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Co-Relation of Hypothyrodism with Triglyceride Level and Raised HDL Cholesterol

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Keywords
"Plasma triglyceride (TG), Low-density lipoprotein (LDL), Hypothyroidism, HDL cholesterol".

Abstract
Background: The cardiovascular system is negatively impacted by hyperthyroidism, but the majority of its positive effects on serum lipid levels. As a result, the focus of this review is on how thyroid disorders affect serum lipid levels, both overt and covert. A link between hypothyroidism and an increase in cardiovascular events has also been proposed. Subclinical hypothyroidism and increased carotid artery intima-media thickness, which may be a sign of early atherosclerosis, have been linked recently by two studies.

Aim and Objective: To study the co-relation of hypothyrodism with triglyceride level and raised HDL Cholesterol.

Methodology: At a tertiary care hospital in Ghaziabad, "total cholesterol (TC)", "triglycerides (TG)", "Very Low-Density Cholesterol (VLDL)", "low density cholesterol (LDL)", and "high density cholesterol (HDL)" were studied between the three study groups. Weight and waist size were reported in a semi-structured manner.

Result: "Hypothyroid was in 7% patients". "Subclinical hypothyroidism" was in14% patients. When "total cholesterol was abnormal (26.3%) compared to normal (17.7%)", the prevalence of hypothyroidism was greater. There was, however, no "statistically significant ($p>0.05$)" relation between the prevalence of hypothyroidism and total cholesterol.

Conclusion: The overwhelming body of research indicates that "HDL cholesterol levels" are normal to slightly raised in overt hypothyroidism, which results in an unfavourable "LDL cholesterol to HDL cholesterol ratio".

1. Introduction

A broad majority of metabolic parameters are regulated by thyroid function. Thyroid function affects some risk factors for "cardiovascular disease (CVD)" and the "metabolism of lipoproteins", which in turn affects the "overall risk of CVD". Hypothyroidism is a disorder that is Characterized by reduced absorption of glucose from the "gastrointestinal tract", delayed utilisation of

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"peripheral glucose", decreased production of hepatic glucose and decreased disposal of glucose from peripheral tissue. A recent analysis of the "cross-sectional study" has shown that even in the "euthyroid condition", "low thyroid function predisposes" to the "risk of higher cholesterol, glucose, insulin and insulin resistance" (Garduna – Garcia, et al, 2010) [1]

Resistance to insulin, present in both "OH and SH", may increase risk of cardiovascular disease, especially when combined with other risk factors, such as "hyperlipidaemia and high blood pressure". (Duntas et al, 2011) [2]

Diabetic dyslipidemia is characterised by "high plasma triglyceride (TG)", "low density lipoprotein (LDL)", and "high-density cholesterol (HDL c)" concentrations with low levels of HDL c. This is because insulin's tissue-level effect is diminished or because the body is resistant to insulin. Atherosclerosis, which is a major risk factor for coronary heart disease and is exacerbated by "diabetic dyslipidaemia", raises the risk of the disease, especially if glycemic management is suboptimal. [3] Due to a reduced LDL receptor in the liver, hypertriglyceridemia, LDL C, and apolipoprotein B (ApoB) are all related with hypothyroidism (HY), as well as hypercholesterolemia, hypertriglyceridemia, and markedly increased circulating cholesterol concentration. [4 6] Cardiovascular illnesses are brought on in HY dyslipidemia by coexisting metabolic abnormalities along with hormone-induced hemodynamic changes. The two most prevalent endocrine conditions are DM and hypothyroidism. There seems to be a connection between DM and thyroid problems. [7] Glucose absorption, synthesis, and utilisation are all improved by thyroid hormone (TH).

