

**Original Article****Lipid Abnormalities in Patients with Subclinical Hypothyroidism Attending a Tertiary Care Centre in Rural South Kerala**

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Abstract

Background: *There exists a controversy regarding the association of subclinical hypothyroidism with lipid abnormalities. The present study was planned to determine whether lipid abnormalities is present in patients with subclinical hypothyroidism in rural South Kerala.*

Objective: *To study the prevalence of lipid abnormalities among patients with subclinical hypothyroidism*

Materials & Methods: *This was an observational study among 102 patients with subclinical hypothyroidism. The lipid abnormalities in the form of total cholesterol, LDL, HDL, VLDL and triglyceride levels were studied in these patients.*

Results: *In this study, 72% were females showing a female preponderance. About 71.6% had elevated total cholesterol levels. 72.5% patients had elevated LDL levels. VLDL levels were elevated only in 46.1%. Also 60.8% had HDL levels within normal levels and only 39% had HDL levels <45mg/dl. Triglyceride levels were elevated in 56.9% patients. When the lipid abnormalities were assessed according to the severity of subclinical hypothyroidism, there was a significant increase in dyslipidemia among those who had TSH level >10 µIU/ml.*

Conclusions: *This study showed significant increase in total cholesterol, LDL, triglyceride levels as well as not much increase in VLDL levels in patients with subclinical hypothyroidism*

Keywords: *Subclinical hypothyroidism; Lipid profile; Cardiovascular risk.*

Background

Subclinical hypothyroidism is defined as an elevation in thyrotropin (TSH) levels in the presence of normal serum free T4 and free T3 and presents with few or no significant clinical signs and symptoms⁽¹⁾. In India, the prevalence is 9.4%⁽²⁾ with more female preponderance (11.4%)^(3,4). Although it has been the focus of multiple clinical

studies over the past 70 years, the relationship between thyroid function, lipid levels, and cardiovascular outcome remain incompletely understood. Subclinical hypothyroidism could impair vascular function by increasing systemic vascular resistance and by altering endothelial function, thus potentially increasing the risk of atherosclerosis and coronary artery disease⁽⁵⁾.

There exists a controversy regarding the association of subclinical hypothyroidism with lipid abnormalities and whether individuals should be screened for subclinical hypothyroidism and lipid abnormalities⁽⁶⁾. There are only very few Indian studies about lipid profile in subclinical hypothyroidism. With this background in consideration, the present study was planned to determine the prevalence of lipid abnormalities in patients with subclinical hypothyroidism in rural Kerala.

Aims and Objectives

1. To study the proportion of lipid abnormalities among patients with subclinical hypothyroidism.
2. To assess whether there is any relationship between lipid abnormalities and TSH levels.

Materials and Methods

Study Design: Observational Study carried out over a period of 1 year (January 2016 to January 2017)

Study Population: 102 patients who attended outpatient department of General Medicine at a tertiary care centre in rural South Kerala.

Inclusion Criteria

1. Elevated TSH greater than 5.2 μ IU/mL
2. Normal Free T4 (0.6-1.1 ng/dl)
3. Normal Free T3 (2.5-3.9 pg/ml)

Exclusion Criteria

1. Obese people with body mass index (BMI) greater than 30 Kg/ m²
2. Current smokers and alcoholics
3. Diabetes mellitus (FBS>110mg/dl)
4. Renal insufficiency (serum creatinine > 1.5 mg/dl)
5. Hepatic failure
6. Diagnosed cases of hypothyroidism
7. Those already on treatment for hyperthyroidism/hypothyroidism/dyslipidemia
8. Thyroid cancer

9. People with a history of antipsychotic treatment or estrogen intake

Study Variables: Age, Sex, Clinical features, Routine Blood Investigations, Serum TSH, Serum Free T3, Serum Free T4, Total cholesterol, LDL, HDL, VLDL, triglyceride levels

Data Collection Procedure: All patients who satisfy the inclusion criteria were subjected to history taking, clinical examination and routine investigations along with lipid profile. Patients were diagnosed to have subclinical hypothyroidism if TSH was > 5.2 μ IU/mL along with normal Free T4 (0.6-1.1 ng/dl) and normal Free T3 (2.5-3.9 pg/ml). Lipid profile included total cholesterol, LDL, VLDL, HDL and triglyceride levels.

