

Patterns of Lipid Abnormalities in Patients of Hypothyroidism

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Abstract

Background: Hypothyroidism is one of the most common endocrinal problems encountered in our clinical practice. Thyroid hypofunctioning significantly affects lipoprotein metabolism by various mechanism which can be detrimental to one's health if not diagnosed and addressed on time.

Aims and Objectives: To Determine patterns of lipid abnormalities in patients of hypothyroidism.

Materials And Methods: A cross-sectional, observational study in which two hundred newly diagnosed patients of hypothyroidism were studied in GMC & hamidia hospital Bhopal which are divided among two subgroups overt(OH) and subclinical hypothyroidism(SH) in which total cholesterol, triglycerides, LDL and HDL level compared.

Results: Dyslipidemia was more prevalent and more severe in overt hypothyroidism (OH) with respect to total cholesterol, LDL and HDL but for triglycerides the derangement is having similar prevalence in both groups. Increase in total cholesterol, LDL, TG and decreases in HDL is more in OH than in SH and the difference is clinically significant for all variables except for TG in which it is statistically insignificant.

Conclusion: Hypothyroid state definitely alters lipid parameters (more in OH than SH), early diagnosis and treatment of which is of paramount importance to prevent morbidity and mortality.

Keywords: Hypothyroidism, Lipids Alteration, Dyslipidemia

Introduction

Hypothyroidism is one of the most common endocrinal problem encountered in our clinical practice. The prevalence of hypothyroidism in Indian context is around 10.95% with significantly high proportion of females affected than males (15.86 versus 5.02%). Thyroid function significantly affects lipoprotein metabolism like reduced activity of HMG-CoA reductase, TC and LDL-C levels are increased in patients with hypothyroidism [1-5]. This is due to the decreased LDL-receptors' activity, resulting in decreased catabolism of LDL and IDL^[6-8]. Moreover, a decrease in LPL activity is found in hypothyroidism, decreasing the clearance of TG-rich lipoproteins. Therefore, hypothyroid patients may also present with elevated TG levels associated with increased levels of VLDL and occasionally fasting chylomicronemia^[1-5,8]. In a study mean total cholesterol, LDL cholesterol and triglycerides were found significantly increased whereas HDL cholesterol was found decreased

in cases compared to controls. The good thing is that administration of substitution therapy with L-thyroxine significantly improves lipid metabolism abnormalities. Among various sign & symptoms of hypothyroidism the alteration in body lipids which we want to study here and whether any significant difference prevailing between the subclinical (SH) and overt hypothyroidism(OH) because these are directly related to CVD morbidity & mortality and the same can be prevented or treated on time by screening ones thyroid profile who has these lipid alterations and restoring his euthyroid status in a couple of months.

Materials and Methods

Current observational, cross-sectional study was conducted on 200 newly diagnosed hypothyroid patients came to medicine OPD, GMC and associated Hospital Bhopal. Based upon their symptoms, signs and relevant clinical examination all those suspicion of hypothyroidism and also met the inclusion criteria (not having previous

cofounding disease like diabetes, smoker, renal pathology, pregnant women, on antithyroid drugs, steroids, OCPs, beta blockers) ordered for T3, T4, TSH by ELISA. Those patients who had TSH value more than 5.5 microIU/ml have been selected and a written informed consent is taken about the participation in the study after which divided in two groups based on their thyroid profile. Patients having raised TSH (>5.5 microIU/ml) but normal T3 (0.8-2.1 ng/ml) and T4 (5-13 microg/dl) are considered subclinical hypothyroid and patients having both raised TSH (>5.5 microIU/ml) and T3 (>2.1 ng/ml), T4 (>13 microg/dl) are considered overt hypothyroid. The assessment used MS Excel 2007, MS word 2010 and statistical calculations were done by Epi-info 7 software. The variables were expressed using percentages and wherever necessary Mean ±SD for quantitative data. The simple statistical test chi-square was performed for comparison between two groups and p-value less than 0.05 was taken as significant.

Observation and Results

Table No.1

Character	Overt Hypothyroidism (N=90)	Patients	Subclinical Hypothyroidism (N=110)	Patients	P Value.
Sex (M/F)	19/71		20/90		0.7332
Age (in years)	36.82±7.94		36.53±7.10		0.4463
BMI (kg/m ²)	25.40±3.71		22.60±1.91		0.0000*
Total cholesterol(mg/dl)	246±74.37		177±44.76		0.0000*
LDL (mg/dl)	118.61±35.36		85.15±18.71		0.0000*
HDL (mg/dl)	44.66±13.33		51.25±9.48		0.0000*
Triglycerides (mg/dl)	156.27±28.60		148.90±28.90		0.3746

(*) shows statistically significant values; p<0.05.

