Original Article

Prevalence of Overt and Subclinical Thyroid Dysfunction among Iraqi Population in Baghdad City

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Abstract

Background: Thyroid hormones control most of the body's metabolic processes; T3 and T4 from the thyroid gland and thyroid-stimulating hormone (TSH) from the pituitary gland. Any defect in these hormones may have a serious clinical impact on different body organs. **Objective:** This study focus on the prevalence of thyroid diseases (subclinical and overt) in the Iraqi population and the possibility of linking their incidence and progression to specific factors. **Patients and Methods:** Cross-sectional study was conducted in the National Diabetes Center for Treatment and Research/Mustansiriyah University in Al-Karkh side from Baghdad/Iraq. Thousand and eight hundred patients, both gender (males and females) from different age groups (12–62 years), have been involved for 6 months. This study was measured serum TSH, thyroxin hormone (T4), and triiodothyroxin hormone (T3). Patients were categorized according to their thyroid status at the time of testing based on both the traditional definitions of thyroid dysfunction and using TSH and T4 levels of subclinical hyper- and hypothyroidism, overt hyper- and hypothyroidism. **Results:** Of 1800 cases collected over 6 months, 3.2% were overt hypothyroid (22.4% males and 77.6% females) ($P < 0.0001$). Moreover, 14.1% were subclinical hypothyroid cases (19.7% males and 80.3% females) ($P < 0.0001$). Overt hyperthyroid cases represent 3% (27.8% in male and 72.2% in females) ($P < 0.0001$). Subclinical hyperthyroid cases were 4% (18.3% in male and 81.7% in females) ($P < 0.0001$). Distribution of thyroid status (euthyroid, subclinical, and overt thyroid) in females significantly higher than in males (75.7%, 6.2%, and 18.1% respectively, $P < 0.0001$). Subclinical hypo- and hyperthyroid appeared in the age group (32–51 years) was significantly higher than other studied ages ($P < 0.05$), and overt hyperthyroid appeared in the age group (42–51 years) higher than other age of studied groups ($P < 0.05$), while overt hypothyroid was distributed equally in all age groups ($P > 0.05$). Less than ten percent of total patients were taking thyroid medication for hypo- and hyperthyroidism. Subclinical and overt thyroid cases received treatments were (47.4% and 42.9%, respectively). Treated old subjects >52 years represent about (17.6%) from the total patients. **Conclusion:** The majority of thyroid problems occur in adult age (32–50) and in females. Understanding the prevalence and risk factors of subclinical thyroid disease could be a help to identify the patients for screening and follow-up. Treatment recommendations must base on measuring thyroid-stimulating hormone concentrations and underlying comorbidities.

Keywords: Baghdad, prevalence, thyroid dysfunction

Introduction

Thyroid hormones play an important role in different metabolism processes and energy homeostasis as well as regulation of many organs performance. The main thyroid hormones; thyroxine (T4), and triiodothyronine (T3); are synthesized according to thyrotrophin (TSH) stimulation secreted from the anterior pituitary gland. Subclinical thyroid disease, either subclinical hypothyroid or subclinical hyperthyroid, present as a condition of normal thyroid hormones (T3, T4) with the change in TSH hormone without apparent symptoms.[1]

Elevated or depressed TSH is associated with indefinite and not serious symptoms in most cases.[2] However, some studies have shown that the risk of cardiovascular disease, cognitive impairment, polycystic ovarian syndrome, bone turnover, and some metabolic syndrome increases in patients with abnormal TSH.[3-7] Baseline TSH level, old age (over 60 years), female

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sex, and the presence of thyroid autoantibodies are the major risk factors possibly related to subclinical thyroid diseases as well as the progression to overt thyroid disease.[8-10]

The management of subclinical conditions is even debatable. Usually, treatment of subclinical hypothyroidism is considered only in patients with special conditions as in pregnant, infertile, or patients with high risk of progression to overt hypothyroidism.[11] In subclinical hyperthyroidism, treatment tends to be considered when the patient is old or when there is high risk of cardiovascular diseases or osteoporosis or a high risk of progression to overt hyperthyroidism.[8,12]

High prevalence of subclinical thyroid diseases in different populations was recorded according to many studies, they stated that >50% of subclinical thyroid disease eventually progressed to overt thyroid disease over 20 years. Therefore, screening and follow-up on the subclinical conditions of thyroid problems and prediction of progression to overt thyroid diseases is very important to reduce the clinical impact of these conditions that expected in future.[13-17]

Aim of the study

The aim of this study was to assess the prevalence of thyroid dysfunction (subclinical and overt) in the Iraqi population and the possibility of linking their incidence and progression to age and gender factors.

