

## **STUDY OF ASSOCIATION OF SUBCLINICAL HYPOTHYROIDISM WITH DYSLIPIDEMIA**

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### **ABSTRACT**

**INTRODUCTION:** Thyroid hormones are important metabolic regulators having direct and indirect action on lipid production, disposal and efflux.

It may be associated with dyslipidaemia, leading to the associated risks of coronary artery diseases and atherosclerosis. To date this has not been clearly elucidated in Indian populations which are considered to be a high risk group when it comes to Coronary Artery Disease.

We in our study have tried to elaborate and find a relationship between Subclinical Hypothyroidism and Dyslipidaemia.

**OBJECTIVE:** To study the association of subclinical hypothyroidism with dyslipidaemia using a normothyroid group as control population.

**METHOD:** Ours is a cross sectional observational study undertaken after approval of the Institutional Review Board. After due consent and verification of the inclusion and exclusion criteria, 100 normothyroid and 100 naïve subclinical hypothyroid patients were considered for the study and their fasting lipid profile checked. The data was compiled and after appropriate statistical analysis inferences were drawn.

**RESULTS:** Our study demonstrated a statistically significant difference in the lipid profile and composition of the two groups with the Subclinical hypothyroid having a higher prevalence of dyslipidaemia.

**CONCLUSIONS:** We were able to demonstrate significantly higher levels of prevalence of dyslipidaemia in the subclinical hypothyroid group as compared to the general population. This is of interest as this group of patients are not targeted for therapy. Further research using larger data pools is required to formulate treatment goals and to evaluate the need for screening SCH patients for dyslipidaemia which may help in preventing and reducing the CAD burden.

**KEY WORDS:** subclinical hypothyroidism, dyslipidaemia, thyroid, cholesterol

## INTRODUCTION

Thyroid hormones regulate metabolic process crucial for the normal development and growth, as well as metabolic regulation. Thyroid hormones have direct and indirect actions on the regulation of lipid production, disposal and efflux [1]

Our study deals with subclinical hypothyroidism. The term Subclinical Hypothyroidism was originally used to describe the patient with a low-normal fT4 but a slightly elevated serum TSH level.[2] Other terms used for this are mild hypothyroidism, preclinical hypothyroidism, decreased thyroid reserve, early thyroid failure. The TSH value in such patients is modest, with values typically between 5 and 15 mIU/L, although patients with TSH above 10 mIU/L more often have a reduced fT4 and many have true hypothyroid symptoms.[2]

Subclinical hypothyroidism may be associated with dyslipidaemia and studies on the risks of cardiovascular disease and mortality due to coronary heart disease in these patients, however, have yielded conflicting results. To date, the clinical significance of cardiovascular effects after long-term subclinical hypothyroidism has not been definitively clarified.[3] especially in Indian Populations.

Thyroid hormones have varied effects on lipid metabolism, because thyroid function regulates cholesterol synthesis and degradation and mediates the activity of key enzymes in these pathways. Thyroid hormones reduce cholesterol concentration mainly through the increased expression of low-density lipoprotein (LDL) cholesterol receptors in the liver and peripheral organs.[4] There have been previous studies regarding correlation between subclinical hypothyroidism and Lipid profile internationally but local data has been lacking.

## METHODOLOGY

After approval from the Institutional Review Board , we conducted our study at a Tertiary care hospital from a period of January 2016 to August 2017.

A sample size of 200 was taken with 100 normothyroid patients as controls and 100 naïve subclinical hypothyroid patients as cohorts.

### **Inclusion Criteria**

Patients newly diagnosed as subclinical Hypothyroidism.

Age > 18 years

### **Exclusion Criteria**

Pregnant Females

Patients with overt hypothyroidism

Heavy exercise prior to 24 hours of the test

Critically ill patients admitted in intensive care unit

The thyroid profile was assessed by withdrawing venous blood under aseptic precautions and estimation of TSH, T3 and fT4 was done using a fully automated immunofluorescence immunoassay analyser was used to estimate TSH, fT4 and T3.

### **Thyroid stimulating hormone (TSH)**

- Normal range – 0.34 to 4.25 mIU/L.
- Abnormal - < 0.34 or > 4.25 mIU/L.

### **Free Thyroxine (fT4)**

- Normal range – 0.7 – 1.9 ng/dL.
- Abnormal - <0.7 or > 1.9 ng/dL.

