



ORIGINAL RESEARCH PAPER

Biochemistry

STUDY OF CHANGES IN LIPID PROFILE IN PATIENTS WITH HYPOTHYROIDISM BELONGING TO TRIBAL POPULATION OF NORTHERN MAHARASHTRA

KEY WORDS: Tri-iodothyronine (T3), Tetra-iodothyronine (T4), Cholesterol, Triglycerides, HDL cholesterol, LDL cholesterol

Sandip Lambe	Associate professor, Department of Biochemistry, SMBT Institute of Medical Sciences & Research Centre, Dhamangaon Tal- Igatpuri, Distt-Nashik, 422403.
Pankaj Kambale*	Assistant professor, Department of Biochemistry, Grant Government Medical College and Sir J.J. Group of Hospitals, Mumbai. *Corresponding Author
Kanchan Lambe	Tutor, Department of Conservative Dentistry & Endodontics, SMBT Institute of Dental Sciences & Research, Dhamangaon Tal- Igatpuri, Distt-Nashik, 422403.
Kalpna Rakshit	Consultant Periodontologist.

ABSTRACT
 The cross sectional study of changes in lipid profile in patients with Hypothyroidism was conducted in a tertiary care of hospital in northern Maharashtra region with the sole purpose of compare and correlate the changes in the levels of lipid profile occurring in hypothyroidism patients. There is a profound effect of thyroid hormones on lipid profile. Serum levels of total cholesterol, triglycerides, HDL, LDL and VLDL cholesterol were estimated in 100 newly diagnosed hypothyroidism patients and 100 normal healthy controls enrolled in the study. The results obtained in our study indicated raised serum total cholesterol, triglycerides, LDL and VLDL cholesterol levels and decreased serum HDL cholesterol levels. In addition increase in levels of serum total cholesterol, triglycerides, LDL and VLDL cholesterol correlated positively with serum TSH levels in hypothyroidism patients while decrease in the levels of serum HDL cholesterol correlated negatively with serum TSH levels in hypothyroidism patients. Hence the present study mandates the estimation of lipid profile in all hypothyroidism patients to prevent the development of cardiovascular events.

INTRODUCTION-

The thyroid gland produces two related hormones, thyroxine (T4) and triiodothyronine (T3). Acting through thyroid hormone receptors α and β , these hormones play a critical role in cell differentiation during development and help maintain thermogenic and metabolic homeostasis in the adult.¹ The primary hypothyroidism, being the most common form of hypothyroidism, occurs due to inability of the thyroid gland to produce adequate amounts of thyroid hormones i.e. Tri-iodothyronine (T3) & Tetra-iodothyronine (T4).² Being metabolic hormones, the thyroid hormones play a very significant role in the regulation of lipid metabolism in the body.³

The hypothyroidism alters the composition and transport of lipoproteins leading to alteration in lipid profile.^{4,5,6} The changes occurring in lipid profile in hypothyroidism include increased total and LDL cholesterol and decreased HDL cholesterol.^{7,8} Hence, hypothyroidism leads to secondary dyslipidaemia. Some studies indicate that there is contradictory increase in HDL cholesterol.³ Hence the present study was undertaken to assess the changes in the levels of lipid profile in hypothyroidism patients of tribal population residing in northern Maharashtra region.

MATERIAL & METHODS-

The present study was carried out in the Department of Biochemistry of a tertiary care hospital in Northern Maharashtra region over a period of 6 months.

Selection of Cases & controls- Patients diagnosed with Primary Hypothyroidism were taken as cases from patients attending General Medicine OPD and admitted in wards of the hospital. 100 patients were enrolled as cases and 100 age and sex matched healthy relatives of patients accompanying them were enrolled as controls after due consent.

Inclusion criteria-

1. Those participants who consented for the study
2. Newly diagnosed patients of Primary Hypothyroidism
3. Age group of cases and controls in between 20 to 50 years

Exclusion criteria-

1. Secondary and tertiary hypothyroidism patients
2. Age < 20 years and > 50 years
3. Patients having any other systemic illness
4. Patients on treatment for hypothyroidism
5. Pregnant and lactating women
6. Patients on diuretics, aminoglycosides or any other medical supplementation

Sample collection- 6 ml venous blood from antecubital vein was drawn from the participants after taking all the aseptic precautions. Serum was separated out after centrifugation. The tests were performed on the same day on separated serum. Haemolysed samples were discarded.

Method of estimation-

PARAMETER	METHOD OF ESTIMATION	EQUIPMENT
Thyroid profile (Serum T3, T4 and TSH)	Chemiluminescence assay	Siemens Advia Centaur XP
Serum Total cholesterol	Enzymatic CHOD-PAP method	Mindray BS 220 Autoanalyser
Serum Triglycerides	Enzymatic GPO-PAP method	Mindray BS 220 Autoanalyser
Serum HDL cholesterol	Enzymatic Direct method	Mindray BS 220 Autoanalyser
Serum LDL cholesterol	Indirect: Friedewald formula	---
Serum VLDL cholesterol		

Statistical analysis-

Performed by using Graph Pad prism. Mean values of the findings were compared among and between groups. Unpaired 't' test was done to assess the significance among the groups and between groups respectively. 'p' values <0.05 were considered significant.

