

Original article

Total Cholesterol and Thyroid-Stimulating Hormone Levels in Libyan Patients with Thyroid Dysfunction

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Abstract

Thyroid dysfunction (hypothyroidism and hyperthyroidism), has been linked to dyslipidaemia with significant variations in the numbers of those suffering from these conditions in populations around the world. This present study examines 46 patients in Nofliyeen diagnostic laboratory in Tripoli, Libya with these conditions, and compares their TC and TSH levels with 58 healthy controls. 5 ml of venous blood was drawn from each participant and TC was measured using spectrometry method by Evolution 3000. The COBAS e 411 (Roche, Germany) electrochemiluminescence technique was used to measure TSH. A positive correlation was found between TC and TSH in patients with hypothyroidism and a negative correlation observed between TC and TSH in patients with hyperthyroidism. TC levels were significantly higher in patients with thyroid dysfunction compared to the healthy control group.

Keywords: Thyroid dysfunction, Thyroid-stimulating hormone, Total cholesterol.

Introduction

Globally, thyroid dysfunction is the most prevalent endocrine condition. In Libya, in 2011, subclinical hypothyroidism was estimated to be 2.3% prevalent (1) whereas hypothyroidism prevalence was reported to be 6.18% (2). Thyroid diseases are found to be more common among the Arab population of Jordan than any other part of the world (3). Changes in the quantity of thyroid hormones released are a sign of thyroid dysfunction. Hyperthyroidism is caused by excessive thyroid hormone release, whereas hypothyroidism is caused by a deficiency in thyroid hormone production (4). Other human health disorders like dyslipidaemia (5) is impacted by thyroid dysfunction in a variety of ways.

Several previous investigations have shown a correlation between the lipid profile and serum thyroid-stimulating hormone (TSH) (6). Other researchers has shown that subclinical hypothyroidism is associated with dyslipidaemia (7). Despite extensive studies already undertaken evaluating the role of lipid parameters in thyroid dysfunction, their impact is still unclear.

The purpose of this study was to compare the total cholesterol (TC) levels of thyroid dysfunction in patients (hypothyroidism and hyperthyroidism) in Tripoli, Libya, with those of healthy individuals. It aimed also to investigate any correlation between serum TSH levels and TC levels in Libyan patients with thyroid dysfunction.

Methods

The study included 19 patients with hyperthyroidism and 27 with hypothyroidism. In this study, 58 healthy individuals served as controls. Every subject ranged in age from 20 to 82 years. For every participant, data including age and sex were gathered and documented and 5 ml of venous blood was drawn from each participant in the Nofliyeen diagnostic laboratory. TC was measured by using spectrometry method by Evolution 3000. The COBAS e 411 (Roche, Germany) electrochemiluminescence technique was used to measure TSH. Serum TSH abnormalities are indicative of thyroid dysfunction, the normal range is 0.3 to 4.2 μ IU/ml. The statistical package SPSS version 26.0 (SPSS, IBM® SPSS® Statistics 26) was used for statistical analysis. Significant difference was considered at $P < 0.05$.

Results

In the current study 46 individuals with thyroid disorders (21 men and 25 women) and a healthy control group of 58 participants (21 men and 37 women) were enrolled. The control group's mean age was 40.1 ± 15.3 years, while the patient group was 39.8 ± 13.7 years. The mean age of patients with hyperthyroid diseases was 38.4 ± 10.16 years, whereas the mean age of patients with hypothyroid thyroid disorders was 40.2 ± 12.3 years. Thyroid dysfunction was more prevalent in women (54.4%) than in men (45.6%) as shown in Table 1.

Table 1. Participants' ages, their sex, and percentages for controls and patients with thyroid dysfunction syndrome.

Parameter	Control group	hypothyroid group	Hyperthyroid group
Male	21 (36.2%)	12 (44.4%)	9 (47.4%)
Female	37 (63.8%)	15(55.6%)	10 (52.6%)
Mean age (years)	40.1 ± 15.3	40.2 ± 12.3	38.4 ± 10.16

Although the thyroid dysfunction group's mean serum TSH levels were somewhat higher than those of the control group (2.3 ± 2.79 vs. 2.05 ± 0.79 $\mu\text{IU/ml}$), there was no statistically discernible difference (p value= 0.405) observed. The thyroid dysfunction group had considerably higher mean serum TC levels than the control group (233.3 ± 130.3 vs. 166.9 ± 52.1 mg/dl; $p=0.001$) as shown in Table 2.

Table 2. Comparison of mean TC and TSH levels between patients with thyroid dysfunction and controls.

Serum levels	Control (n=58)	Thyroid dysfunction (n=46)	P-value
TSH $\mu\text{IU/ml}$	2.05 ± 0.79	2.3 ± 2.79	0.405
TC (mg/dl)	166.9 ± 52.1	233.3 ± 130.3	0.001

In hypothyroid cases, a positive correlation ($p=0.035$) between the serum TSH value and the TC levels was found; in hyperthyroid cases, a negative correlation was obtained ($p=0.043$). No significant association ($p > 0.05$) between the TSH and TC levels in the control group was observed as shown in Table 3. A statistically significant correlation ($P < 0.05$) between TC and TSH levels is shown in two scatter plots in Figure 1 and 2.

