RESEARCH

CORRELATION OF CLINICAL EFFECT OF TSH ON LIPID PROFILE IN SUBCLINICAL HYPOTHYROIDISM SUBJECTS.

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Abstract

Background: A wide range of metabolic activities are orchestrated by thyroid hormones. Subclinical hypothyrythroidism more prevalent compared to obvious hypothyroidism. The aim is to correlate the clinical effect of TSH on lipid profile in Subclinical hypothyrythroidism. **Materials and Methods:** The study sample consisted of the OPD patients who were referred from the department of general medicine and other departments of our institute. 90 randomly selected subjects (Study Group / Group II) were included in this study. An equivalent number of subjects / attendants of these patients in the same age group, who volunteered for the study served as control group / Group I. **Result:** Subclinical hypothyrythroidism increased with increasing age and was more prevalent in females. The base TSH levels was observed to be significantly increased in Group II as compared to Group I. The Group II subjects had significantly higher Total cholesterol and triglyceride levels in comparison to control group. Though the LDL level was also increased clinically in Group II, but the difference was not statistically significant. In contrast the HDL level was found to be higher in Group I. The Cholesterol/HDL ratio again significantly increased in Group II. A strong positive correlation was found for LDL, Total Serum Cholesterol, and Triglyceride with Thyroid profile in both the groups. While, there was negative correlation with HDL. **Conclusion:** The subclinical hypothyroidism definitely alters lipid profile. This cause effect relationship alarms for cardiovascular risk. A timed diagnosis and timely treatment may reverse the cause and may also reduce the risk.

INTRODUCTION

Thyroid hormones influence almost all major metabolic pathways and eventually all the organs are affected by this hormone. The hormone plays a key role in the regulation of synthesis, metabolism and mobilization of lipids in our body.[1]

Any change in the level of thyroid will affect the synthesis and mobility of lipoproteins and so, thyroid disorders are related to dyslipidemia.[2,3]

Thyroid dysfunction is the one most common hormonal disorder and is represented as either hyperthyroidism or hypothyroidism. Hypothyroidism is more prevalent than hyperthyroidism.

An elevated level of serum TSH is the marker for hypothyroidism. In mild thyroid gland failure, there is an increase in serum TSH level but the serum levels of free triidothyronine (FT3) and free thyroxine (FT4) are normal. This condition is described as Subclinical hypothyroidism (SCH).[4]

SCH is often asymptomatic but sometimes may show mild to moderate symptoms associated with hypothyroidism as myalgia, nausea, and constipation. SCH is more common in females than in males. The prevalence of SCH increases as the age advances.[5]

Overt hypothyroidism is a condition where the thyroid dysfunction further progresses and serum TSH levels are raised while free T4 levels are decreased. In overt hypothyroidism total cholesterol (TC) and low-density lipoproteins levels are raised and is the prime risk factor in cardiovascular diseases.[6,7]

To our knowledge, very sparse studies are available correlating sub clinical hypothyroidism with cardiovascular disease. The previous available study reports also remained inconclusive.

Therefore, this study was conducted to correlate the clinical effect of TSH on lipid profile.

MATERIALS AND METHODS

Study Setting: This was a prospective, longitudinal, comparative, unicentric, study. The study was conducted in the Department of physiology, at Lord Buddha Koshi Medical College and Hospital, Saharsa. The study was conducted over a period of 24 months from October 2019 to September 2021. All study participants were counseled. An informed and written consent was obtained from the participating subjects before the commencement of the study.

Study Sample
The study sample consisted of the OPD patients who were referred from the department of general medicine and other departments of our institute. 90 randomly selected subjects (Study Group / Group II) were included in this study. An equivalent number of subjects / attendants of these patients in the same age group, who volunteered for the study served as control group / Group I.

Inclusion Criteria
Subjects in the age range of 40- 60 years, of either gender were included in this study considering the risk of cardiovascular disease in this specific population.

Exclusion Criteria
Subjects with systemic disease, mental illness or any other co-morbidity.

Examination
The demographic data was recorded and physical examination was done for all the participating subjects.

Biochemical investigations
Whether symptomatic or asymptomatic, a TSH level in the range of 5–10 μ IU/mL with free T3 and T4 in normal range was considered to be SCH.
An overnight fasting of 12 hours was done before blood sample collection for lipid profile. Hypercholesterolemia was considered when >200 mg% Total Cholesterol, >130 mg% Low Density Lipoproteins, >250 mg% Triglycerides, and <35 mg% high-density lipoproteins was observed.

Statistical Analysis
The data was tabulated in a Microsoft excel spread sheet. And the data was subjected to statistical analysis using SPSS Software.

