

patients (n=2) had total cholesterol >200 while out of 44 patients with clinical hypothyroidism 45.46% (n=20) had total cholesterol >200. Triglycerides (>150 mg/dl) and LDL (>130 mg/dl) values were higher (68.18% and 40.90 % respectively) in clinical hypothyroidism as compared to subclinical hypothyroid patients (39.29% and 21.43% respectively). Higher HDL values (>40 mg/dl) were observed among subclinical hypothyroidism (60.71%) compared to clinical hypothyroidism (59.10%)

Table 3 Association Of Thyroid Profile With Atherosclerotic Inflammatory markers

ATHEROSCLEROTIC INFLAMMATORY MARKERS	SUBCLINICAL HYPOTHYROIDISM NO. OF PATIENTS	CLINICAL HYPOTHYROIDISM NO. OF PATIENTS
CRP		
<0.5	36 (64.28%)	8 (18.18%)
0.5-3.0	16 (28.57%)	18 (40.91%)
>3.0	4 (7.15%)	18 (40.91%)
ESR		
<10	12 (21.42%)	0 (0%)
10-30	38 (67.85%)	22 (50%)
>30	6 (10.72%)	22 (50%)
TOTAL COUNT		
4000-10,000	44 (78.57%)	26 (59.09%)
>10,000	12 (21.43%)	18 (40.91%)

CRP>3 was noted in 40.91% patients of clinical hypothyroidism whereas it was noted in 7.15% of subclinical hypothyroidism. Likewise, higher ESR (>30) and TOTAL COUNTS (>10,000) were noted more among clinical hypothyroid patients (50% and 40.91% respectively) as compared to subclinical hypothyroid patients (10.72% and 21.43% respectively).

DISCUSSION

Hypothyroidism is associated with atherosclerotic cardiovascular disease which can be explained by thyroid hormones regulation of lipid metabolism and its effect on blood pressure (BP). Hypothyroidism is associated with parameters like obesity, hypertension, decreased HDL and elevated triglycerides, and hence with metabolic syndrome. Few studies have suggested the role of hypothyroidism as an independent risk factor for atherosclerosis even in subclinical hypothyroidism⁴¹. Clinical hypothyroidism is associated with increased risk of atherosclerosis as these subjects share the potential atherogenic factors such as higher total and LDL cholesterol, increased high sensitivity C-reactive protein (CRP), hyperhomocysteinemia, altered coagulation profile, increased arterial stiffness, and endothelial dysfunction.

Along with this, thyroid hormones have a substantial influence on the peripheral vasculature, and thyroid hormone receptors have also been identified in human vascular smooth muscle cells⁵¹. So, the role of these cells in the development of atherosclerosis raises the hypothesis that thyroid hormone deficiency and higher levels of TSH may be associated with atherosclerosis as an independent factor. Low-grade inflammation may also cause endothelial dysfunction and impaired nitric oxide availability. Patients with Hashimoto's thyroiditis, which is a leading cause of hypothyroidism, can have more of the underlying inflammation hastening the progression of atherosclerosis.

Carotid intima-media thickness (CIMT) testing via B-mode ultrasound is a safe, simple, and inexpensive method for evaluating CV risk by measuring the combined thickness of the intimal and medial layers of the arterial wall. According to large studies, such as The Atherosclerosis Risk in Communities (ARIC) study, The Cardiovascular Health Study (CHS), and The Rotterdam study, a correlation between CIMT measurements and risk of cardiovascular events has been established. The advantage of measuring the CIMT by high resolution B-mode ultrasonography lies in its rapidly applicable and available, non-invasive and cost-effective nature. Progression of CIMT is therefore an attractive method for use in research as it can be easily assessed to study vascular risk or the therapeutic effects of a specific treatment.

Our study was carried out to find the prevalence of atherosclerosis in patients with clinical vs subclinical hypothyroidism using CIMT as a marker for atherosclerosis. In our study, 54.55% of clinical hypothyroid

patients had CIMT >1 mm as compared to 17.86% of subclinical hypothyroidism. Mean value of CIMT in clinical hypothyroidism in present study was 1.02, whereas mean value of CIMT in Valentina *et al.* study was 0.98. Thus result in both study were comparable. Similar results were obtained in Mariana Tudoran *et al.* study.

The total cholesterol was statistically significant with p value of 0.0466 in patients with CIMT > 1mm. Similarly other parameters of lipid profile such as Triglycerides and LDL (except HDL) had a positive association with CIMT of more than 1 mm. CIMT had positive correlation with all parameters of lipid profile except for HDL.

Patients having subclinical hypothyroidism, only 3.58% patients had total cholesterol >200 while 45.46% patients clinical hypothyroidism had total cholesterol >200. Triglycerides (>150 mg/dl) and LDL (>130 mg/dl) values were higher (68.18% and 40.90 % respectively) in clinical hypothyroidism as compared to subclinical hypothyroid patients (where they were 39.29% and 21.43% respectively). Higher HDL values (>40 mg/dl) were observed among subclinical hypothyroidism (60.71%) compared to clinical hypothyroidism (59.10%). Study by Gupta *et al.* revealed that elevated total cholesterol (≥ 200 mg) in 45.8% and hypertriglyceridemia (≥ 150 mg) in 28.6%, whereas in our study they were 22% and 52% respectively. Ramachandran *et al.* in his study found reduced HDL (<40mg) in 65.5% of patients whereas our study had 40% patients having HDL <40 mg/dl.

Likewise, CRP >3, higher ESR (>30) and TOTAL COUNTS (>10,000) were noted more commonly among clinically hypothyroid patients compared to subclinical hypothyroid patients, suggesting active accelerated atherogenesis in clinical hypothyroid patients.

CONCLUSION

Prevalence of atherosclerosis is 54.55% and 17.86% in clinical and subclinical hypothyroidism respectively in our study, markedly higher in clinical hypothyroidism. Low Free T4 and High TSH are important factors for development of atherosclerosis rather than free T3 Levels. All the markers of atherogenesis like decreased HDL, elevated triglycerides, elevated LDL, CRP, ESR & TLC are substantially increased in Clinical hypothyroidism. CIMT >1 mm is an excellent screening test for early detection of atherosclerosis, and thus Prevention of end organ damage such as cerebrovascular stroke and myocardial infarction. Affordable, accessible health care, health education including diet, exercise and drug compliance may halt the progression of atherogenesis and hence premature coronary artery disease in hypothyroid patients.

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