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A STUDY ON EFFECT OF HYPOTHYROIDISM ON LIPID PROFILE

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Abstract:
Design: Observational study design.
Background: Hypothyroidism is the clinical syndrome and associated with slowing down the metabolic process in the body. Thyroid function significantly affects lipoprotein metabolism as well as some cardiovascular disease.
Objectives: To assess the correlation between of thyroid functions and lipid abnormalities. .
Methods: 20 Hypothyroidism patients were selected through convenience random sampling for the study. Blood sample was withdrawn from patients of hypothyroidism after overnight fasting and used for biochemical analysis.
Results: Results of the study revealed that there was a statistically significant positive correlation between serum TSH, LDL, statistically significant negative correlation between serum TSH, and HDL.
Conclusion: Thyroid dysfunction can have an important effect on lipid profile. Therefore, patients presenting with dyslipidemia are recommended to be investigated for hypothyroidism.

Keywords: hypothyroidism, TSH, LDL, HDL

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1. Introduction

Hypothyroidism is reported as a common metabolic disorder in the general population. Hypothyroidism is the clinical syndrome which occurs due to deficiency of thyroid hormones, which leads to generalized slowing down of metabolic processes. Thyroid hormones perform a wide range of functions including regulation of lipids, carbohydrates, proteins and electrolytes. The most important effect on lipid metabolism includes mobilization of triglycerides from the adipose tissue causing increased concentration of free fatty acids in plasma. Thyroid hormones can influence HDL metabolism by increasing cholesteryl ester transfer protein [CETP] activity, which exchanges cholesteryl esters from HDL2 to the very low density lipoprotein [VLDL] and TGs to the opposite direction[1].

Decreased thyroid secretion reduces the rate of cholesterol secretion in the bile and consequently leads to diminished loss in the feces due to decreased number of low density lipoprotein receptors on liver cells. Decreased activity of LDL receptors resulting in decreased receptor-mediated catabolism of LDL and IDL is the main cause of the hypercholesterolemia observed in hypothyroidism[2]. Thus hypothyroidism constitutes a significant cause of secondary dyslipidemia.

Decreased thyroid function not only increases the number of LDL particles, but also promotes LDL oxidability[3]. The abnormalities of lipid metabolism associated with hypothyroidism predispose to the development of atherosclerotic coronary artery disease (CAD)[4] .

Subjects with hypothyroidism also exhibit impaired endothelial function, increased uric acid and phosphate levels, all of which are associated with increased CVD risk[5]. Hypothyroidism is also accompanied by increased prevalence of metabolic syndrome and waist-to-hip ratio[6].

Early diagnosis and proper management can significantly reduce the mortality and morbidity of dyslipidemic cardiovascular diseases. It has been reported that lowering total cholesterol and LDL cholesterol reduces the risk of cardiovascular events like angina, myocardial infarction and stroke, and also reduces the need for revascularization. Therefore, this study was designed for evaluation of lipid profile in hypothyroid patients that might be helpful for clinical management of hypothyroid patients with dyslipidemia.

2. Methodology

This observational study was conducted in the SGT Hospital, Budhera, Gurgaon to assess the lipid profile in the hypothyroidism patients. A sample of 20 males & females

clinically and biochemically diagnosed hypothyroid with age group 20 to 60 years through convenience random sampling were included in the study. Subjects with diabetes mellitus, liver disease, and chronic renal failure, Patients on medication such as diuretics, calcium, iron tablets and athletes were excluded from the study.

Written informed consents were taken from all the subjects. 5ml of venous blood was withdrawn from patients of hypothyroidism after overnight fasting with dry disposable syringe and needle by vene puncture under all aseptic conditions. Then the serum was separated after 30 minutes of blood collection by centrifuging at 3000 rpm for 10 minutes. This serum sample was used for various biochemical assays.

3. Data Analysis & Results

The data collected was analyzed for thyroid level and lipid profile by SPSS software version 16. Karl Pearson Correlation test was used to find out the correlation between TSH and lipid levels. The result was considered statistically significant at $p<0.05$.

The characteristics of the data were presented through tables and graphs. Data was studied to find out the prevalence of lipid abnormalities in patients of hypothyroidism in selected population. The serum TSH values of patients were studied in relation to the values of serum lipids. All the lipids were measured, namely total cholesterol, triglycerides, LDL and HDL. Among these LDL was found to be significantly elevated in hypothyroid patients. A statistically significant positive correlation between serum TSH and LDL was noticed. At the same, a statistically significant negative correlation between serum TSH and HDL level was observed.

Table 1: Correlation between TSH level and lipid profile

	Lipid Profile in mg/dl	**r- Value**	**p-Value**
TSH	HDL 47.49±12.37	-0.450*	<0.01
	LDL 105.07± 52.05	0.553*	<0.05
	TC 173.055± 82.34	0.373NS	>0.05
	TG 197.16±97.48	0.632*	<0.05