Cut off for abnormal lipid levels were: Total cholesterol \geq 200mg/dl; LDL \geq 130mg/dl; VLDL \geq 35mg/dl; HDL \leq 45 mg/dl; Triglyceride \geq 150mg/dl

TSH, FT4, FT3, total cholesterol, HDL, VLDL, Triglyceride levels are done in the hospital laboratory. LDL level was calculated using Friedewald formula ie, LDL= Total cholesterol-HDL-(Triglyceride/5)

Analysis: Data was entered into excel sheet and analysis was done by using SPSS version 20. Qualitative variables were summarized using percentage and proportions. Quantitative variables using mean with standard deviation. Associations were checked using Chi –square test. Association between numerical variables was computed using Pearson’s correlation co- efficient. The level of significance was set at P<0.05., 95% confidence interval.

Observations

A total of consecutive 102 cases of subclinical hypothyroidism patients, who satisfied inclusion and exclusion criteria were enrolled in the study after obtaining the informed consent from the patient. The sample population included patients of age 18 to 90 years. Out of the 102 patients, 36 (35%) were belonging to the age group <30 years.

Figure 1 Percentage distribution of the sample according to age

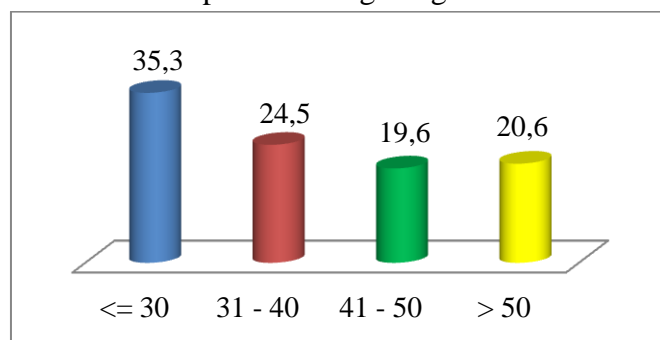
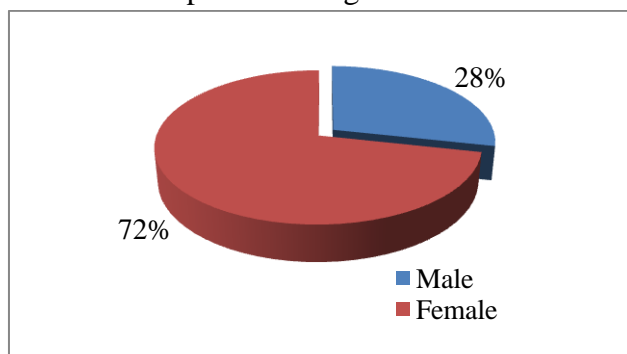
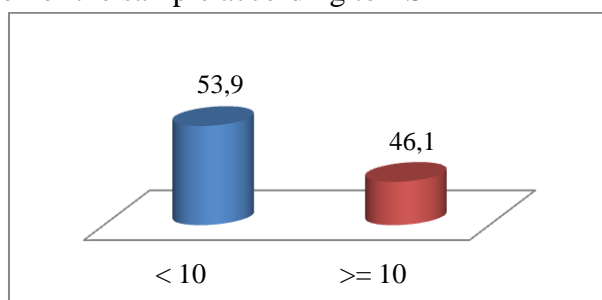


Figure 2 Percentage distribution of the sample according to sex



Here in the study, 55 patients (53.9%) had TSH values between 5.2- 10 μ IU/ml and 47 patients (46.1%) had TSH value >10 μ IU/ml. The mean TSH level was 10.8 μ IU/ml.

Figure 3 Percentage distribution of the sample according to TSH



LDL level above 130mg/dl was considered abnormal in this study. We had 72.5% patients with elevated LDL and 27.5% patients with normal values. Mean LDL was 148.5 +/- 31mg/dl.

