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Dyslipidemia in Thyroid Disorders

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Abstract

Background- Thyroid hormones have profound metabolic effects, the most striking action being an increase in energy expenditure . Thyroid hormones play an important role in regulating lipid metabolism; and thyroid dysfunctions can result in lipid abnormalities which increase the risk of endothelial dysfunction, hypertension and cardiovascular disease.

Methods-A cross-sectional study was conducted on 100 patients with suspicion of thyroid disorders were taken as cases. One hundred patients with normal thyroid profile and no history of other chronic diseases were taken as control group.

Results- The serum TC, TG and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group.

Conclusion- We conclude that, dyslipidemias are associated with thyroid disorders, so biochemical screening for thyroid dysfunction in all dyslipidemic patients. Therefore, patients presenting with dyslipidemia are recommended for investigation to explore thyroid dysfunction.

Keywords- Total cholesterol, Triglycerides and LDL.

Introduction

Thyroid hormones have profound metabolic effects, the most striking action being an increase in energy expenditure [1,2]. Thyroid hormones play an important role in regulating lipid metabolism; and thyroid dysfunctions can result in lipid abnormalities which increase the risk of endothelial dysfunction, hypertension and cardiovascular disease [3]. It is well known that alterations in thyroid functions result in changes in the composition and transport of lipoproteins [4-6]. In hyperthyroidism, the metabolic effects include the increased utilization and oxidation of all major fuel substrates that is, protein, glucose and lipids. The metabolic effects of hypothyroidism are not well characterized. The condition is characterized by increased fasting plasma cholesterol and triglycerides [7,8]. The effects of hypothyroidism on HDL cholesterol level has been contradictory. HDL cholesterol levels have been reported to be increased [8] decreased [9] and normal [10] in hypothyroidism. It is well-known that hypothyroidism is associated with hypercholesterolemia and increases the risk of atherosclerosis [11,12]

Hyperlipidemia observed in hypothyroidism is a metabolic result currently treatable with thyroid hormone. Before the availability of sensitive thyroid hormone analysis, increased serum or plasma cholesterol level was accepted as important evidence supporting the diagnosis of hypothyroidism [13] Classical signs and symptoms of clinical hypothyroidism may not be observed when it is mild or moderate. The present study was planned to assess the levels of total cholesterol (TC), LDL-cholesterol, VLDL-cholesterol, HDL-cholesterol and triglyceride (TG) in patients with thyroid dysfunction (hypo and hyperthyroidism) and to study the association between thyroid dysfunction and lipid profile.

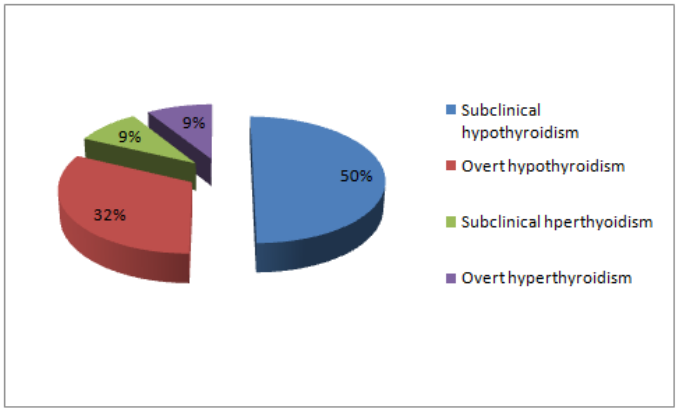
Materials and Methods

A cross-sectional study was conducted on 100 patients with suspicion of thyroid disorders were taken as cases. One hundred patients with normal thyroid profile and no history of other chronic diseases were taken as control group. Detailed informations of the patients were collected after taking informed consent with the help of pre-test proforma that included age, sex and family or personal history of chronic diseases.

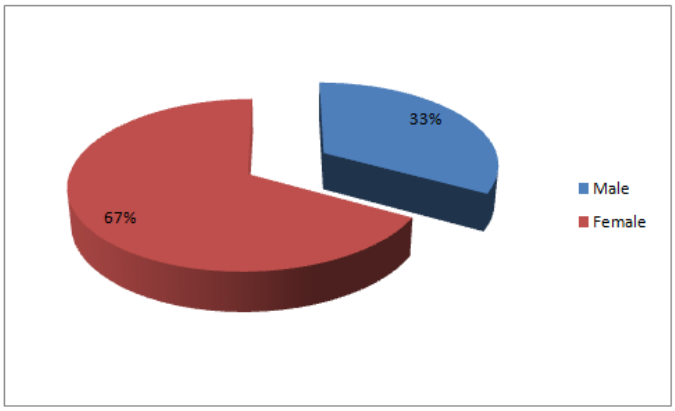
After 12 hours overnight fasting, 5 ml blood was collected by standard venipuncture method, and the serum was separated. T3, T4 and TSH were quantitatively estimated by Enzyme linked immunosorbent assay (ELISA) method. Lipid profile measured following methods

- Serum total cholesterol: was measured by Enzymatic method Normal serum cholesterol: 150-250 mg/dl
- Serum HDL cholesterol: was measured by "Phosphotungstate method. Normal HDL – Cholesterol: 30 – 70 mg/dl.
- Serum LDL cholesterol: If the value of Triglycerides is known, LDL-cholesterol can be calculated based on Friedewald"s equation.
- Serum Triglycerides: was measured by enzymatic colorimetric method Normal Serum Triglycerides: Male: 60-165 mg/dl Female: 40-140 mg/dl.

Results



Graph 1



Graph 2

Parameters	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hperthyoidism	Overt hypothyroidism	Control
TC	262.25±71.02	296.25±75.12	180.23±60.23	145.23±11.20	135.23±12.38
LDL	98.42±16.54	120.24±36.24	91.23±22.84	81.74±7.84	80.23±11.24
HDL	45.20±13.20	32.51±7.84	37.48±6.48	37.11±6.08	54.23±13.72
TG	206.4±48.24	236.24±38.12	117.20±24.81	60.47±4.13	80.23±11.24

Table .1 Comparision of biochemical parameters in case and controls.

The serum TC, TG and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group.

Discussion

Thyroid dysfunction, along with a higher prevalence of goiter, is a major public health problem in India population. In this study, the prevalence of hypothyroidism was higher than hyperthyroidism similar finding observed by findings by Baral et al.[14] and Holowell et al.[15]

The serum TC and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group in our study.

Jung[16] found mean plasma total cholesterol and LDL cholesterol levels elevated in hypothyroid cases than in normal controls.

In another study, average serum total cholesterol level was found elevated in primary and secondary hypothyroidism[17].

Keyes & Heimberg[18], Laker & Mayes[19] found triglyceride level elevated in hypothyroid patients. Thompson[20] and Abrams & Grundy[21] have stated decreased activity of LDL receptors as the main cause of hypercholesterolemia in hypothyroidism.

Conclusion

We conclude that, dyslipidemias are associated with thyroid disorders, so biochemical screening for thyroid dysfunction in all dyslipidemic patients. Therefore, patients presenting with dyslipidemia are recommended for investigation to explore thyroid dysfunction. As our sample size was small and duration of study was limited, another study with large sample size and longer duration is also recommended.

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