

Original Research

Relationship between hsCRP and TSH in patients with subclinical hypothyroidism

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Abstract

Background: Subclinical hypothyroidism patients are at high risk of developing cardiovascular disease. Identifying the risk factors like high sensitivity C-reactive protein (hsCRP) and lipid profile in patients with subclinical hypothyroidism helps in the early diagnosis and treatment of cardiovascular disease (CVD). The mortality and morbidity due to CVD can be reduced and further progression to overt hypothyroidism can be halted. This study aims to assess the levels of inflammatory markers like hsCRP and lipid profile and their relationship with TSH in subclinical hypothyroidism. **Material and methods:** The study population comprised 300 patients with subclinical hypothyroidism (SCH) and 300 euthyroid. It was an analytical cross-sectional study. The levels of free thyroxine (fT4), and thyroid-stimulating hormone (TSH) in serum samples were measured using the chemiluminescence immunoassay method. The serum Lipid profile and hsCRP were measured using Seimens autoanalyzer. Low-density lipoprotein (LDL-C) and very low-density lipoprotein (VLDL-C) were calculated using friedewald formula. **Results:** The observed means of SCH and euthyroid were compared using student's unpaired t-test to determine if there was a significant difference between the two. The mean levels of TSH, hsCRP, Total cholesterol, Triglycerides, LDL-C, and VLDL-C were found to be highly significant ($p < 0.0001$). The mean levels of fT4, and HDL-C were found to be significant ($p < 0.05$). Pearson's correlation analysis showed a significant positive correlation between TSH and hsCRP in subclinical hypothyroidism. **Conclusion:** hsCRP and lipid profile may be used as a marker to predict the underlying inflammatory process that leads to the development of cardiovascular disease in subclinical hypothyroidism. Early diagnosis and treatment will prevent the progression of subclinical hypothyroidism to overt hypothyroidism.

Keywords: subclinical hypothyroidism, cardiovascular disease, and inflammatory marker.

Introduction

One of the most common endocrine disorders worldwide is thyroid disorders [1]. Subclinical hypothyroidism (SCH) is one of the common health issues with a prevalence rate of 3–8% [2].

SCH is a mild variant of hypothyroidism. In this condition, peripheral thyroid hormones levels – free triiodothyronine (fT3), and free thyroxine (fT4) are within normal limits while thyroid-stimulating hormone (TSH) are mildly increased.

Most SCH patients have very little or no symptoms. It's primarily a laboratory diagnosis. Many cases of SCH are diagnosed accidentally while screening the general population for medical conditions like type 1 diabetes, hyperlipidemia, atrial fibrillation, Down's syndrome, and breast cancer [3].

SCH is highly associated with cardiovascular disease (CVD) risk [4]. Many studies have shown the relationship between SCH and atherosclerotic risk factors [5, 6]. Recently, many inflammatory markers have emerged among which high



sensitive C-reactive protein (hsCRP) serves as a strong predictor of CVD than low-density lipoprotein (LDL-C) [7]. But few studies have found no significant difference between these two [8, 9]. Because of these conflicts, the current study was undertaken. The purpose of the current study was to compare the mean levels of thyroid profile in SCH and euthyroid and also to assess the relationship between hsCRP and TSH in patients with SCH.

Material and methods

The current study was an analytical cross-sectional study done in Tagore hospital and research institute, Rathinamangalam. The study was done after getting informed consent from the study subjects. The study subjects between 20 and 70 years were included in the study.

Using the standard procedure, height and weight were measured and body mass index was calculated.

Those subjects with normal free T4 (0.58–1.64 ng/dl) and TSH above 4.5 µIU/ml (0.34–4.5 µIU/ml) were categorized as SCH. Those who suffer from diabetes mellitus, hypertension, liver disorders, renal failure, congestive cardiac failure, tuberculosis, etc. were excluded from the

study. Those patients on thyroid medication were excluded from the study. Pregnant ladies were excluded from the study.

Under standard aseptic precautions, 5 ml of venous blood sample was collected. The levels of free thyroxine (fT4), and thyroid-stimulating hormone (TSH) in serum samples were measured using UniCel DxI 600 – Chemiluminescence immunoassay method. The serum lipid profile and hsCRP were measured using Seimens autoanalyzer. Low-density lipoprotein (LDL-C) and very low-density lipoprotein (VLDL-C) were calculated using friedewald formula.

Statistical analysis

The means of SCH and euthyroid were compared using the student’s independent t-test. Pearson’s correlation analysis was done to find the association between hsCRP and TSH. p-Value <0.05 was considered statistically significant. SPSS software was used to perform statistics.

