

A Comparative Study of Lipoprotein Levels in Normal and Hypothyroidism Patients

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Research Article

Abstract: Introduction: Thyroid hormones influence all the major metabolic pathways. Their most obvious and well known action is increase in basal energy expenditure obtained acting on protein, carbohydrate and lipid metabolism. With specific regards to lipids, thyroid hormone affects synthesis, mobilization and degradation of lipids, although degradation is influenced more than synthesis. **Aims and objectives:** To study changes in lipoprotein levels in overt and subclinical hypothyroidism patients and compare it with matched healthy controls in population. **Material and method:** The present study was conducted in Government Medical College and Hospital, Aurangabad from October 2005 to October 2007. Lipid profile of patients of hypothyroidism was compared with control group. **Results:** Thus among the patients with overt hypothyroidism, we found highly significant increase in TC, LDL and HDL values and no significant change in TG and VLDL when compared with controls. Among the patients with subclinical hypothyroidism, we found significant increase in TC and LDL while no change in TG, HDL and VLDL when compared with controls. **Conclusion:** that in overt and subclinical hypothyroidism patients, the lipid profile is clearly atherogenic.

Keywords: Lipoprotein Levels, Hypothyroidism.

Introduction

Thyroid dysfunction is very well prevalent in India. Functional studies of goitrous subjects have showed overall prevalence of 5.4% hypothyroidism, 1.9% hyperthyroidism and 7.4% of autoimmune thyroiditis. Thyroid disease burden in India is approximately 42 millions.¹ Thyroid dysfunction is notably more common in female population. The morbidity and mortality caused by thyroid dysfunction is mainly through its effect on cardiovascular system.^{2,3,4} Thyroid disorders are known to influence lipid metabolism and common in dyslipidemic patients. Hypothyroidism is a graded phenomenon extending from minimal thyroid failure to severe overt hypothyroidism.

Overt hypothyroidism: It is characterized by low circulating T3 and T4 hormones and elevated thyrotropin levels. This is evident by clinical features. This is common in elderly patients especially in women.

Subclinical hypothyroidism: Also called as mild hypothyroidism, a term used for condition in which there are small elevations in thyroid stimulating hormone yet

normal level of thyroid hormone. This is more common in elderly and found twice often in women as men. It is an interesting syndrome for study of physiology of impending hypothyroidism at pituitary and thyroid levels and effects on peripheral target tissues and overall biochemical changes. It illustrates marked individual variations in response to thyroid failure, probably reflecting genetic differences at molecular level, which it is to be hoped, will be clarified in future.

Thyroid disease is associated with cardiovascular atherosclerotic disease. Overt hypothyroidism is undoubtedly associated with atherosclerotic disease but association of other degrees of thyroid dysfunction with atherosclerosis is not clear. Thyroid disorders are known to influence lipid Metabolism. Frank hypothyroidism is clearly associated with lipid abnormalities. The effect of milder abnormalities of thyroid function, most of which are clinically silent, is uncertain. Some cross sectional studies have found that SCHT is associated with deleterious changes in TC and LDL-C^{5,6,7}. Furthermore, the relationship between thyroid function and HDL-C in older women has not been well studied and existing studies are conflicting.⁸ Goitre is most common cause for hypothyroidism. The district of Aurangabad is endemic for goiter, even though the region reported no published study to the best of our knowledge on lipid metabolism in thyroid dysfunction. The effect of thyroid dysfunction on atherosclerosis can be very well being studied through lipid metabolism.

Aims and objectives

To study changes in lipoprotein levels in overt and subclinical hypothyroidism patients and compare it with matched healthy controls in population.

Material and Method

Study design: The present study was conducted in Government Medical College and Hospital, Aurangabad from October 2005 to October 2007. For conducting the study two groups were selected. First group consists of

patients of hypothyroidism and second group of control i.e. not suffering from hypothyroidism. Following inclusion and exclusion criterion was used to select cases.

Inclusion criterion

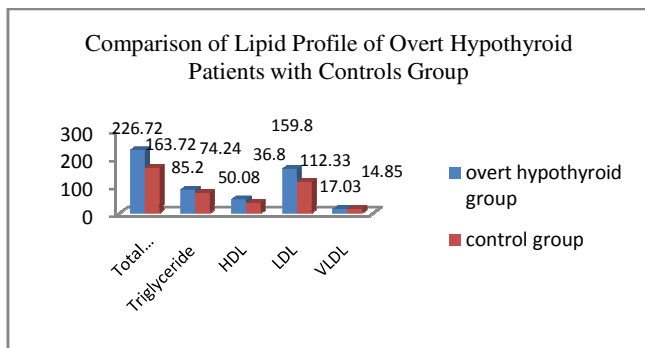
The subjects were those who reported to outpatient department of hospital for complaints related to hypothyroidism. The history was taken and complete clinical examination was done. Their blood sample was taken into plain and fluoride bulb after 12 hours fasting. The diagnosis of those patients was confirmed by thyroid function tests. The patients were categorized into three groups as follows,

- Overt hypothyroidism: TSH > 12 IU/L along with clinical features of hypothyroidism with decreased T3 and T4 levels.
- Subclinical hypothyroidism: TSH > 4.5 IU/L with minimal clinical features or no features.