Disorders like hypothyroidism are rather common among people in general. The production, metabolism, and mobilisation of lipids are all known to be controlled by thyroid hormone. "Serum total cholesterol", "low-density lipoprotein (LDL) cholesterol", "apolipoprotein B", and "lipoprotein(a) [Lp(a)] levels" rise in people with overt hypothyroidism, as well as perhaps triglyceride levels as well. Less is known about how serum lipid levels are affected by subclinical hypothyroidism. The overwhelming body of research indicates that people with hypothyroidism have higher levels of "total cholesterol, LDL cholesterol, and perhaps triglycerides while their levels of high-density lipoprotein (HDL) cholesterol and Lp(a) stay stable". Thyroid hormone replacement medication will usually cure the majority of lipid problems in people with overt hypothyroidism. Thyroid hormone therapy does not, however, appear to improve the serum lipid levels in people with hypothyroidism, according to clinical trials conducted to date. Thyroid hormone is a desirable target for therapeutic development due to its effects on lipids. The creation of specially targeted analogues of thyroid hormone with the potential to treat hyperlipidemia without triggering systemic thyrotoxicosis is now under way.

The link between dyslipidemia and thyroid dysfunction was originally discovered in 1930. The connections between "thyroid function, lipid status, and cardiovascular" outcomes remain poorly understood despite being the subject of countless clinical investigations "over the past 70 years". The frequency of thyroid malfunction and the consequences of overt hypothyroidism for the lipids are outlined. Here, a number of the most recent and significant clinical studies are summarised with respect to lipid alterations in "subclinical hypothyroidism", "screening methods", and the "effects of thyroid hormone therapy" on those changes. In the future, it might be possible to benefit from the "effects of thyroid hormone on lipid metabolism" by creating highly selective analogues of "thyroid hormone" that could treat "hyperlipidemia" without potentially damaging the peripheral tissues of the body.

It's interesting to note that in patients with insulin sensitivity, this LDL cholesterol increase is accentuated [10]. Cigarette smoking also plays a role in the relationship between hypothyroidism and lipid levels; blood LDL cholesterol and total cholesterol concentrations are roughly 25% higher in hypothyroid smokers than in hypothyroid nonsmokers [11]. In overt hypothyroidism, triglyceride and VLDL levels range from normal to elevated [8, 9, 12]. Effects of overt hypothyroidism on HDL cholesterol have been inconsistent, with some studies demonstrating an increase, others

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demonstrating normal levels, and still others demonstrating an increase.

2. Methods and Materials

"The department of general medicine at Santosh medical college and hospital in Ghaziabad, Uttar Pradesh", was the site of the current study. The study we conducted involved 100 patients. Weight and waist size were reported in a semi-structured manner. L-T4 therapy is recommended for all patients with hyperlipidemia and overt hypothyroidism. Serum lipid readings should be repeated after serum TSH values have returned to normal, which typically occurs after 2 to 4 months of sufficient L-T4 medication. With L-T4 therapy, a reduction in the "ratio of total cholesterol to HDL cholesterol" of up to 30% to 50% is possible. "Therapeutic lifestyle modifications" should be implemented and "lipid-lowering drugs" should be added as necessary if hyperlipidaemia cannot be controlled with "L-T4 therapy" alone. Statins should ideally be started, if necessary, when patients achieve euthyroid status since "overt hypothyroidism" may be a risk factor for "statin-associated myopathy".

3. Results

The present study was conducted in the "Department of General Medicine, Santosh medical college and hospital, Ghaziabad, Uttar Pradesh" with the objective to study "hypothyroidism in metabolic syndrome". A total of 100 patients were included in the study. In our study, Table-1 & Fig.1 (a) shows the distribution of thyroid dysfunction. Hypothyroid was in 7%patients. "Subclinical hypothyroidism" was in 14% patients. The prevalence of hypothyroidism was 21% [Fig.1 (b)].

