

Study of Lipid Profile in Relation with Hypothyroidism

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Abstract: Thyroid gland plays an important and specific role in the endocrine system. Hypothyroidism is one of the most common disorders seen in present days especially among women. Thyroid hormones have significant effects on synthesis, mobilization and metabolism of lipids. So this study was conducted to find out the association of lipid profile with hypothyroidism. **MATERIAL AND METHOD:** This study was conducted in Department of Biochemistry, GMC kota. 50 patient samples and 50 control samples were taken. Serum was separated and serum lipid profile levels were estimated by fully Automated Analyzer ERBA EM 360. Thyroid estimation was done on Roche Chemiluminescence Analyzer. Data was analyzed using Mann-Whitney U test. **RESULT:** Cases have significantly higher values for serum lipid profile than controls and have significant positive correlation with TSH. **CONCLUSION:** Our data statistically suggest that hyperlipidemia is associated with hypothyroidism. These enhance the risk for development of atherosclerosis and coronary artery disease.

Keywords: Hypothyroidism, Cholesterol, Triglycerides, VLDL, LDL, HDL.

1. INTRODUCTION

Hypothyroidism, a common endocrine disorder affecting adults of all ages, is due to relative deficiency in thyroid hormones. It is more common in woman, with a female to male ratio of 3:2. Hypothyroidism is the most common pathologic hormone deficiency among the endocrine disorders. It may be due to primary disease of the thyroid gland itself or lack of pituitary TSH. Biochemically decrease in T₄ and T₃ concentrations lead to hypersecretion of pituitary TSH and an amplified increase in serum TSH levels. This is a key laboratory finding, particularly in the early detection of thyroid failure.

Thyroid hormones (T₄ and T₃) regulate the rate of metabolism, affect growth, and modulate energy utilization by increasing the basal metabolic rate, increasing oxygen consumption, and facilitating heat production. Thyroid hormones have significant effects on synthesis, mobilization and metabolism of lipids. Overt hypothyroidism is associated with significant increase in circulating concentrations of total cholesterol leading to coronary artery disease.

The present study aims to assess the association of hypothyroidism with lipid profile abnormalities.

2. MATERIAL AND METHOD

This study was performed in the Department of Biochemistry, Government Medical College, Central Laboratory NMCH and MBS Hospital Kota from period of September 2014 to August 2015. 50 patient samples and 50 control samples were taken.

Inclusion Criteria:

1. Patients with newly diagnosed hypothyroidism.
2. Age group between 10 years to 70 years.

Exclusion Criteria: Patients with the following diseases were excluded from the study

1. Patients on thyroxine treatment
2. Patients on hypolipidemic drugs, antihypertensives, steroids.
3. Patients with renal disease, liver disease, cardiovascular disease and diabetes mellitus.
4. Critically ill patients admitted in intensive care unit
5. Pregnancy and patients on drugs.
6. Patients with gout and hypertension.
7. Patients not willing to participate in study.

After explaining the type of study, written consent was taken from all the subjects. A 12-hour fasting period, venous blood samples were collected from all the cases and controls. Serum was separated and serum lipid profile was estimated by fully Automated Analyzer ERBA EM 360. Thyroid estimation was done on Roche Chemiluminescence Analyzer.

Statistical Analysis: Statistical analysis was done using suitable statistical tool. Data was estimated on excel sheet and analysed statistically. Quantitative data was summarized in the form of MEAN ± SD and a difference in means of both the groups was analyzed using Mann-Whitney U test. The P value <.05 was taken as significant.