Table 3 Distribution of the sample according to VLDL

VLDL	Count	Percent
Normal	55	53.9
Abnormal	47	46.1
Mean \pm SD	38.7 \pm 17.2	

For VLDL, we had taken 35mg/dl as the cut-off range. 53.9 % (55/102) patients were within the normal range and 46.1 % (47/102) patients had elevated VLDL. Mean VLDL was 38.7 +/- 17.2mg/dl.

Table 4 Distribution of the sample according to HDL

HDL	Count	Percent
Abnormal	40	39.2
Normal	62	60.8
Mean \pm SD	42.3 \pm 6.5	

HDL above 40mg/dl was considered to be normal. In this study, we had 62 patients (60.8%) with normal HDL level and 40 patients (38.2%) with abnormal HDL level ie, <40mg/dl. The mean HDL level was 42.3+/-6.5mg/dl

Table 5 Distribution of the sample according to Triglyceride level

Triglyceride level	Count	Percent
Normal	44	43.1
Abnormal	58	56.9
Mean ± SD	193.6 ± 85.9	

TG value > 150 was considered to be abnormal. 58patients (56.9 %) had elevated TG levels and 44 patients (43.1%) had normal TG level. The mean TGL level was 193.6mg/dL

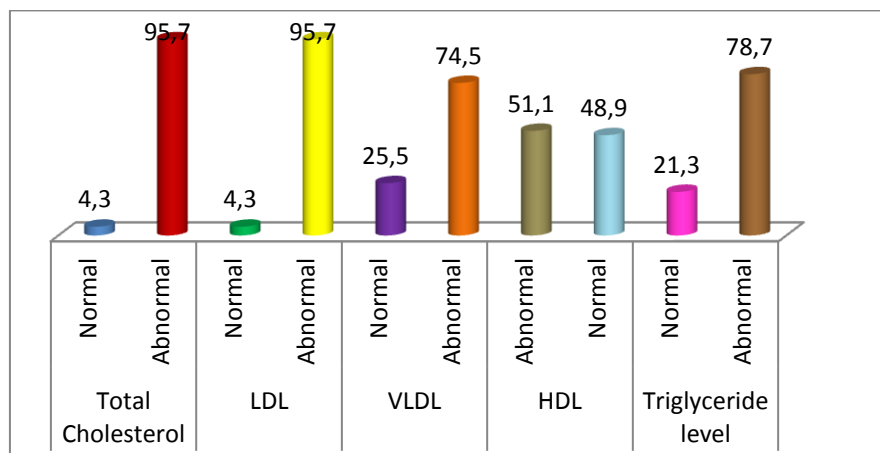
Table 6 Association of Lipid abnormalities with elevated TSH among patients with subclinical hypothyroidism

From this table, we can infer that abnormalities in the components of lipid profile is more when TSH >10 µ IU/ml when compared with values in patients having TSH <10 µ IU/ml

		< 10		≥ 10		χ ²	P
		Count	Percent	Count	Percent		
Total Cholesterol	Normal	27	49.1	2	4.3	25.04**	0.000
	Abnormal	28	50.9	45	95.7		
LDL	Normal	26	47.3	2	4.3	23.55**	0.000
	Abnormal	29	52.7	45	95.7		
VLDL	Normal	43	78.2	12	25.5	28.27**	0.000
	Abnormal	12	21.8	35	74.5		
HDL	Abnormal	16	29.1	24	51.1	5.13*	0.023
	Normal	39	70.9	23	48.9		
Triglyceride level	Normal	34	61.8	10	21.3	16.98**	0.000
	Abnormal	21	38.2	37	78.7		

**:-Significant at 0.01 level, *:-Significant at 0.05 level

Figure 4 Association of Lipid abnormalities with elevated TSH >10 µ IU/ml among patients with subclinical hypothyroidism



This table shows that all components of lipid profile were abnormal when TSH is more than 10 µ IU/ml.

