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## Dyslipidemia and Hypothyroidism in Population of East Medinipur, West Bengal

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### Abstract

*Hypothyroidism accounts for about 2% of all cases of hyperlipidemia and is second only to diabetes mellitus as a cause of secondary hyperlipidemia. The present study was planned to determine the level of lipid profile in patients diagnosed with hypothyroidism. Patients were screened for T3, T4 and TSH. Based on these values those who were having hypothyroidism were selected. Blood samples of these patients were drawn aseptically after 12 hours of overnight fasting for lipid profile. Out of total 260 cases 83 were subclinical hypothyroid (SCH) and 177 were hypothyroid. Mean  $\pm$  SD values of Total cholesterol was  $213.37 \pm 24.58$  (for SCH) and  $209.46 \pm 27.43$  (for Hypothyroidism), Triglycerides was  $201.41 \pm 21.38$  (for SCH) and  $197.67 \pm 29.87$  (for Hypothyroidism) and LDL -C was  $143.21 \pm 26.81$  (for SCH) and  $134.56 \pm 25.77$  (for Hypothyroidism). Our study demonstrated that dyslipidemia is associated with hypothyroidism.*

*Keywords- Dyslipidemia, Subclinical hypothyroidism, Hypothyroidism*

## INTRODUCTION

Hypothyroidism is the most common form of thyroid hormone disorder.<sup>1</sup> The World Health Organization (WHO) estimates that about two billion people are iodine deficient.<sup>2</sup> It is a common metabolic disorder in the general population specially in women of higher age group, 9.5% of the participants of the Colorado prevalence study had elevated levels of thyroid stimulating hormone (TSH).<sup>3</sup> Hypothyroidism can occur due to many causes of which iodine deficiency remains one of the most common cause worldwide. In areas of iodine sufficiency, auto immune disease (Hashimoto Thyroiditis) and iatrogenic cause (treatment of hyperthyroidism) are most common.<sup>4</sup> Hypothyroidism accounts for about 2% of all cases of hyperlipidemia and is second only to diabetes mellitus as a cause of secondary hyperlipidemia.<sup>5</sup> Levels of total and LDL cholesterol (LDL-C) tend to increase as the thyroid function declines.<sup>3</sup> Therefore, hypothyroidism constitutes a significant cause of secondary dyslipidemia.<sup>6,7</sup> Thyroid disorder leads to changes in the composition and transport of lipoproteins.<sup>8</sup> In general hypothyroidism is associated with hypercholesterolemia mainly due to elevation of LDL-C levels, where as high density lipoproteins cholesterol (HDL-C) concentrations is usually normal or even elevated.<sup>9,10</sup> It is known that overt hypothyroidism leads to an increase in plasma cholesterol levels.<sup>11</sup> Most studies in subclinical hypothyroidism show comparable but less pronounced associations.<sup>12,13</sup> There remains a debate regarding extent to which

cardiovascular events and lipid profile are affected by various degrees of thyroid hormone disorder. With this background the present study was planned to determine the level of lipid profile in patients diagnosed with hypothyroidism.

## MATERIALS AND METHODS

After obtaining the ethical clearance from the institutional ethical committee present hospital based study was undertaken in the Department of Biochemistry in collaboration with the Department of Medicine of Dr BC Roy hospital, attached with ICARE Institute of Medical Sciences and Research, Haldia, East Medinipur W.B. Cases selected for the study were newly diagnosed with hypothyroidism and not on treatment. Patients were screened for T3, T4 and TSH. Based on these values they were classified as hypothyroid. Further on the basis of TSH and clinical symptoms hypothyroid patients were divided to SCH and OH. Blood samples of these patients were drawn aseptically after 12 hours of overnight fasting for lipid profile. The inclusion criteria adopted were newly diagnosed and untreated cases of hypothyroidism. The patients having normal thyroid profile (Euthyroid) were excluded from the study. Patients suffering from diabetes, polycystic ovarian disease, tuberculosis, oral contraceptive pills, statins and other medication that alter thyroid hormone and lipid profile levels let to exclusion from the study. Thyroid profile was estimated on Lablife ER 2007 Elisa reader from Ranbaxy. Lipid profile was

estimated on Accurex AC 112 plus semi auto analyser from Accurex Biomedical India.

