (43.75%)	3(7.5%)	<0.0001
	FH ⁻	45 (56.25%)	37 (92.5%)	

The demographical distribution of thyroid dysfunction patients and healthy people groups was done according to their age, gender, BMI, and family history in Table (1), the mean age of the patient group is 39.1 years, indicating the middle ages appear to be more susceptible to thyroid disorders. These results corroborated the results of other authors [12-13].

In this study, the maximum percentage of patient groups (hypothyroidism and hyperthyroidism) was found within the age group (36-45) years (38.47% and 40%, respectively), and the minimum percentage of patient group (16.37% and 8%, respectively) in the age group of 10-25 years Table (2). The maximum age was 55 years within the age group 45-55 years. Other incidences of other study patient cases and healthy were also distributed within the age group as listed in Table (2). Middle and advanced ages, especially females, were more prone to thyroid disorders. Thyroid disorders are more common in the elderly as thyroid autoimmunity tends to increase with age [14].

Table (2): Distribution of Healthy Patients According to Age Group.

Age Group	Hypothyroidism		Hyperthyroidism		Healthy	
	NO.	(%)	NO.	(%)	NO.	(%)
10-25	9	16.37	2	8	7	17.5
26-35	11	20	5	20	8	20
36-45	21	38.18	10	40	14	35
46-55	14	25.45	8	32	11	27.5
Total	55	100	25	100	40	100

According to the current study, most of the patients studied were females (77.5%) compared to males (22.5%). The ratio of females to males was 3.4:1. Most studies indicate females as a risk factor for thyroid diseases, such as the Iraqi local study and Arabian study [15-16].

As listed in Figure (2), females had the highest rates in both groups of patients (hypothyroidism and hyperthyroidism) (83.64% and 64%, respectively) compared to males (16.36% and 36%, respectively). 30% of healthy subjects were male, while 70% were female. This result was consistent with an Iraqi study with Iraqi studies [17-18]. On the other hand, an Iraqi

study by Yosif *et al* found that more females were diagnosed with hyperthyroidism than males (63% and 47%, respectively) [19].

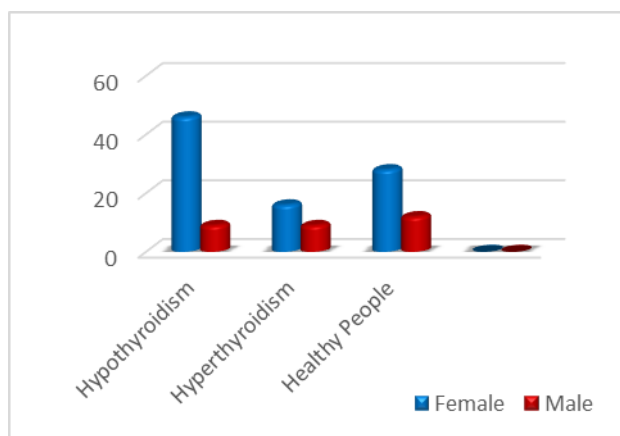


Figure (2): Distribution of Patients and Healthy According to Sex.

Thyroid problems are among the most common endocrine dysfunction in the world, especially in females, and this is associated with female sex hormones imbalances such as estrogen hormone, which is normally elevated in females during puberty and pregnancy, and the X chromosome inactivation on the thyroid gland and immune system, which

greatly contribute to the female predilection of autoimmune thyroiditis [20]. The higher incidence of thyroid problems in females may be attributed to stress-related to the nature of their life, especially Iraqi women who had more domestic responsibilities than men, this is due to the confusion in the economic situation and its impact on the standard of living. Females were more likely to be antibody positive and have a risk of progression of hypothyroidism [21].

Results in Table (3) also show an elevated mean of BMI in patients (25.57 ± 4.992 kg/m²) as compared with healthy people (23.19 ± 3.317 kg/m²), with a highly significant difference ($P < 0.01$). This finding is consistent with local studies [22-23].

Regarding the role of BMI in thyroid dysfunctions. The results recorded significant an elevated mean of BMI in hypothyroidism (27.72 ± 3.56 kg/m²) compare to hyperthyroidism (20.82 ± 4.38 kg / m²) and healthy group (23.19 ± 3.316 kg / m²) as shown Table (3).

This finding is consistent with the results of a recent study in Iraq [24]. A paper by Obaid and his colleagues revealed a significant difference in BMI between patients with hyperthyroidism and hypothyroidism [25]. In addition, this result is consistent with the results of other studies [22], [26].

Table (3): Distribution of Healthy People and Patients According to BMI.

BMI	Hypothyroidism		Hyperthyroidism		Healthy People		P-value
	%	Mean± SD	%	Mean± SD	%	Mean± SD	
Underweight	0	0	52	17.53± 0.66	2.5	18.44	0.00** F= 35.927
Normal weight	18.19	21.87± 1.51	28	21.56± 1.70	75.5	21.56± 1.57	
Overweight	52.72	27.77± 1.41	12	26.98± 0.46	20	27.32± 0.90	
Obese	29.09	32.18± 1.23	8	30.32± 0.16	5	30.39± 0.18	
Mean± SD	27.72 ± 3.55		20.82 ± 4.38		23.19 ± 3.316		

Hypothyroidism is related to reduced metabolic rate, and reduced thermogenesis and has also appeared to associate with an elevated BMI and a higher prevalence of obesity with some clinical evidence telling that even moderate thyroid disorder in the form of subclinical hypothyroidism is related to notable changes in body weight and denotes a risk factor for overweight and obesity [27].

