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Study of Lipid Profile in Hypothyroidism Patients

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Abstract

Hypothyroidism is a clinical case due to structural or functional deterioration of production of thyroid hormone and affects most the organ systems. Major clinical findings are fatigue, coarseness and dryness of the skin, intolerance to cold, poor concentration. The present study aim was to assess the association of lipid profile in hypothyroidism. 30 cases of hypothyroidism were chosen, 30 age group subjects' controls were chosen. Blood samples were collected from patient and T3, T4 and TSH levels were measured. Also, triglyceride, Cholesterol, HDL Cholesterol, LDL cholesterol levels in blood was measured. It was found that triglyceride, cholesterol, HDL, LDL levels were significantly increased in hypothyroidism cases than the controls. It is concluded that increasing total cholesterol, Triglycerides and LDL cholesterol Levels are at may enhance risk for developing cardiovascular disorders and Atherosclerosis

Keywords: Hypothyroidism; Dyslipidemia; Total Cholesterol; Triglycerides.

Introduction

Hypothyroidism is a common metabolic disorder in the general population. Around 42 million people are suffering from thyroid diseases in India, Hypothyroidism is commonest disorder in India [1]. Hypothyroidism is characterized by as a decreased thyroid activity, lack of secretion of T3 and T4 hormones and leads to hyper secretion of pituitary TSH level [2]. Hypothyroidism is more common in women and increased levels of LDLC and TC [3]. Hypothyroidism is a secondary cause of dyslipidemia [4]. Thyroid hormones perform a large arrangement of metabolic functions including regulation of carbohydrate, protein and lipid metabolisms. The main significant effect on lipid metabolism consists of mobilization of triglycerides from the adipose tissue causing concentration of free fatty acids levels raised in plasma.

In patients with overt hypothyroidism there is increased in), Low Density Lipoproptein cholesterol (LDL-C), serum total cholesterol (TC). Apolipoprotein B, Lipoprotein (a) levels and possibly triglyceride (TG) levels [5]. The present study aims to assess the association of hypothyroidism with lipid abnormalities.

Materials and Methods

This study was carried out in the Department of Physiology collaboration with department of bio chemistry and general medicine in our college. 60 cases (mostly females) in the age group of 20 to 60 yrs were included. Patients with Low T3, Low T4 and TSH level above 6μIU/ml were considered to be having hypothyroidism. Patients suffering from overt hypothyroidism who were undergoing treatment with anti thyroid drugs/ thyroxin, congestive cardiac failure, end stage renal disease, type II diabetes mellitus, patients on anti lipidemic drugs, post myocardial infarction and women on oral contraceptive pills were excluded from the study. The study included total 60 cases in that 30 cases of hypothyroidism and 30 cases of normal healthy euthyroids as controls. This data was statistically analyzed using the SPSS software (version 12.0) and by applying Student's t-test.

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Results

A total of 60subjects of age group 20 to 60 years, 30 hypothyroid cases and 30 (Euthyroid) controls were included in this study. Table 1 shows that there was significant difference in the values between two groups. Table 2 shows that all the lipids measured, namely total cholesterol, triglycerides, HDL and LDL were found to be significantly increased in hypothyroid patients when compared to the euthyroid group ($p<0.001$).

Table 1: Levels of T3, T4, TSH in different groups

Parameters	Group- I CASES(n=30)	Group -II Controls(n=30)	P value
TSH(μIU/ml)	8.04±1.10	3.56±0.82	0.000
T3(ng/ml)	0.93 ±0.38	2.95±0.55	0.000
T4(μg/dl)	0.43±0.15	1.36±0.30	0.000

Table 2: Levels of lipid profile in different groups

Parameter	Group- I Cases (n=30)	Group – II Controls (n=30)	P valve
Total Cholestrol(mg/dl)	227.57±17.60	191.92±7.49	0.000
Serum Triglycerides(mg/dl)	167.22±16.37	144.63±3.44	0.000
HDl Cholestrol(mg/dl)	43.76±5.02	49.51± 1.73	0.000
LDl Cholestrol(mg/dl)	150.37±20.32	113.60±8.12	0.000
VLDL Cholesterol (mg/dl)	33.44±3.27	28.81±0.89	0.000

Discussion

Hypothyroidism can bring unfavorable effects on the lipid metabolism. However, hyperthyroidism can be associated with acquired hypercholesterolemia or improvement of lipid profile [9]. The present cross sectional study was carried out in 30 Hypothyroid cases and 30 Healthy euthyroid subjects. Thyroid hormones main function is metabolism of lipids. Lack of thyroid hormones leads to form a hyperlipidemia. Some authors suggested that atherosclerosis might be caused due to chronic autoimmune thyroiditis independent of thyroid function. [10] This study suggests that lack of thyroid function is followed by decreased activity of HMG-CoA reductase, and increasing TC and LDL-C levels in hypothyroidism patients [6]. The higher prevalence of hypothyroidism among middle aged women, associated with an elevation in total plasma cholesterol level [7]. Hypothyroidism is followed by diastolic hypertension, in association with dyslipidemia may produced atherosclerosis and may effected to coronary artery disease [8]

In this study we aimed to find out the association of thyroid function with the lipid profile of hypothyroid patients by comparing with the euthyroid cases. Serum T3, T4, TSH, serum total cholesterol, serum triglycerides, HDL and LDL levels were measured by standard analytical methods. We observed a positive association between hypothyroidism and serum total cholesterol, serum triglycerides, HDL and LDL levels. There was significant increase in lipid profile with the increase in serum TSH levels. It indicates that this interference of thyroid function with the lipid profile may increase the risk of developing CVDs in hypothyroid patients. The machainism for this association is that the thyroid hormones are the catabolic hormones and regulates various metabolic processes including synthesis, mobilization, and breakdown of lipids. The association between serum TSH and serum total cholesterol and LDL cholesterol might be both being a consequence of autoimmune activation involving lipoprotein (a) [11].

Altered levels of thyroid hormones can also influence the metabolism of HDL by showing the enhance activity of CETP (cholesterly ester transfer protein) which in turn transfers the CE (cholesteryl esters) from HDL2 to VLDL in exchange for TG. [12]. Conversion of HDL2 to HDL3 and IDL to LDL is mediated by the action of hepatic lipase enzyme which is released and activated by HDL itself. Thyroid hormones also stimulates the activity of LPL (lipoprotein lipase enzyme) that breaks down the TG in chylomicrons and other lipoproteins into fatty acid and glycerol [13,14].

Changes in HL activity seem to be an important mechanism for the disturbance of cholesterol

metabolism in thyroid dysfunction while the thyroid hormone influence on LPL seems to be of importance mainly for the disturbance in triglyceride metabolism [15].

Conclusion

From this study, it is concluded that Hypothyroidism is one of the most prevalent endocrine disease. Hypothyroid patients increasing total cholesterol, Triglycerides and LDL cholesterol Levels are at may enhance risk for developing cardiovascular disorders and Atherosclerosis.

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