3. RESULTS

Table 1:

Parameter	Cases	Control	p value
	(Mean±SD)mg/dl	(Mean±SD)mg/dl	
Cholestrol	198.20 ± 64.72	156.6 ± 28.01	<0.001
Triglycerides	215.7 ± 100.2	134.2 ± 58.8	<.001
VLDL	43.14 ± 26.84	20.03 ± 11.75	<.001
LDL	101.7 ± 60.4	81.5 ± 74.0	0.029
HDL	54.38 ± 9.41	48.26 ± 8.90	0.003

Table 2:

Lab variables	Cases	
	r value	p value
CHO v/s TSH	0.476	<.001
TG v/s TSH	0.273	0.006
VLDL v/s TSH	0.272	0.006
LDL v/s TSH	0.427	<.001
HDL v/s TSH	0.417	0.003

Table no.1 depicts the serum lipid profile in cases and controls, showing mean serum Cholestrol 198.20 ± 64.72 mg/dl for cases and 156.6 ± 28.01mg/dl for controls, mean serum Triglycerides 215.7 ± 100.2 mg/dl for cases and 134.2 ± 58.8mg/dl for controls, mean serum VLDL 43.14 ± 26.84 (mg/dl) in cases and 20.03 ± 11.75 (mg/dl) in controls, mean serum LDL 101.7 ± 60.4 (mg/dl) in cases and 81.5 ± 74.0 (mg/dl) in controls, mean serum HDL 54.38 ± 9.41(mg/dl) in cases and 48.26 ± 8.90(mg/dl) in controls. These differences are statistically significant (p<.05).

Table no.2 depicts the correlation of TSH with lipid profile, Showing TSH is positively correlated with CHO, TG, HDL, LDL, VLDL. These all differences are statistically significant (p<.05).

4. DISCUSSION

Hypothyroidism is a condition in which the body suffers from insufficient thyroid hormone. Since thyroid hormones are involved in controlling various metabolisms, more importantly lipid metabolism, the hypothyroid patients generally suffers from a slow metabolism. Hypothyroidisms is a very common condition and have a significant role to play in metabolism of lipids.^{10, 11}

This study was undertaken to understand the effect of lipid profile in hypothyroid patient compared to healthy control subjects. The hypothyroid subjects in our study had higher levels of total Cholesterol and LDL, similar findings was observed by Staub JJ et al which reported higher total cholesterol, LDL cholesterol and apolipoprotein B in overt hypothyroidism.¹⁰ A study conducted by Archana et al has shown that hypothyroidism results in a small increase in low density lipoprotein(LDL)-C, total serum cholesterol and decrease in high density lipoprotein (HDL)-C that enhance the risk for development of atherosclerosis and coronary artery disease.¹¹ Our study results were in consistent with the findings of Mayer et al who had found that untreated hypothyroidism patients (both overt and subclinical) had significantly higher total and LDL cholesterol.¹² These findings supports other studies such as the one done by Chan Hee Jung et al in Seoul, Korea.¹³ This is due to the fact that expression of LDL receptor is modulated by Thyroid hormones. In a study done by Scarbottolo et al in experimental hypothyroid rats it was demonstrated by ligand binding analysis that of a decreased expression of lipoprotein receptors by liver.¹⁴ In overt hypothyroidism, the number of LDL receptors in the liver decreases and as a result, there is an increase in overall cholesterol and LDL cholesterol.

A significant increase was found in serum Triglycerid and VLDL in cases than controls ($p < .05$) in our study. This is due to the fact that there is a poor clearance of exogenous and endogenous triglycerides from circulation in hypothyroidism.¹⁵

We also found serum HDL was significantly increased in cases than controls ($p < 0.05$). The cause of normal or elevated level of HDL in hypothyroid cases is due to the reduced activities of CETP and hepatic Lipase.¹⁶ This results in reduced transport of cholesterol esters from HDL-2 to VLDL and IDL.¹⁷

We also found that lipid profile is significantly correlated with TSH. This is in accordance with previous study done by Murgod R & Gladys.¹⁸

5. CONCLUSION

The present study was designed to evaluate the changes of serum lipid profile in hypothyroidism patient and to correlate the changes between the lipid profile and thyroid profile.

It has been seen that there is a change of lipid profile parameter in hypothyroid patient. This finding shows that hyperlipidemia is associated with hypothyroidism. Hypothyroidism results in an increase of total cholesterol, LDL-cholesterol, Triglyceride and HDL-cholesterol. These enhance the risk for development of atherosclerosis and coronary artery disease.

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