RESULTS

90 subjects / control group subjects and 90 subjects / study group subjects were evaluated to correlate subclinical hypothyroidism and cardiovascular risk. The descriptive data and the thyroid profile of study group and control group is shown in table 1. The mean BMI values of both the groups were comparable. Hypertension and diabetes were considered normal for all the subjects. The observed fasting blood glucose level and blood pressure measurement at rest was found to be within the normal range in both the groups.
The prevalence of subclinical hypothyroidism was found to be higher in females compared to males. And the incidence increased with advancing age. [Figure 1]
The base TSH levels was observed to be increased in Group II as compared to Group I. this difference was found to be statistically significant. The free thyroxine level was found to be within normal range in both the groups. The Group II subjects had significantly higher Total cholesterol and triglyceride levels in comparison to control group. Though the LDL level was also increased clinically in Group II, but the difference was not statistically significant. In contrast the HDL level was found to be higher in Group I. The Cholesterol/HDL ratio again significantly increased in Group II. [Table 2]
A strong positive correlation was found for LDL, Total Serum Cholesterol, and Triglyceride with Thyroid profile in both the groups. While, there was negative correlation with HDL. [Table 3]

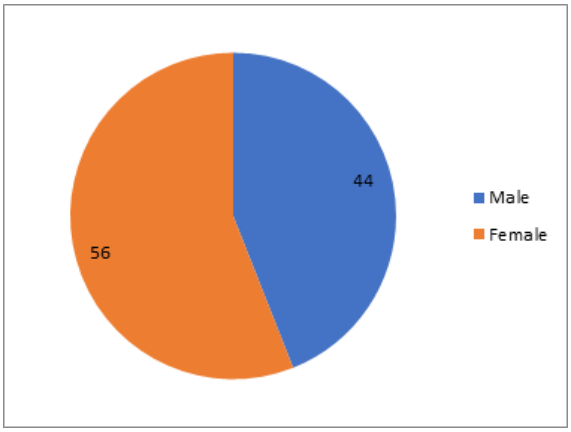

Figure 1: Prevalence of subclinical hypothyroidism.

Table 1: Demographic Characteristics and thyroid profile of subjects.

	Group I		Group II		p value
	Mean	**SD**	**Mean**	**SD**	
AGE (year)	43.32	7.41	42.65	7.69	0.70952
TSH (mU/L)	1.61	0.76	5.32	1.42	0
FT4 (ng/dl)	1.30	0.39	1.16	0.11	0.17248
FT3 (pg/dl)	2.97	0.19	2.47	0.39	0.13916

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BMI (kg/m²)	24.98	4.75	23.56	3.32	0.19502
FBS (mg/dl)	85.88	8.74	87.78	9.97	0.2107
SBP (mmHg)	122.07	14.91	113.71	6.84	0.00686
DBP (mmHg)	75.05	13.01	78.85	4.46	0.13328
MAP (mmHg)	90.72	11.97	90.44	3.04	0.87122
PP (mmHg)	47.02	14.25	34.86	9.5	0

Table 2: Lipid profile of subjects.

	Group I		Group II		p-value
	Mean	**SD**	**Mean**	**SD**	
Total cholesterol (mg/dl)	164.16	24.89	199.59	36.57	0.001
Triglyceride (mg/dl)	92.72	21.09	157.7	39.71	0.001
LDL (mg/dl)	101.27	18.71	110.01	30.87	0.191
HDL (mg/dl)	43.89	7.98	31.73	6.08	0
Chol/HDL ratio	3.325	0.76	5.89	0.38	0.003

Table 3: Correlation between thyroid profile and lipid profile.

Lipid profile	r–value	Mean	SD
LDL	0.45	105.669	25.7355
Total cholesterol	0.64	181.859	35.7865
Triglyceride	0.83	125.191	45.4765
HDL	- 0.70	37.829	9.329

DISCUSSION

An adverse lipid profile observed in subclinical hypothyroidism alarms for the possibility of its correlation with cardiovascular disease. Levothyroxine is proven to be beneficial in treating dyslipidemia due to obvious hypothyroidism. The lipoprotein metabolism is affected by thyroid hormones. The LDL oxidation and fatty acids encourage hypothyroidism.[8,9]

Our study observed a significant dyslipidaemia in Group II compared to Group I. Total serum cholesterol and triglyceride level was increased in Group II to statistically significantly level in comparison to Group I. Though the LDL level was also increased in Group II, but the difference was not statistically significant. The commonest lipid abnormality among hypothyroid subjects is increased cholesterol level. This is due to the augmented low density lipoproteins concentration.[10]

The current study found, a comparatively lower level of HDL in group II. HDL-cholesterol catabolism is mediated in liver and in subjects with hypothyroidism, HDL clearance is decreased due to compromised HDL binding site in hepatic cells.

The present study also found a strong positive correlation was found for LDL, Total Serum Cholesterol, and Triglyceride with Thyroid profile in both the groups. While, there was negative correlation with HDL.

CONCLUSION

The subclinical hypothyroidism definitely alters lipid profile. This cause effect relationship alarms for cardiovascular risk. A timed diagnosis and timely treatment may reverse the cause and may also reduce the risk.

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