Results

Subclinical hypothyroidism patients had significantly higher BMI, Free T4, TSH, hsCRP,

Table 1: Characteristics of subclinical hypothyroidism (SCH) and Euthyroid.

Variables	SCH (n=300)	Euthyroid (n=300)	p-Value
Age (years)	39.64±12.93	43.77±14.85	0.1885
BMI (kg/m ²)	25.02±1.83	24.12±1.45	0.0076*
Systolic BP (mmHg)	120±5.82	121.02±5.06	0.352
Diastolic BP (mmHg)	83.19±4.92	82.12±6.99	0.3783
Serum Free T4 (ng/dl)	1.248±0.289	1.328±0.224	0.0002*
Serum TSH (mIU/l)	7.168±1.332	2.248±0.926	0.0001*
Serum hs-CRP (mg/l)	7.654±4.012	1.502±0.834	0.0001*
Serum TC (mg/dl)	169.72±35.06	128.86±19.979	0.0001*
Serum TGL (mg/dl)	134.25±42.42	110.11±16.56	0.0001*
Serum HDL-C (mg/dl)	43.116±17.14	40.217±12.541	0.0184*
Serum LDL-C (mg/dl)	101.994±24.644	91.16±13.86	0.0001*
Serum VLDL-C (mg/dl)	26.719±8.559	22.094±3.3873	0.0001*

*p<0.05 – Statistically significant, BMI – body mass index, TC – total cholesterol (mg/dl), TGL – triglycerides (mg/dl), HDL-C – high density lipoprotein cholesterol (m/dl), LDL-C – low density lipoprotein cholesterol (mg/dl), VLDL-C – very low density lipoprotein cholesterol (mg/dl).

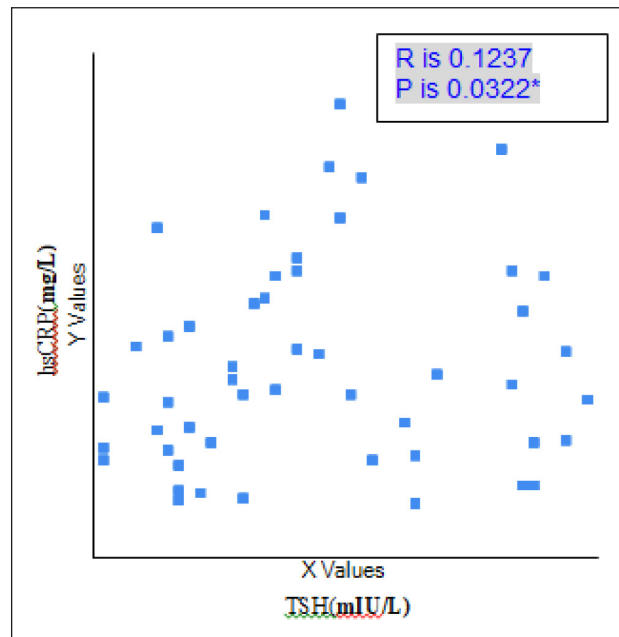


Figure 1: Pearson's correlation analysis in subclinical hypothyroidism.

* $p < 0.05$ – statistically significant.

TC, TGL, HDL-C, LDL-C, and VLDL-C compared to euthyroid. There was no significant difference in the means of age, and systolic and diastolic blood pressure.

In subclinical hypothyroid patients there was a significant positive correlation between TSH and hsCRP.

Discussion

Subclinical hypothyroidism is a mild variant of thyroid disorders. In the general population, the prevalence of SCH is about 7.5% in males, and 3.1% in females [10]. Many studies have found that SCH is highly associated with cardiovascular disease risk factors [11–13]. A study by Sharma et al. also reported a significant difference in the mean levels of serum hsCRP, LDL-C, and total cholesterol in SCH when compared to euthyroid [14].

All these findings suggest that low-grade inflammation sets in SCH. Studies by Roy et al. [15] and Syamsunder et al. [16] have reported that in SCH there occurs stimulation of the sympathetic nervous system and inhibition of vagal activity which are the root cause of low-grade inflammation and they are directly related to hsCRP. Hence SCH patients are at potential risk

of developing atherosclerosis which in turn leads to coronary artery diseases.

One of the major causes of death worldwide is CVD. Early diagnosis of CVD risk factors in SCH is necessary so that mortality and morbidity can be considerably reduced.

Conclusion

The current study found high levels of inflammatory markers like hsCRP and lipid profile in patients with SCH when compared to euthyroid. These findings suggest that SCH patients have a high risk of developing CVD as compared to euthyroid. Hence these inflammatory markers may be used for early diagnosis of CVD in SCH. Also, it helps to prevent the progression of SCH to overt hypothyroidism.

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Conflict of interest

There was no conflict of interest among authors.

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