Table-1: Distribution of thyroid dysfunction and prevalence of hypothyroidism

Thyroid's function	**Frequency (%)** **(n=100)**
Euthyroid	79(79%)
Hypothyroid	7(7%)
Subclinical hypothyroidism	14(14%)
Hypothyrodism	
Present	21(21%)
Absent	79(79%)

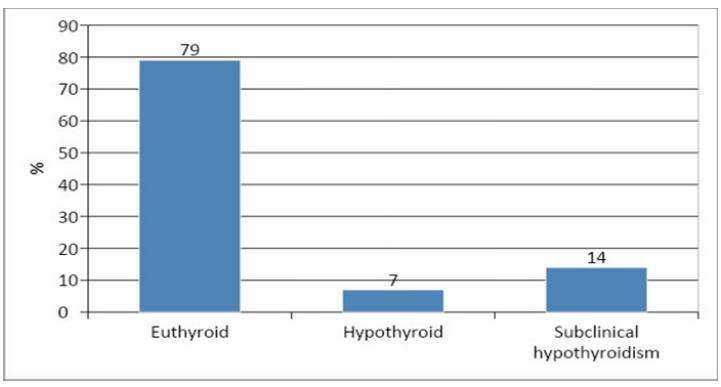

Figure 1(a) Distribution of thyroid dysfunction

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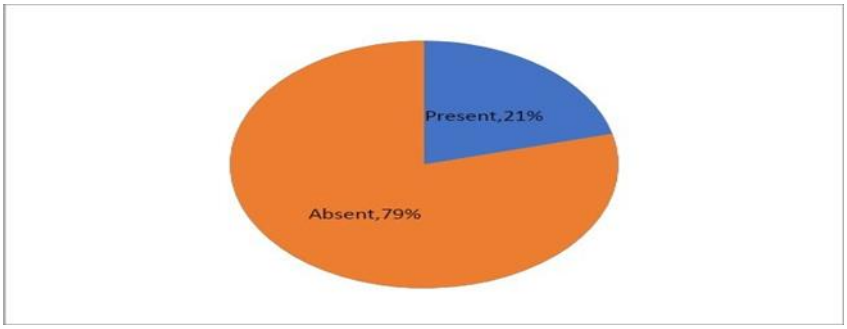

Figure 1(b): Distribution of prevalence of hypothyroidism

Table-2: "Distribution of patients according to age & gender and its association with hypothyroidism"

	Hypothyroidism		**Normal**		**p-value**
	No.	**%**	**No.**	**%**	
Age(yrs)					
30-40	5	16.7	25	83.3	0.63
41-50	9	20.5	35	79.5	
>50	7	26.9	19	73.1	
Gender					
Male	7	15.9	37	84.1	0.26
Female	14	25.0	42	75.0	

"In Table-2 & Fig.2 (a) shows the distribution of patients according to age and gender and its association with prevalence of hypothyroidism. More than one third of patients were between 41-50 years of age (44%) followed by 30-40 (30%) and >50(26%) years and the prevalence of hypothyroidism was higher among patients of age >50 years (26.9%) than 41-50 (20.5%) and 30-40 (16.7%) years. However, there was no significant ($p>0.05$) association of prevalence of hypothyroidism with age. Similarly, in Fig. 2(b) more than half of patients were females (56%) and the prevalence of hypothyroidism was higher among female patients (25%) than males (15.9%). However, there was no significant ($p>0.05$) association of prevalence of hypothyroidism with gender".