Hyperthyroidism has been linked with weight loss and underweight [28]. Patients with hyperthyroidism have an adrenergic hyperstimulation with increased basal metabolism and thermogenesis and greater overall energy expenditure resulting in a tendency toward weight loss. Hyperthyroidism also induces an increased gastrointestinal transit and occasionally anorexia due to the anorexigenic effect of T3 [29].

Results in Table (1) shows that 43.75% of patients have a family history of thyroid disorders in one or more members of their family history, with a significant difference compared to healthy people. From the total percentage 26.25% of hypothyroidism patients had a family history and 17.5% of hyperthyroidism patients had a family history. These findings are from a study by Shakor [30].

Having a history of thyroid disorders in the family is one of the most important risk factors, which contributes to an increased chance of developing thyroid disease. A common model for the onset of autoimmune thyroid disease (AITD) is that 70%-80% of susceptibility to thyroid disease is genetic. The remaining 20% to 30% contribution to the onset of AITD is thought to be due to environmental exposures or triggers [31].

The results showed an increase in the mean serum TSH levels in the hypothyroidism group compared to the hyperthyroidism group (9.873 ± 4.126 and 0.102 ± 0.056 μIU/mL, respectively) with a highly significant difference ($P < 0.001$). Also, there was a significant difference between patient groups and healthy Table (4).

The present data agree with the study by Abood and ALHussaynei (2022) which reported that there were highly statistically significant differences between patients with hypothyroidism and healthy subjects, and there were highly significant differences between patients with hyperthyroidism and healthy subjects [32]. A study published by Faith and his colleagues demonstrated a significant difference in TSH levels between hypothyroidism and hyperthyroidism groups [33]. Table (4)

shows the statistical relationship between the patients and the healthy groups in TSH levels.

Table (4): Serum level of TSH inpatient group and healthy subjects.

Groups	Mean± S.E. of TSH (µIU/mL)	Sig. between groups	P-Value
Hypothyroidism (Hypo.)	9.873± 4.126	Hypo. X Hyper.	0.00**
Hyperthyroidism (Hyper.)	0.102± 0.056	Hypo. X Healthy	0.0*
Healthy	1.992 ± 0.806	Hyper. X Healthy	0.01

The results of the current study showed an increase in serum mean FT4 and FT3 levels in hyperthyroidism than in hypothyroidism groups (1.829± 0.507, 1.09.873± 0.377 and 3.908± 0.790 ng/dL, 2.432±0.758 pg/mL, respectively), and there was a highly significant difference between patient groups (p=0.00). Also, there was a significant difference (P≤0.05) between the n hypothyroidism group and the healthy subjects for both serum FT4 and FT3 levels. While there was a highly significant difference (P<0.001) between the hyperthyroidism group the and healthy subject for both serum FT4 and FT3 levels as shown in Tables (5) and (6).

Table (5): Serum level of FT4 inpatient group and healthy subjects.

Groups	Mean± S.E. of FT3 (pg/mL)	Sig. between groups	P value
Hypothyroidism (Hypo.)	2.432±0.758	Hypo. X Hyper.	0.00**
Hyperthyroidism (Hyper.)	3.908± 0.790	Hypo. X Healthy	0.03*
Healthy	2.742 ± 0.507	Hyper. X Healthy	0.00**

Table (6): Serum level of FT3 inpatient group and healthy subjects.

Groups	Mean± S.E. of FT4 (ng/dL)	Sig. between groups	P value
Hypothyroidism (Hypo.)	1.09.873± 0.377	Hypo. X Hyper.	0.00**
Hyperthyroidism (Hyper.)	1.829± 0.507	Hypo. X Healthy	0.053*
Healthy	1.238 ± 0.188	Hyper. X Healthy	0.00**

These results are consistent with a recent study that revealed a significant difference in T4 and T3 mean sera levels between the hyperthyroidism group and the hypothyroidism group [24]. Also, the research paper by Fawzi recently indicated that there was a significant difference in serum T4 and T3 levels between the hyperthyroidism groups and the control group [34].

TSH, T4, and T3 are the most useful physiological marker of thyroid hormone action. An imbalance of the levels of these hormones may lead to major health disorders [35]. The

most significant chemical marker in a thyroid disorder is TSH, where a low level of TSH profile is due to hyperthyroidism, while a high value of TSH is the hallmark of hypothyroidism [36].

Thyroid hormones (T4 and T3) have a complex inverse relationship with the pituitary hormone (TSH). TSH and thyroid hormones have a negative feedback system, hence TSH levels are the most sensitive indicator of a person's thyroid function. Increased serum TSH level, either in association with a low serum FT4 and FT3 (over hypothyroidism) or within the reference range (subclinical hypothyroidism). A lack of thyroid hormones in the blood causes hypothyroidism, because of the ultrasensitive negative feedback link between the hypothalamic-pituitary-thyroid axis, serum thyroid hormone levels are low and TSH levels are increased in hypothyroidism due to thyroid gland failure [37].

The pituitary gland secretes TSH as a result of the negative feedback process. High levels of FT4 and FT3 negatively affect the anterior pituitary, decreasing TSH secretion, due to the thyroid gland's inappropriate high production and secretion of thyroid hormone [35].

IV. CONCLUSION

The study concluded that thyroid disorders, particularly hypothyroidism, are a major public health concern and that middle-aged and female subjects are the most vulnerable group to thyroid disorders.

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ETHICAL CONSIDERATION

Ethical permission was obtained from the Diabetes and Endocrinology Centre in Thi Qar, a private clinic, and from all participants in this work (patients and healthy) to conduct the research.

CONFLICT OF INTEREST

The authors declare no conflicts of interest

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