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Dyslipidemia in Thyroid Disorders

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Abstract

Background: Thyroid hormones influence nearly all major metabolic pathways. Their most obvious and well-known action is the increase in basal energy expenditure obtained by acting on protein, carbohydrate and lipid metabolism. The lipid metabolism is more influenced by the thyroid hormone.

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: 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: Thyroid profile, Total cholesterol, Triglycerides and LDL.

Introduction

Thyroid disorders may occur at any stage of life. They are more commonly encountered in the mid age and adulthood. Thyroid hormones influence nearly all major metabolic pathways. Their most obvious and well-known action is the increase in basal energy expenditure obtained by acting on protein, carbohydrate and lipid metabolism. The lipid metabolism is more influenced by the thyroid hormone. [1] Thyroid hormones are of vital importance in maintaining the initial level of phospholipids in cell membranes and fatty acids composition of the lipids. Triiodothyronine (T3) plays a critical role in lipid metabolism by regulating genes involved in lipogenesis and lipolysis.[2]

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 [3] 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

Table 1: Socio-Demographic Profile

Variable	No of cases	Percentage
Male	32	32.00%
Female	68	68.00%
Mean age	28.56±9.42 Yrs	
Urban	68	68.00%
Rural	32	32.00%
Hindu	88	88.00%
Muslim	12	12.00

In present study most of patients were hindu female and mean age of patients was 28.56±9.42 Yrs.

Table 2 : Comparision of biochemical parameters in case and controls.

Parameters	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hperthyoidism	Overt hypothyroidism	Control
TC	256.32±68.20	289.56±71.25	178.25±58.23	142.23±10.25	132.52±10.80
LDL	97.56±13.20	118.52±34.25	88.23±19.56	78.56±6.98	78.24±20.80
HDL	44.80±11.24	33.10±7.06	36.24±6.12	36.24±6.12	53.12±12.45
TG	205.6±46.24	236.2±37.4	116.20±24.2	58.64±4.02	79.82±9.24

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.[4] and Holowell et al.[5]

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[6] 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[7]

Keyes & Heimberg[8], Laker & Mayes[9] found triglyceride level elevated in hypothyroid patients. Thompson[10] and Abrams & Grundy[11] have stated decreased activity of LDL receptors as the main cause of hypercholesterolemia in hypothyroidism.

Conclusion

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.

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