

Original article :

Correlation of Lipid level in Thyroid Disorder Patients: A Case Control Study

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Abstract

Background: Hypothyroidism is related with many biochemical abnormalities. Increased levels of total cholesterol and low density lipoprotein cholesterol, when decreases thyroid function. So, we have designed this study in our population for evaluation of lipid profile in hypothyroid patients that might be helpful for clinical management of hypothyroid patients with dyslipidemia.

Material & Methods: The present a Case Control Study done on 80 patients were attending both OPD and IPD in Department of Medicine, Narayan Medical College & Hospital, Sasaram, Bihar, India. Presence of thyroid dysfunction is defined as per American Thyroid Associations Guidelines and dyslipidemia as per NCEP ATP II and IDF Guidelines.

Results: In our study showed that the majority of patients were 62.5% in case group and 60% in control group was 30-60 years of age (table 1). The mean value of TSH, Total T3 & Total T4 was 9.423 ± 3.944 , 123.7 ± 36.12 & 7.106 ± 4.136 respectively in case group and 2.54 ± 0.8180 , 133.5 ± 22.03 & 9.019 ± 1.527 respectively in control group, but statistically significant ($P<0.0001$, $P=0.0287$ & $p=0.1002$ respectively). The lipid profile (TC, LDL, HDL, VLDL & TG) was statistically significant ($P<0.0001$, $P=0.0001$, $P=0.425$, $P<0.0001$ & $P=0.0001$ respectively).

Conclusion: So it can be concluded that patients with thyroid disorder did have a marked impact on lipids fractions like total cholesterol, LDL-C, HDL-C levels, triglyceride and VLDL-C in patients with subclinical hypothyroidism suggested that subclinical hypothyroidism might be associated with increased risk of some amount of cardiovascular risk that could be improved on giving L-thyroxine.

KeyWords: Thyroid disorder, HDL, LDL, TC, VLDL, TG.

INTRODUCTION

Hypothyroidism is a clinical syndrome resulting from a deficiency of thyroid hormones, these hormones regulates a wide array of metabolic activities¹. It is a common metabolic disorder in general population², which is more common in women and epidemiological rate of prevalence increase with age³. Thyroid disorders are more prevalent in women as compare to men and can cause many problems including weight gain and hormonal imbalance. In the developed countries,

the prevalence of thyroid disorders is about 4% to 5%⁴.

Hypothyroidism is related with many biochemical abnormalities. Increased levels of total cholesterol and low density lipoprotein cholesterol, when decreases thyroid function². Thus hypothyroidism comprises a significant cause of secondary dyslipidemia⁴.

The generally increase the serum total cholesterol level (raised serum LDL cholesterol and

intermediate density lipoprotein) in hypothyroidism patients, despite the decreased activity of HMG CoA reductase⁵. Decline the thyroid hormone secretion greatly raises the plasma concentration of cholesterol because the decline rate of cholesterol secretion in the bile and consequent reduced loss in the feces due to decreased number of low density lipoprotein receptors on liver cells⁶. Reduced activity of LDL receptors resulting in decline receptor-mediated catabolism of LDL and IDL is the main cause of the hypercholesterolemia found in hypothyroidism⁷.

In newly diagnosed hypothyroid patients (value more than 40 mg/dL) reported increases concentration of high density lipoprotein cholesterol in serum, whereas euthyroid and previously reported hypothyroid cases who were on thyroid replacement therapy reported decreased level of serum HDL cholesterol⁸. Hypothyroid patients usually manifest elevated levels of high density lipoprotein cholesterol (HDL-C) mainly due to raise concentration of HDL2 particles⁹.

Various studies were done to evaluate the lipid profile status of hypothyroid patients. But controversies still overcome and that needs to attain consensus. So, we have designed this study in our population for evaluation of lipid profile in hypothyroid patients that might be helpful for clinical management of hypothyroid patients with dyslipidemia.

MATERIAL & METHODS

The present a Case Control Study done on 80 patients were attending both OPD and IPD in Department of Medicine, Narayan Medical College & Hospital, Sasaram, Bihar, India.

Inclusion criteria

- All the patients with thyroid dysfunction

Exclusion criteria

- Patients with chronic liver disease.
- Patients who had already taken treatment.
- Coagulation disorders.
- Severe systemic disease.
- Pregnancy.
- Renal failure
- Malignancy
- Underlying known cardiac disorder

Presence of thyroid dysfunction is defined as per American Thyroid Associations Guidelines.