### **Triiodothyronine (T3)**

- Normal range – 1.2- 2.1 ng/mL
- Abnormal - <1.2 or >2.1ng/mL

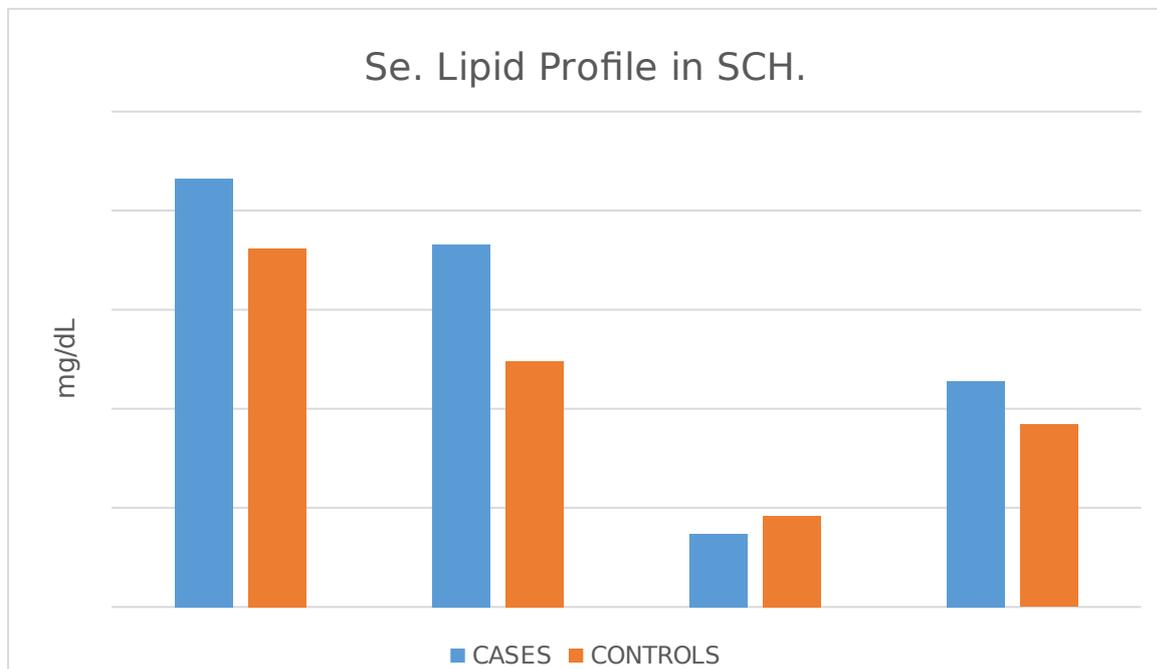
The lipid profile was assessed using an 8 hour fasting venous sample drawn under aseptic precautions.

Based on NCEP (National Cholesterol Education Program) guidelines normal values of lipid parameters were taken as follows

- Low density lipoprotein < 100 mg/dL.

- High density lipoprotein;  
Male >40 mg/dL  
Female >50 mg/dL
- Total Cholesterol <200mg/dL
- Triglycerides <150mg/dL

## RESULTS



	<b>CASE (N=100)</b>	<b>CONTROL (N=100)</b>	<b>p VALUE</b>
TOTAL CHOLESTEROL	216.44±44.35	181.5±50.03	<0.0001
TRIGLYCERIDE	183.71±86.04	124.79±49.98	<0.0001
HDL	37.39±6.03	46.87±6.27	<0.0001
LDL	114.07±25.52	92.09±22.93	<0.0001

Our study demonstrated a statistically significant ( $p < 0.0001$ ) difference across all the measured serum lipids ( Total Cholesterol, Triglycerides, HDL and LDL Cholesterol levels) being much higher in the population having subclinical hypothyroidism than in normothyroid population.

This correlates well with other studies done by Murgod R. et al [5], Desai JP et al [6], Gutch M et al [7], Khan MA et al [8].

## DISCUSSION

Our study deals with the correlation between SCH and dyslipidaemia.

Following are a few of the proposed mechanism for dyslipidaemia in Subclinical Hypothyroidism

- Primary accumulation of LDL cholesterol due to reduction in the number of cell surface receptors for LDL results in decreased catabolism of LDL[9]
- Diminished secretion of cholesterol into bile[10]
- Reduced cholesteryl ester transfer (the net transfer of cholesterol from HDL to LDL and VLDL) in hypothyroidism may minimize the increase in serum LDL cholesterol concentrations[10]
- Reduced lipoprotein lipase activity is responsible for the development of hypertriglyceridemia in hypothyroidism although the rate of TG synthesis is normal[9]

The relationship between subclinical hypothyroidism and serum lipids remains controversial[11] In several cross-sectional studies, subclinical hypothyroidism was found to be associated with a variable and somewhat inconsistent increase in TC and in LDL-C, [12,13] higher plasma oxidized LDL-C levels[14] and inconsistent changes in serum levels of HDL-C[15] whereas Indian studies have consistently demonstrated a statistically significant correlation between dyslipidaemia ( including TC, LDL, HDL and TGs) [5,6,7]

This may need to be further investigated and correlated with dietary, ethnic and genetic factors as the Indian Population is at a higher risk for CAD and dyslipidaemia as compared to non -Asians[16,17] and on management and need to treat SCH at an earlier stage in Indian Population in view of the significant correlation between SCH and dyslipidaemia as has consistently been demonstrated in South Asian Populations.

#### LIMITATIONS

We conducted our study over a relatively small sample size which was limited to a small geographical region. Further larger studies involving large populations over a larger region so as to cover different ethnicities and dietary habits would be beneficial.

#### CONFLICTS OF INTEREST

None

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