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Original Research Article

Effects of Hypothyroidism on Total Cholesterol, Triglycerides and LDL

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Abstract: Hypothyroidism is an important metabolic disorder and is associated with many biochemical abnormalities.Thyroid hormones are involved in regulation of lipids and lipoprotein metabolism,therefore hypothyroidism induce significant change in lipid levels. A cross sectional study was done in our population to evaluate lipid profile status of hypothyroid patients compared to healthy euthyroid persons. The objective of our study was to see the effect of Hypothyroidism on Total Cholesterol,Triglycerides and LDL. Our study was conducted at Sree Balaji Medical College and Hospital Chromepet,Chennai from November 2015 to April 2016.Blood samples and data were collected from patients attending the hospital. A total of 100 cases were included in this study.100 cases with normal thyroid profile were taken as control.Serum FT3,FT4,TSH,Total cholesterol,LDL-C,HDL-C,and Triglycerides were estimated in these patients. Total cholesterol and LDL-C was significantly raised in Hypothyroidism thereby,indicating the need for monitoring of lipid levels in patients with Hypothyroidism. However,there was no significant association of lipid levels in control group.
Keywords: Hypothyroidism, Total Cholesterol, Triglycerides,LDL Cholesterol

INTRODUCTION

Lipid metabolism is affected by thyroid diseases. The structure of lipoproteins will undergo change if thyroid function is altered in any way[1]. The transport of lipoproteins will also be affected in consequence of thyroid dysfunction[2].It was suggested that the values of cholesterol, triglyceride and LDL-C were elevated in Hypothyroidism when compared with Euthyroidism.There is a significant link between Hypothyroidism and Total Cholesterol,Triglycerides and LDL.This is because the synthesis, composition and transport of lipids are greatly dependent on thyroid hormones. Thyroid dysfunction of hypothyroid state is related to high levels of TG, lipoprotein i.e. LDL-C has been observed with increasing TSH[3, 4].

In 1952, Robertson & Kirkpatrick showed very high level of cholesterol in serum of patients with overt hypothyroidism which decreased after adequate hypothyroidism treatment. In 1972, Nikkilä & Kekki observed a moderate increase of serum triglycerides in hypothyroid patients, associated with a decrease in efficiency of triglyceride removal from plasma, which was attributed to a low lipoprotein lipase (LPL) activity [5, 6]. Fowler, in 1973, mentioned that serum cholesterol and triglycerides were increased in patients with "preclinical" hypothyroidism, condition equivalent to the actual subclinical hypothyroidism. Furthermore the author also suggested that the abnormal lipid pattern is the first change to occur as hypothyroidism develops and the last to disappear after treatment. The most common abnormalities of lipoprotein metabolism associated with hypothyroidism are elevated levels of Total Cholesterol and Low-Density-Lipoprotein Cholesterol (LDL-C), which are attributable to the effect of thyroid hormone on lipoprotein lipase activity [9] and the expression of the LDL- receptor [10].

METHODS AND MATERIALS

This study is a cross sectional study conducted at Sree Balaji Medical College and Hospital,Chennai, during the month of November 2015 to April 2016.Blood samples and data were collected from patients attending the hospital. A total of 100 recently diagnosed hypothyroid cases were taken with the age group 40-55 years and 100 cases with normal thyroid profile from the same age group were taken as control. Total cholesterol was determined by an automated analyser. Serum TG was assayed through peroxidase amino antipyrine (PAP)enzymatic colometeric method.

LDL-C was determined by the homogenous enzymatic calorimetric method using auto analyser system.HDL-C was measured through precipitation of VLDL-C using kit provided by MERCK.Frequencies,p-value and other analysis were used to compare different parameters, using SPSS.

RESULTS:

The mean age of hypothyroid population is 49.6, in 100 hypothyroid patients.The mean age of control groups is 49.8.The mean TSH value for the hypothyroid population is 9.05,compared to that for the controls is 1.25.The mean total cholesterol value for hypothyroid population is 225,than that for the controls is 130(p=<0.001). The mean LDL value for the hypothyroid population is 206 and that of the controls is 103(p=<0.001).The mean triglyceride value for hypothyroid population is 210 than that for the control is 98(p=<0.001).Thus,serum lipids(Total cholesterol,LDL,Triglycerides)are high in hypothyroid patients than in normal patients and the values are statistically significant. Jung found mean plasma total cholesterol and LDL cholesterol levels elevated in hypothyroid cases than in normal controls.

Table-1: Observation of Lipid parameters in the patients

Characteristics	HYPOTHYROID	EUTHYROID	
Number of patients	100	100	
TSH	9.051200	1.263200	**p value**
TC	225	134.36	<0.001
TG	210.20	98.24	<0.001
LDL	206.72	103.24	<0.001

DISCUSSION:

Hypothyroidism is a common metabolic disorder, due to the deficiency of thyroid hormone, a biochemical abnormality is present. According to these results, lipid metabolism is remarkably affected in hypothyroidism, especially in patients with increased TSH level comparable with the normal TSH level. In another study, average serum total cholesterol level was found elevated in primary and secondary Hypothyroidism. Keyes & Heimberg, Laker & Mayes found triglyceride level elevated in hypothyroid patients. So, our study findings were consistent with the previous studies done by other investigators.

Thompson and Abrams & Grundy have stated decreased activity of LDL receptors as the main cause of Hypercholesterolemia in hypothyroidism. Thus,Hyperlipidemia is a direct consequence of Hypothyroidism which is also confirmed by the present study. The Hypothyroid state is related to increased level of TG and LDL-C, when compared with Euthyroidism[7, 8]. Results of our study suggest the findings of Dyslipidemia in hypothyroid patients. Therefore, patients presenting with Dyslipidemia are recommended to be investigated for Hypothyroidism.

CONCLUSION:

Total cholesterol,Triglycerides and LDL was significantly raised in hypothyroid patients thereby, indicating the need for monitoring of their levels in patients with hypothyroidism to avoid the risk of cardiovascular diseases.

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