RESULTS-

TABLE No 1: Table showing distribution of study subjects according to age

Age in years	Cases		Controls		p value
	M	F	M	F	
20 to 30	20	20	22	19	
31 to 40	17	19	18	19	
41 to 50	12	12	11	11	
Total	100		100		0.785
Mean age	32.72 ± 8.6		32.55 ± 9.2		

M: Males, F: Females, p>0.05= Non significant

TABLE No 2: Table showing comparison of mean serum levels of Thyroid hormones in the study subjects (cases & controls)

Parameter	Cases (n=100) Mean SD	Controls (n=100) Mean SD	p Value
Serum T ₃ (ng/ml)	0.99 0.26	1.63 0.46	p=0.0001

Serum T ₄ (µg/dL)	3.19 1.68	7.78 1.95	p=0.0001
Serum TSH (mIU/ml)	9.61 2.33	4.73 1.91	p=0.0001

p<0.001= highly significant

The above table no. 2 indicates the comparison of mean serum T₃, T₄ and Thyroid Stimulating Hormone (TSH) levels between hypothyroidism patients and controls. It was observed that mean serum T₃ and T₄ levels were decreased statistically highly significantly in hypothyroidism cases when equated with the controls whereas the mean levels of serum TSH were increased statistically highly significantly in cases when equated with the controls.

Table No. 3: Table showing comparison of mean serum levels of lipid profile parameters in the study subjects (cases & controls)

Parameters (mg/dL)	Cases (n=100)	Controls (n=100)	p value
Total cholesterol	261.56 ± 50.02	156.94 ± 31.10	<0.001
HDL cholesterol	53.76 ± 87.54	67.32 ± 47.97	<0.05
Triglycerides	265 ± 54.19	87.87 ± 67.33	<0.001
LDL cholesterol	181.87 ± 59.11	66.43 ± 32.87	<0.001
VLDL cholesterol	53 ± 10.83	17.57 ± 13.47	<0.001

p<0.05= statistically significant p<0.001= highly significant

The above table no. 3 shows the comparison of mean serum lipid profile parameters levels between hypothyroidism cases and healthy controls. From the values obtained, it was evident that mean serum total cholesterol, triglycerides, LDL and VLDL cholesterol levels were increased statistically highly significantly in hypothyroidism cases when equated with the controls whereas the mean levels of serum HDL cholesterol were reduced statistically highly significantly in cases when equated with the controls.

Table No. 4: Table showing correlation between the levels of serum TSH and serum lipid profile parameters in the study subjects (cases & controls)

	Total cholesterol	Triglycerides	HDL cholesterol	LDL cholesterol	VLDL cholesterol
Serum TSH	r= 0.586 p<0.05	r= 0.643 p<0.05	r= - 0.038 p<0.05	r= 0.731 p<0.05	r=0.611 p<0.05

p<0.05= statistically significant

The above table no. 4 indicates the correlation between the mean serum TSH levels and mean serum lipid profile parameters levels in hypothyroid patients. It is observed that the mean levels of serum total cholesterol, triglycerides, LDL and VLDL cholesterol correlated positively with mean serum TSH levels in hypothyroidism patients while mean serum HDL cholesterol correlated negatively with mean serum TSH levels in hypothyroidism patients.

DISCUSSION-

The present study to assess the changes in the lipid profile parameters in hypothyroidism patients was undertaken in the department of Biochemistry of our tertiary care hospital with the purpose to see whether thyroid hormones alteration has any effect on lipid profile in the tribal population of Northern Maharashtra region and to study the correlation between the same.

In our study, mean serum total cholesterol, LDL cholesterol, VLDL cholesterol and triglycerides were found significantly increased whereas HDL cholesterol was found significantly decreased in cases compared to controls. The findings obtained in our study corroborated well with the studies conducted by Sangeeta N et al³, Jung CH et al⁹, Keyes & Heimberg¹⁰, Laker & Mayes¹¹, Thompson¹² and Abrams & Grundy¹³. Some studies however have indicated towards increase in the levels of HDL cholesterol in hypothyroidism patients.^{14,15} In addition the mean serum total cholesterol, triglycerides, LDL and VLDL cholesterol correlated positively statistically significantly with mean serum TSH levels while mean serum HDL cholesterol levels correlated negatively statistically significantly in hypothyroidism patients indicating that increase in

the levels of serum TSH increased the levels of mean serum total cholesterol, triglycerides, LDL and VLDL cholesterol and reduced the levels of serum HDL cholesterol.

Increase in the level of serum total and LDL cholesterol has been attributed to decreased LDL receptors on hepatocytes due to decreased thyroid hormones.^{14,15} Inability to remove both exogenous and endogenous triglycerides from the blood in hypothyroidism has been indicated as the cause behind the increase in triglyceride level.^{14,16} Decreased level of HDL cholesterol in the present study may be ascribed to increased lipoprotein lipase and CETP activity in hypothyroid patients.^{3,7} The cause behind raised VLDL cholesterol remained absurd.

CONCLUSION-

The findings obtained in the present study emphasise that there are alterations in the levels of lipid profile parameters in hypothyroidism patients thus stressing on the point of estimating lipid profile parameters in newly diagnosed hypothyroidism patients and there after regularly, so as to avoid potential risk of developing future cardiovascular complications. This also was one of very few studies conducted on the tribal population of northern Maharashtra region. Finally to put an end to the controversy regarding the changes in HDL cholesterol, a large cross sectional study with a wide sample size belonging to all socioeconomic class is required to be carried out.

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