Patients and Methods

This cross-sectional study was conducted on the daily attendance of patients to the National Diabetes Center for Treatment and Research/Mustansiriyah University in Al-Karkh side from Baghdad/Iraq. A total of 1800 patients have been involved over a period of 6 months (from July to December 2018) after approval from the scientific committee in the center. This study involved both males and females from different age groups. After the physical examination and according to the specialist decision, all patients were subjected to laboratory tests (thyroid function test) to check thyroid hormones. For each individual, blood samples were collected and the following hormones were measured: serum thyroid-stimulating hormone (TSH), thyroxin hormone (total T4), and triiodothyroxin hormone (total T3) and recorded if the patient has received thyroid medication or not. Thyroid hormone measurements were done in the laboratory of the center by Enzyme-Linked Fluorescent Assay using a compact automated immunoassay system, MINI VIDAS® commercial kit (Biomerieux, France). The normal ranges of the MINI VIDAS® T3, T4, and TSHare (0.95–25 nmol/L), (60–160 nmol/L) and (0.25–5 μmol/L), respectively.[18]

Patients were categorized according to their thyroid status at the time of testing based on both the traditional definitions of thyroid dysfunction and using TSH and T4 levels of subclinical (hyper and hypothyroidism) overt (hyper and hypothyroidism as shown in Table 1.[19]

Statistical analysis

Results were expressed as mean and percentages using Microsoft Excel 2010 for the statistical analyses. Chi-square was used to compare percentages. Value of $P < 0.05$ was considered significant.

Results

The characteristics of this study sample are demonstrated in Table 2. The mean age for male was 33.9 years and for female was 38.7 years, percentage of the age distribution of the studied sample was as follows: <12 years was 8.1%, from 12 to 21 years was 12.8%, from 22 to 31 years was 15.8%, from 32 to 41 years was 19.9%, from (42 to 51) years was 21.7%, from 52 to 61 years was 14.6% and >62 years was 7.3%. Males represent 21.6%, while females represent (78.4%) from the study sample. Of 1800 subjects, euthyroid cases were 1363 (75.7%), overt thyroid and subclinical thyroid cases were 112 (6.2%), and 325 (18.1%) respectively.

Patients taking thyroid medication for hypo- and hyperthyroidism (170 patients) were as follows: the percentage of treated males was 9.8% and the percentage of treated females was 9.3% from the total. Subclinical and overt thyroid cases received treatments were 16.6% and 25.9%, respectively.

Table 3 shows the prevalence of thyroid abnormalities between males and females among the study sample.

Table 1: Definitions of thyroid disease and thyroid dysfunction levels

Thyroid dysfunction definition	TSH (μmol/L)	T4 (nmol/L)
Overt hyperthyroidism	<0.2	>160
Subclinical hyperthyroidism	<0.2	60-140
Euthyroidism	0.2-5.0	60-140
Subclinical hypothyroidism	>5.0	60-140
Overt hypothyroidism	>5.0	<60

Table 2: Characteristics of the study sample

Characteristics	Study population (n=1800), n (%)	Subjects taking thyroid medication (n=170)
Age distribution (years)		
<12	145 (8.1)	10 (6.2)
12-21	231 (12.8)	14 (6.1)
22-31	284 (15.8)	25 (8.8)
32-41	358 (19.9)	47 (13.1)
42-51	390 (21.7)	40 (10.3)
52-61	262 (14.6)	22 (8.4)
≥62	130 (7.3)	12 (9.2)
Mean age (years)		
Male	33.9	
Female	38.7	
Sex		
Male	388 (21.6)	38 (9.8)
Female	1412 (78.4)	132 (9.3)
Thyroid status		
Euthyroid	1363 (75.7)	87 (6.4)
Subclinical thyroid	325 (18.1)	54 (16.6)
Overt thyroid	112 (6.2)	29 (25.9)