Above table shows the spectrum of clinical variables of the patients in our study who were grouped among overt

and subclinical hypothyroidism. The quantitative data are shown by mean \pm sd (standard deviation) and the

categorical data by the percentage(%).the significance is shown by p-value in the last coloumn.

Table 2: Distribution of Patients By Total Cholesterol Value

Hypothyroid status	Total Cholesterol Level (mg/dl)						Total
	251-300		>300		Normal (<250)		
Overt	27.78%	25	14.44%	13	57.78%	52	90
subclinical	10%	11	2.73%	3	87.27%	96	110
Total		36		16		148	200

Table 3: Distribution of Patients by Plasma Triglycerides Value

Hypothyroid status	Triglyceride Level (mg/dl)						Total
	151-175		>175		Normal(50-150)		
Overt	20%	18	33.33%	30	46.67%	42	90
subclinical	20.91%	23	24.55%	27	54.55%	60	110
Total		41		57		102	200

Table 4: Distribution of Patients by Low Density Lipoprotein (LDL)

Hypothyroid status	Low Density Lipoprotein Level (mg/dl)						Total
	110-150		>150		Normal (<110)		
Overt	44.44%	40	16.67%	15	38.89%	35	90
subclinical	8.18%	9	0.00%	0	91.82%	101	110
Total		49		15		136	200

Table 5: Distribution of Patients by High Density Lipoprotein (HDL)

Hypothyroid status	High Density Lipoprotein Level (mg/dl)				Total
	Less than 35		Desirable(35-70)		
Overt	23.33%	21	76.67%	69	90
subclinical	0.91%	1	99.09%	109	110
Total		22		178	200

Discussion

The prevalence of hypothyroidism in current study according to sex follows traditional pattern of female predominance in all 200 patients (80.50% female versus 19.50% male).But the distribution of sex between two groups is not statistically significant (p=0.7332). The mean age in OH is 36.82 \pm 7.94 while in SH it is 36.53 \pm 7.10 showing not much difference. Very few are of 50 year or above which may be due to the other age

related co-morbidities which places them in exclusion criteria. Most SH patients(91.82%) having their BMI in normal range while a large fraction of patients (37.78%) in OH are overweight or obese. Dyslipedemia is an established factor associated with hypothyroidism. In a study by Tumbanatham A et al.^[10] a significant difference (p<0.05) was observed in the mean values of total cholesterol, triglycerides and LDL levels between clinical and subclinical hypothyroidism. In another study

by K. Ramesh and Balaji Nayak^[11] there was increase of total cholesterol (15%), LDL (32%), triglycerides (100%) and decrease of HDL (82.5%) in patients of hypothyroidism. Also data from the NHANES III revealed increased levels of TC in SH patients (n=215) vs controls (n=8013)^[9]. Our study also shows the similar findings with these studies. We observed increase in total cholesterol (42.12% in overt group and 12.73% in subclinical), triglycerides (53.33% in overt & 43.45% in SH), LDL (61.11 in overt & 8.18 in SH) and decreases in HDL (23.33% in overt & 0.91 in SH). Increase in total cholesterol, LDL, TG and decreases in HDL is more in OH than in SH and the difference is clinically significant for all variables (p=0.000) except for TG in which it is statistically insignificant (p=0.375).

Conclusion

This study shows that the lipid homeostasis is affected definitely, sometimes severely in hypothyroid state. These changes are more in overt hypothyroidism patients and to a mild extent in subclinical hypothyroid patients. So the chance of developing these complications should be kept in mind while dealing with a new case of hypothyroidism or during its natural history or if their is under-treatment state so that we can order the relevant investigation and if comes to be abnormal can treat the condition (the hypothyroidism, hence the pathology will automatically remitted) earlier before sufferings of patient increase and also true is the vice-versa.

Limitations

Cross sectional nature and small sample size was the main limitations of the present study. A further large case-control study has to be performed in the future to confirm the results of this present study.

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Ethical Approval

The study was approved by the Institutional Ethics Committee, GMC Bhopal

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