Discussion

This study was conducted in the Department of Medicine at a tertiary care centre in rural South. A total of 102 patients were enrolled in this study. In the present study, 73 (72 %) were females and 29 (28%) were males. The study showed female preponderance which was similar to a study done by Hueston et al⁷ where 8228 subclinical hypothyroidism patients were enrolled, among

which 72.6% were females and 27.4% were males. The mean age of cases in this study was 38.6 ± 12.5. This is similar to the study done by Sharma et al⁸, Gauhati where the mean age was 39.43±9.72 years. Another study by Alamdari S et al⁹ also showed mean age group to be 38.5±8.5. This suggests that mean age of patients of hypothyroidism seeking healthcare is around 40 years. This implicate that if treatment and other

lifestyle interventions are initiated at a proper time these complications can be delayed, if not fully corrected. This study showed mean TSH to be 10.8. About 53.9 % of patients are having TSH between 5.2- 10 μ IU/ml and 46.1% are with TSH value of >10 μ IU/ml. This was similar to a study done by Guntaka et al¹⁰, Andhra Pradesh, where the mean TSH level was 9.76 μ IU/ml. Another study by Sharma et al⁸ showed the mean TSH level to be 9.03 μ IU/ml.

While analysing the lipid abnormalities in these cases of subclinical hypothyroidism, the mean total cholesterol level was 229.5 ± 41.5 . Among 102 patients studied, 73 (71.6%) had elevated total cholesterol levels. This result was similar to a study done by Hueston et al⁷ and Prasad et al¹¹. The mean LDL level among the study subjects was 148.4 ± 31 . Among that, 74 (72.5%) patients had LDL level > 130 mg/dl and 28 (27.5%) patients had LDL <130 mg/dl. This is similar to a study done by Desai et al¹² which showed mean LDL level to be 157.71mg/dl among subclinical hypothyroidism group, which was statistically significant. Another study by Prasad et al¹¹ showed mean LDL to be 161.15mg/dl. The mean VLDL level was 38.7 ± 17.2 mg/dl. 55 patients (53.9%) had normal VLDL levels ie <35 mg/dl and 47 patients (46.1%) had VLDL levels >35 mg/dl. This was similar to a study done by Prasad et al¹¹ in which mean VLDL level was 38.53mg/dl (statistically significant) and Sharma et al⁸ study showed mean VLDL to be 34.40mg/dl.

The mean HDL level in this study was 42.3 ± 6.5 mg/dl. Among 102 subclinically hypothyroid patients studied, 62 (60.8%) had HDL levels within normal levels and 40(39%) had HDL levels <45 mg/dl. This is similar to the study done by Alamdari S et al⁹ in which mean HDL was 42 mg/dl. A study by Sharma et al⁸ also showed low mean HDL level ie, 38.56mg/dl. But in Hueston et al⁷ study, mean HDL was 50.9mg/dl. Other studies by Laway et al¹³, Prasad et al¹¹ and Singh et al¹⁴ showed mean HDL level 42.27mg/dl, 40.63 and 42.99mg/dl respectively. The mean Triglyceride

level in my study was 193.6 ± 85.9 mg/dl. Among this, 58 (56.9%) patients had elevated TGL level ie, >150 mg/dl and 44 patients (43.1%) had TGL levels within normal limits. This was similar to a study done by Prasad et al¹¹ which showed mean TGL to be 184.54mg/dl and by Hueston et al⁷ which showed mean Triglyceride level to be 178.1mg/dl.

When the lipid abnormalities were assessed according to the severity of subclinical hypothyroidism, ie TSH levels below and above 10 μ IU/ml, there is a significant increase in dyslipidemia among the group who had TSH level >10 μ IU/ml. This finding was similar to the study done by Singh et al¹⁴ which also showed lipid abnormalities more when TSH level was >10 μ IU/ml.

Conclusion

The present study showed that subclinical hypothyroidism can cause significant levels of lipid abnormalities. There is significant increase in the levels of total cholesterol, LDL and triglyceride levels. HDL is abnormally low in these patients with subclinical hypothyroidism. But there is not much elevation of VLDL values in this study. We also found that dyslipidemia was more in the group with TSH >10 μ IU/ml and there was a female preponderance. The screening and treatment for subclinical hypothyroidism should be done to prevent its adverse effects on lipid metabolism and cardiovascular risk.

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