Overt hypothyroid cases represent 58 (3.2%), 13 (22.4%) males and 45 (77.6%) females ($P < 0.0001$). Subclinical hypothyroid cases were 254 (14.1%), 50 (19.7%) males and 204 (80.3%) females ($P < 0.0001$). Overt hyperthyroid cases represent 54 (3%), 15 (27.8%) in males and 39 (72.2%) in females ($P < 0.0001$). Subclinical hyperthyroid cases were 71 (4%), 13 (18.3%) in males and 58 (81.7%) in females ($P < 0.0001$).

Figure 1 shows the distribution of thyroid status (euthyroid, subclinical, and overt thyroid) between males and females, as percentages of females significantly higher than males in the mentioned conditions (75.7%, 18.1%, and 6.2%, respectively), $P < 0.0001$.

Figure 2 shows the distribution of thyroid status among different age groups in the study sample, subclinical hypo-and hyperthyroid appeared in the age group (32–41) year which was significantly higher than other age groups ($P < 0.05$), and overt hyperthyroid appeared in the age group (42–51) higher than other age groups ($P < 0.05$), while overt hypothyroid was distributed equally in all age groups ($P > 0.05$).

Discussion

Prevalence of thyroid disease in Iraq was not clearly stated, this study has benefited from previous reports studied thyroid disease in different regions in Iraq. The present study focused on the prevalence of thyroid disease in Al-Kark hside from Baghdad city depend on data recorded in the diabetes center in this area.

Table 3: Prevalence of thyroid status between male and female

Study sample	Male, *n* (%)	Female, *n* (%)	*P*
Thyroid status			
Euthyroid	297 (21.8)	1066 (75.5)	<0.0001
Overt thyroid	28 (25)	84 (75)	<0.0001
Subclinical thyroid	63 (19.3)	262 (80.6)	<0.0001
Thyroid abnormalities			
Overt hypothyroid	13 (22.4)	45 (77.6)	<0.0001
Subclinical hypothyroid	50 (19.7)	204 (80.3)	<0.0001
Overt hyperthyroid	15 (27.8)	39 (72.2)	<0.0001
Subclinical hyperthyroid	13 (18.3)	58 (81.7)	<0.0001

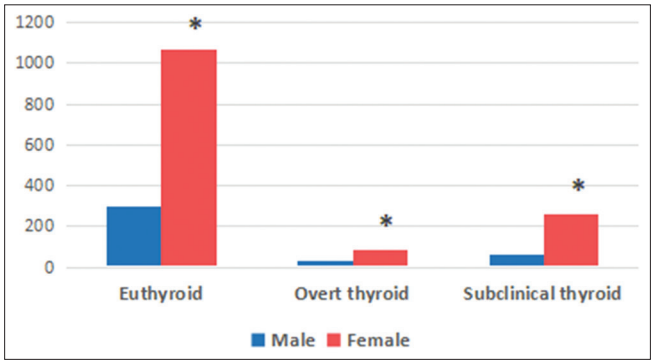

Figure 1: Distribution of thyroid status among study sample between males and females * represent significant difference ($P < 0.0001$)

The present study concerning the distribution of thyroid disease compatible with a previous study done in Baquba city by Athab *et al*. in 2014,[20] euthyroid status represent the greater percent of thyroid cases pointing to the fact that most patients suffer from thyroid symptoms (goiter) were with normal thyroid function test (normal T3, T4, TSH).