Results

Table 1: Comparison of lipid profile of overt hypothyroid patients with controls group

Parameters (mg/dl)	Cases (n = 25) mean± S.D.	Controls (n = 25) mean± S. D.	p value	Significance
Total cholesterol	226.72±54.9	163.72±27.34	P<0.001	Significant
Triglyceride	85.2 ± 27.5	74.24 ± 13.8	P=0.081	Not significant
HDL	50.08±13.36	36.8 ± 8.1	P<0.001	Significant
LDL	159.8 ± 38.2	112.33±17.9	P<0.001	Significant
VLDL	17.03 ± 5.50	14.85 ± 2.7	P=0.083	Not significant



When lipid profile of overt hypothyroid patients was compared with control group it was observed that total cholesterol, HDL and LDL were increased in overt hypothyroid group and the difference was highly significant. But the changes in triglycerides and VLDL are statistically not significant.

Exclusion criteria

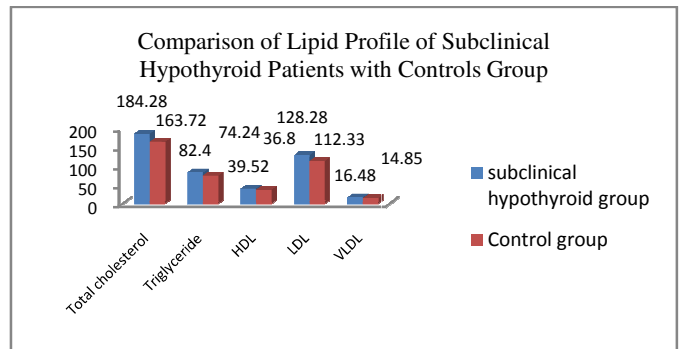
- smoking
- clinical evidence of hepatic or renal disease
- medications known to influence lipid metabolism
- Patients receiving post menopausal replacement therapy.

Age, sex and body mass index matched subjects including males and females were taken as controls. The same exclusion criteria were applied to control subjects as well. Thyroid function test was also conducted in control group and normal levels were confirmed. Simultaneously lipid profile (total cholesterol, triglycerides, HDL, LDL, VLDL) was also done in all the study population. VLDL and LDL were calculated using Friedwald formula.

Thus total 25 patients of overt hypothyroidism, subclinical hypothyroidism and control group each were selected.

Table 2: Comparison of lipid profile of subclinical hypothyroid patients with controls group.

Parameters (mg/dl)	Cases (n = 25) mean ± S.D.	Controls (n = 25) mean ± S. D.	p value	Significance
Total cholesterol	184.28 ± 32.6	163.72± 27.3	P<0.05	Significant
Triglyceride	82.4 ± 27.06	74.24 ± 13.8	P=0.186	Not significant
HDL	39.52 ± 12.1	36.8 ± 8.1	P=0.314	Not significant
LDL	128.28±18.1	112.33 ± 17.9	P<0.05	Significant
VLDL	16.48 ± 5.41	14.85 ± 2.7	P=0.188	Not significant



In subclinical hypothyroid patients, the table showed increase in total cholesterol and LDL which was statistically significant. The changes in triglycerides, HDL and VLDL were statistically not significant.

Discussion

The present study was conducted at Government Medical College and Hospital, Aurangabad with the objective to study changes in lipoprotein levels in overt and subclinical hypothyroidism patients and compare it with matched healthy controls in population. Thus among the patients with overt hypothyroidism, we found highly significant increase in TC, LDL and HDL values and no significant change in TG and VLDL when compared with controls. Among the patients with subclinical hypothyroidism, we found significant increase in TC and LDL while no change in TG, HDL and VLDL when compared with controls. In hypothyroidism, though there is decrease in synthesis of cholesterol, serum total and LDL cholesterol levels are increased. This is mainly due to decrease in LDL catabolism. It was observed that increased levels of total and LDL cholesterol in both overt ($p < 0.001$) as well as sub clinically hypothyroid ($p < 0.05$) patients while HDL cholesterol is increased ($p < 0.001$) significantly in only overt hypothyroid patients. It is not significantly changed ($p = 0.314$) in sub clinically hypothyroid patients. Erem et al⁹ studied alterations in lipid profile in thyroid dysfunction. He stated that thyroid hormone regulates lipid metabolism through various mechanisms. The key role is played by LDL receptor pathway. The results of study were significantly increased LDL and total cholesterol values in overt hypothyroid patients. Raziel A et al¹⁰ studied lipid profile in hypothyroid patients and compared with age and sex matched individuals. They found that there was increase in net values of TC, LDL and HDL. Jefery Abrams¹¹ et al studied ten non obese and sixteen obese patients with hypothyroidism. They did not find any change in levels of triglycerides in these patients, as in the case of our study. F. Monzani et al¹² found that 45 sub clinically hypothyroid patients had significantly elevated total and LDL cholesterol levels when compared with controls. We have similar findings in our study. Triglycerides and VLDL are not significantly altered when compared with normal control subjects from both groups i.e. overt and sub clinically hypothyroid patients. Thus our study supports most of the publications. In hypothyroidism, there is decrease in cholesterol synthesis but serum total and LDL cholesterol levels are increased.

This is mainly because of decrease in LDL catabolism. Increase in levels of HDL is mainly due to decreased activity of CETP which results in reduced transfer of cholesteryl esters from HDL to VLDL. Also in hypothyroidism, hepatic lipase activity is decreased which decreases catabolism of HDL 2 particles.

Conclusion

Thus in the end we can conclude that in overt and subclinical hypothyroidism patients, the lipid profile is clearly atherogenic.

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