Table 3 Correlation of TSH with TC in controls and each thyroid dysfunction syndrome

TC	Pearson Correlation	P-value
Hypothyroid (TSH)	0.415*	0.035
Hyperthyroid (TSH)	-0.468-*	0.043
Control	-0.210	0.114

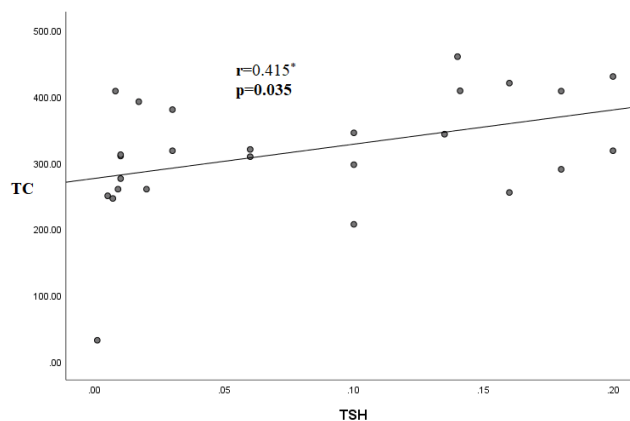


Figure 1. Scatter plot showing a positive correlation between TSH and TC in in hypothyroid patients.

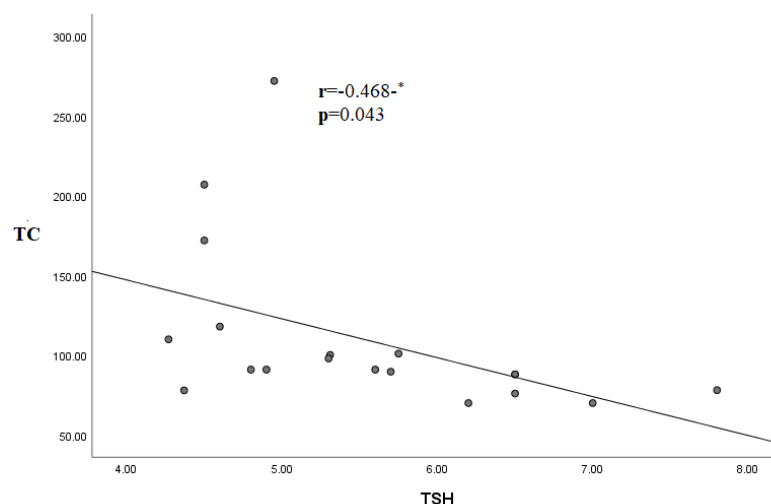


Figure 2. Scatter plot showing a negative correlation between TSH and TC in hyperthyroid patients.

Discussion

The main finding of the current study was that those with thyroid dysfunction had significantly higher serum TC levels compared to the control group. TC was shown to be higher in patients with subclinical hypothyroidism than in the control group in a previous study conducted in Benghazi, Libya (8). This result was consistent with a recent study conducted on patients in Jordan (9). An additional study on Indian patients also demonstrated that TC levels were higher in hypothyroid and subclinical hypothyroid individuals than in controls (10). This present study in Tripoli, Libya found a significant positive correlation between TC levels and TSH in patients with hypothyroidism. Whereas in patients with hyperthyroidism, TC levels and TSH showed significant negative correlation. In contrast to this, in a previous study conducted in Benghazi, Libya patients with subclinical hypothyroidism (8) showed no significant correlation between TC and TSH levels. The considerable disparities between the regions of Libya's east and west, in terms of cultures, lifestyles, genetics, environment and diet could be the cause of the different results observed in these two studies. Additionally, the current study revealed that thyroid dysfunction was more common in Libyan women than in men. The hormonal changes that women undergo during their life cycle, such as puberty, the menstrual cycle, pregnancy, childbirth, lactation, and menopause, may make them more susceptible to thyroid malfunction (11). Thyroid dysfunction in females may also be more common due to immunological changes that impact thyroid hormone levels during the prenatal, perinatal, and postpartum phases (12,13). Although the impact of thyroid hormones on female reproduction has been studied, more research is needed to determine how female sex hormones affect thyroid function and how the prevalence of thyroid dysfunction varies across the sexes.

In conclusion, this study showed that Libyans with thyroid disease have elevated TC levels. It has been known that one of the main risk factors for cardiovascular disease is dyslipidaemia. As a result, the current study supports the importance of screening for thyroid dysfunction in high-risk categories, including women. Additionally, raising public awareness of thyroid dysfunction can aid in the early detection of thyroid disorders allowing appropriate and timely treatment to be provided. Lastly, the current study highlights how crucial it is to keep an eye on TC levels in thyroid dysfunctional patients in order to prevent or help reduce cardiovascular illnesses. Thyroid disease may be helped by supplementing iodine in the diet, by eating dairy and seafood, enabling the thyroid gland to function better.

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