Concerning thyroid abnormalities between genders, the present study reported that thyroid diseases in females significantly higher than in males, these results were agreed with previous studies in the same (or other) region. Two studies in Baghdad and Baquba found the same results concerning hypo and hyperthyroid diseases between males and females.[20,21] We also agree with Dashty in his work in Erbil who stated that females were four times higher than males in getting hyperthyroidism.[22] Pakistan and India studied results also revealed that female is the predominant gender.[22-24]

In UAE study, females are more likely to develop overt hypothyroidism as stated by Alameri *et al*.[25] The higher incidence of thyroid problems in females may be attributed to stress-related to the nature of their life, women (especially Asian) had more domestic responsibilities than men. Females also are more exposed to nutritional deficiencies that can cause health problems such as goiter, anemia, and other disorders.[26] Meng *et al*. reported that females with high TSH and high free T3 (FT3) had higher metabolic syndrome risks than males.[27]

Regarding the prevalence of thyroid diseases among different age groups, there were conflicting results among reported studies. In the present study, a high prevalence of thyroid disease was seen in adult age (32–51 years) followed by, almost constant, old age (≥52 years) and young age (≤30 years) and then in children (<12 years). Two studies from India and Malaysia found thyroid diseases was observed more in the patient's age (41–60 years).[28,29]While a study from Ethiopia revealed the majority of thyroid diseases occurred in the age (30–39 years).[30]

It has been approved that the effect of both overt and subclinical hyperthyroid is similar and potential complications of untreated

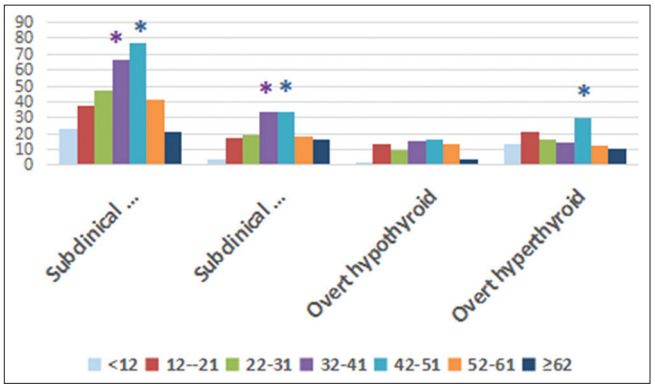

Figure 2: Distribution of thyroid status among different age groups in study sample; * represent significant difference ($P < 0.05$)

subclinical hyperthyroidism will be at high risk of incidence. The most profound consequences of subclinical overactive thyroid dysfunction are observed on the cardiovascular system and the skeleton.[31,32] A prospective cohort study with a follow-up period of 10 years, showed that low serum TSH level is a risk factor for atrial fibrillation.[33] Small-scale uncontrolled studies have shown an improvement in cardiac parameters of patients after the reconquest of the euthyroid state.[34,35] A risk of dementia also associated with long-term untreated subclinical hyperthyroidism.[5,36]

On the other side, strong evidence associated untreated subclinical hypothyroidism with progression to overt hypothyroidism recorded in prospective cohort studies.[8,37,38] Females and those with higher baseline TSH are more likely to develop overt hypothyroidism as stated by Alameri *et al*.[25] The presence of thyroid antibody raises the risk of developing subclinical and then progressing to overt hypothyroidism. Smoking status, environmental temperature, and ethnicity are also risk factors for subclinical hypothyroidism. The role of iodine is somewhat controversial.[39,40]

Because of the high progression rate of subclinical thyroid to overt thyroid, treatment is compulsory, especially in high-risk population such as older patients (>65 years) or in presence of comorbidities (such as osteoporosis and atrial fibrillation).[41,42] In the present study, less than half subclinical thyroid patients (including old age patients) were received thyroid medication suggesting an increased likelihood of thyroid complications and increase progression to overt thyroid dysfunction in future. Biondi *et al*. recommend treating elderly patients with subclinical hyperthyroidism patients because of high cardiovascular and skeletal risks and the frequent progression of subclinical hyperthyroidism to overt hyperthyroidism.[42]

Conclusion

The majority of thyroid problems occur in adult age and in females. Understanding the prevalence and risk factors of subclinical thyroid disease could be a help to identify the patients for screening and follow-up. Treatment recommendations must base on thyroid-stimulating hormone concentrations and underlying comorbidities.

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Conflicts of interest

There are no conflicts of interest.

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