Dyslipidemia as per NCEP ATP II and IDF Guidelines:

- Total cholesterol > 200 mg/dl
- Triglyceride > 150 mg/dl
- HDL < 40 mg/dl
- LDL > 100 mg/dl

Data Analysis

Statistical analysis of the data's was done by SPSS where the values ≤ 0.05 was considered as significant.

RESULTS

In our study showed that the majority of patients were 62.5% in case group and 60% in control group was 30-60 years of age (table 1). The mean value of TSH, Total T3 & Total T4 was 9.423 ± 3.944 , 123.7 ± 36.12 & 7.106 ± 4.136 respectively in case group and 2.54 ± 0.8180 , 133.5 ± 22.03 & 9.019 ± 1.527 respectively in control group, but statistically significant ($P < 0.0001$, $P = 0.0287$ & $p = 0.1002$ respectively) (table 2).

In our results suggested that the lipid profile was statistically significant showed in table 3. 2-D echo positive in 55% in case group and none of patients in control group (table 4).

DISCUSSION

In the present study, we observed a statistically significant the levels of lipid profile in thyroid disorder with respect to control subjects. Dyslipidemia is a well-known risk factor for cardiovascular diseases like atherosclerosis.

The correlation between changes in lipid profile and overt hypothyroidism is well established. However, lipid profile alterations in subclinical hypothyroidism are controversial; some studies showing positive correlation and prompt reversal of changes following treatment (Athans et al., 1988¹⁰ and Monzani et al., 2004¹¹) and few studies refusing any correlation between the two (Houston and Pearson, 2004)¹². The results of the present study contrasts previous study in which it was observed that subclinical hypothyroidism was associated with raised LDL-C levels and thus had larger cardiovascular risk (Bakker et al., 2001)¹³. Literature reporting hypercholesterolemia to be more common condition in cases with subclinical hypothyroidism may simply reflects that hypercholesterolemia is a common condition in general population. A significant increase in

serum triglycerides and VLDL levels in the present study are in agreement with the report by Vierhapper et al., (2000)¹⁴ that hypothyroid cases showed alteration in pattern of triglyceride kinetics as removal of both endogenous and exogenous triglycerides is markedly reduced and this change seems to account for the hypertriglyceridemia associated with thyroid hypofunction. There is also decrease in plasma post heparin lipolytic activity in hypothyroid state accounting for the raised triglyceride levels (Nikkila and Kekki, 1972)¹⁵. The above factors may play some part in raising the level of serum triglycerides in cases of subclinical hypothyroidism (Miura et al., 1994)¹⁶.

CONCLUSION

So it can be concluded that patients with thyroid disorder did have a marked impact on lipids fractions like total cholesterol, LDL-C, HDL-C levels, triglyceride and VLDL-C in patients with subclinical hypothyroidism suggested that subclinical hypothyroidism might be associated with increased risk of some amount of cardiovascular risk that could be improved on giving L-thyroxine.

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Table 1: Age wise distribution of case and control group

Age (yrs)	Cases		Control		Chi-square test	P- value
	Number	Percentage	Number	Percentage		
<30 yrs	11	27.5%	10	25%	4.182	0.2424
30-45	20	50%	13	32.5%		
46-60	5	12.5%	11	27.5%		
>60 yrs	4	10%	6	15%		
Total	40	100%	40	100%		

Table 2: Mean Thyroid Level of case and control group

Parameters	Cases	Control	T	Df	P- value
TSH (μ IU/ml)	9.423 \pm 3.944	2.54 \pm 0.8180	10.86	78	<0.0001***
TotalT3 (ng/dl)	123.7 \pm 36.12	133.5 \pm 22.03	2.226	78	0.0287*
TotalT4 (μ g/dl)	7.106 \pm 4.136	9.019 \pm 1.527	2.584	78	0.0112*

Table 3: Mean Lipid Parameters (mg/dl) of case and control group

Parameters	Cases	Control	T	P- value
Serum Cholesterol	182.0±38.71	130.4±17.63	7.431	<0.0001
LDL	122.1±23.34	100.6±11.66	4.002	0.0001
HDL	36.23±5.421	33.10±4.002	2.004	0.0485
VLDL	24.64±7.013	20.15±3.129	4.397	<0.0001
TG	133.4±41.62	114.2±13.11	4.019	0.0001

Table 4: 2D-Echo in case and control group

2D-Echo	Cases		Control	
	Number	Percentage	Number	Percentage
Positive	22	55%	0	0%
Negative	18	45%	40	100%
Total	40	100%	40	100%