*Statistical analysis* Data was analysed by unpaired student t test. Results were expressed as mean  $\pm$  standard deviation.

## RESULTS

Among the 260 cases in the present study newly diagnosed cases of hypothyroidism consisting of 83 subclinical hypothyroid (SCH) and 177 hypothyroidism cases (Table 1). Mean  $\pm$  SD values of T3, T4, TSH and Lipid profile of SCH and hypothyroid patients are shown in Table 2.

Table 1: Distribution of hypothyroid patients according to age and gender (n=260)

Age group (years)	Sub Clinical Hypothyroidism		Hypothyroidism		Total	
	Male No(%)	Female No(%)	Male No(%)	Female No(%)	Male No(%)	Female No(%)
20-30	14	17	26	39	40	56
31-40	10	12	21	24	31	36
41-50	7	9	13	18	20	27
51-60	4	5	9	13	13	18
>60	2	3	3	11	5	14
Total	37	46	72	105	109	151

Table 2: Mean values and standard deviation of thyroid parameters & lipid profile in Hypothyroidism

Test Parameters	Subclinical hypothyroid	Hypothyroid patients
Total Cholesterol (in mg/dL)	213.37 $\pm$ 24.58	209.46 $\pm$ 27.43
Triglycerides (in mg/dL)	201.41 $\pm$ 21.38	197.67 $\pm$ 29.87
HDL (in mg/dL)	31.27 $\pm$ 2.74	35.13 $\pm$ 2.28
LDL (in mg/dL)	143.21 $\pm$ 26.81	134.56 $\pm$ 25.77

## DISCUSSION

Thyroid disorders are among the most common endocrine disorders and these usually alter lipid metabolism. Increase in serum TSH levels is the key laboratory finding for early detection of thyroid failure in case of hypothyroidism and it is more common in females as compared to males also its prevalence increases with age.<sup>14</sup> Duntas<sup>8</sup> observed that hypothyroidism was often accompanied by hypertension and in associated with dyslipidemia may promote atherosclerosis.

Following studies are in accordance with our study. According to Al Sayed A et al<sup>15</sup> Total cholesterol and LDL-C were significantly higher in patients with SCH as compared with control subjects however TG and HDL-C were not statistically different. Patients with SCH exhibited elevated atherogenic parameters (TC, LDL-C).

Sing et al<sup>16</sup> in their study demonstrated significant positive correlation between TSH and HOMA –IR level in hypothyroid group. Patients with hypothyroidism demonstrated dyslipidemia as compared to controls. TSH was found to be significantly high in overt hypothyroidism ( $45.8 \pm 20.85$   $\mu$ IU/ml,  $0.67 \pm 0.18$  ng/dl) as compared with the SCH ( $11.08 \pm 6.65$   $\mu$ IU/ml,  $1.1 \pm 0.6$  ng/dl). The total cholesterol levels were significantly higher in OH as compared to SCH where as TG and LDL-C levels in OH and SCH were comparable although they were significantly raised as compared to the control group.

Tuczu et al<sup>17</sup> in their study showed that TSH levels of SCH group were higher than control ( $7.4 \pm 2.9$ ) and ( $1.55 \pm 0.78$   $\mu$ IU/ml) respectively. Mean total

and LDL-C of SCH group were higher than control.

These findings of different studies demonstrate that with increasing grades of hypothyroidism, there is decrease in serum HDL-C values and the levels of HDL-C is decreasing with age in all the groups also. Other authors<sup>18-20</sup> supported our findings that hypothyroidism a type of thyroid disorder was commonly associated with dyslipidemia.

## CONCLUSION

Our study demonstrated that dyslipidemia is associated with hypothyroidism and it may be recommended that patients having evidence of metabolic syndrome should be screened for the thyroid disorder and that the replacement therapy should be started as early as possible to reduced the ill effects of thyroid hormone dysfunctions.

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