*- significant

NS- not significant

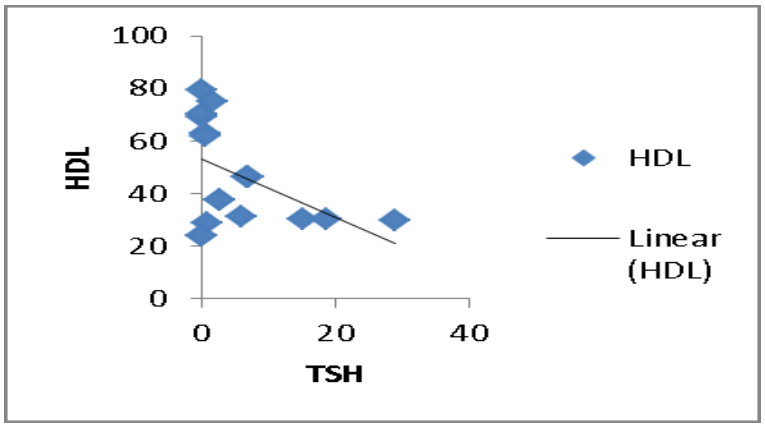

Figure 1: Correlation between TSH & HDL

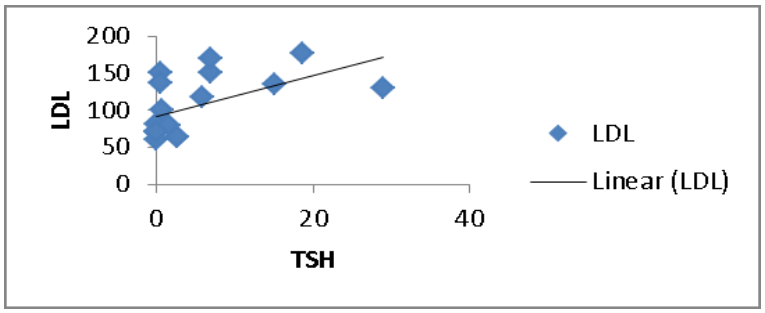

Figure 2: Correlation between TSH & LDL

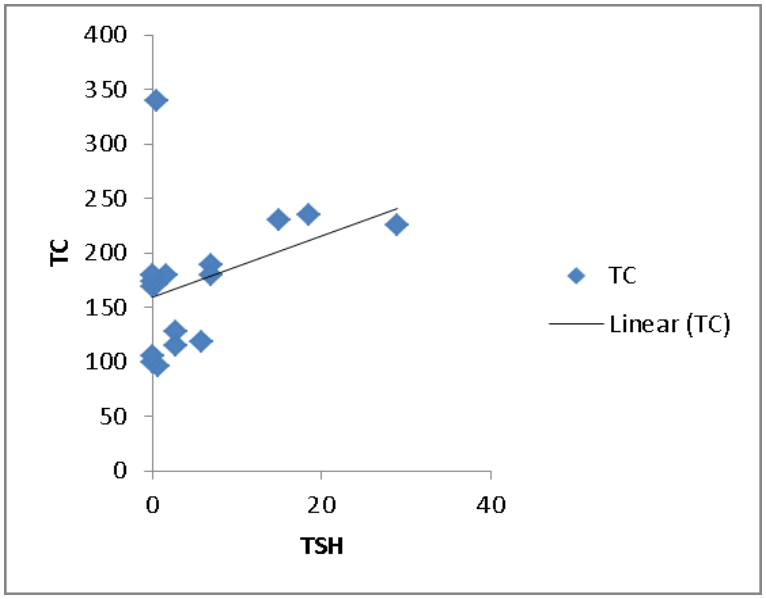

Figure 3: Correlation between TSH & TC

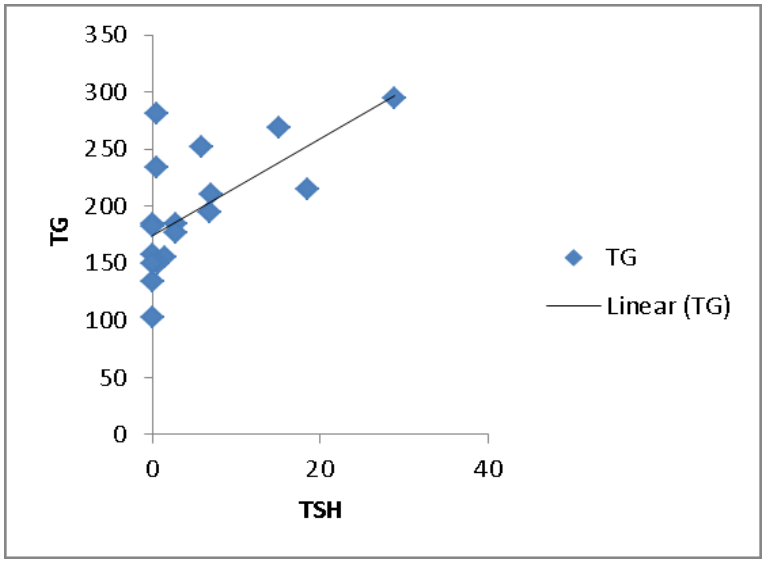

Figure 2: Correlation between TSH & TG

4. Discussion

Thyroid hormones are involved in controlling various metabolisms, more importantly lipid metabolism, the hypothyroid patients generally suffers from a slow metabolism resulting in dyslipidemias. From this study it was observed that LDL, TG and TC levels were elevated but HDL level was decreased in patients of hypothyroidism. A negative correlation was found between TSH and HDL levels and positive correlation was there between TSH and LDL, TC and TG. The results of the study were consistent with the study done by Khan et al. In their study, they found that significant increase in LDL cholesterol and triglycerides and decreased in HDL levels in hypothyroidism patients[7].

In another study by Chan Hee Jung et al 2003, mean plasma total cholesterol and LDL cholesterol levels elevated in hypothyroid cases than in normal controls[8]. Abrams & Grundy have stated decreased activity of LDL receptors as the main cause of hypercholesterolemia in hypothyroidism[9].

Decrease in HDL cholesterol level in our study might be due to increased activity of CETP and lipoprotein lipase in hypothyroid patients. Results of this study suggest that thyroid dysfunction can have an important effect on lipid profile. Therefore, patients presenting with dyslipidemia are recommended to be investigated for hypothyroidism.

5. Limitations of the study

In this study, the sample size was small and duration of study was limited, another study with large sample size and longer duration can be done. The cardiovascular

fitness and exercise response of the hypothyroidism patients is also recommended for future.

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