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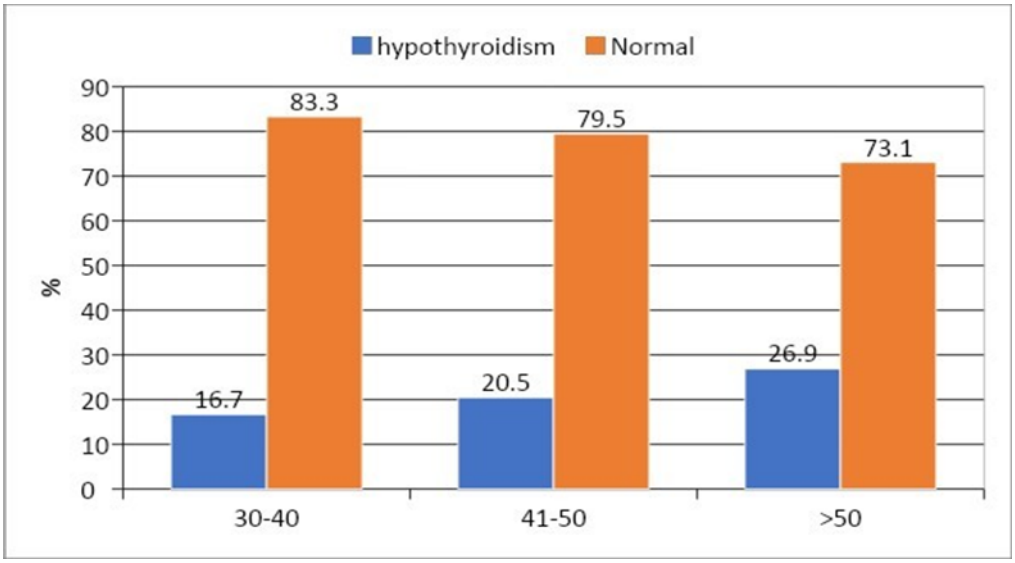

Figure 2(a): Distribution of patients according to age and its association with hypothyroidism

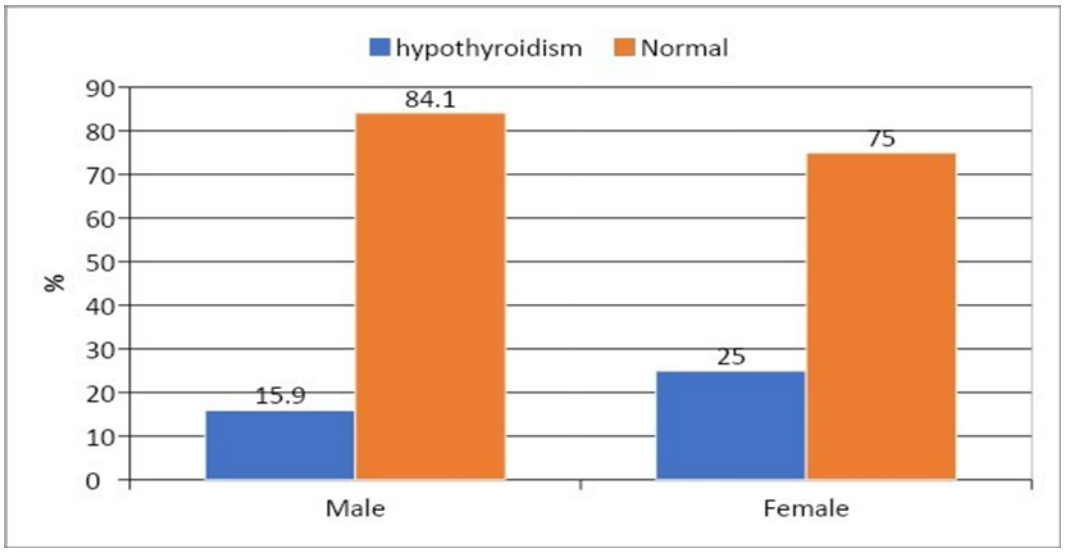

Figure 2(b): Distribution of patients according to gender and its association with hypothyroidism

Table-3: "Distribution of patients according to total cholesterol and its association with hypothyroidism"

Total cholesterol	Hypothyroidism		Normal		p-value
	No.	%	No.	%	
Abnormal	10	26.3	28	73.7	0.30
Normal	11	17.7	51	82.3	

"Table-3 & Fig.3 shows the distribution of patients according to total cholesterol and its association with prevalence of hypothyroidism. Total cholesterol was abnormal among 38% patients. The

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prevalence of hypothyroidism was higher among whom total cholesterol was abnormal (26.3%) than normal (17.7%). However, there was no significant ($p>0.05$) association of prevalence of hypothyroidism with total cholesterol."

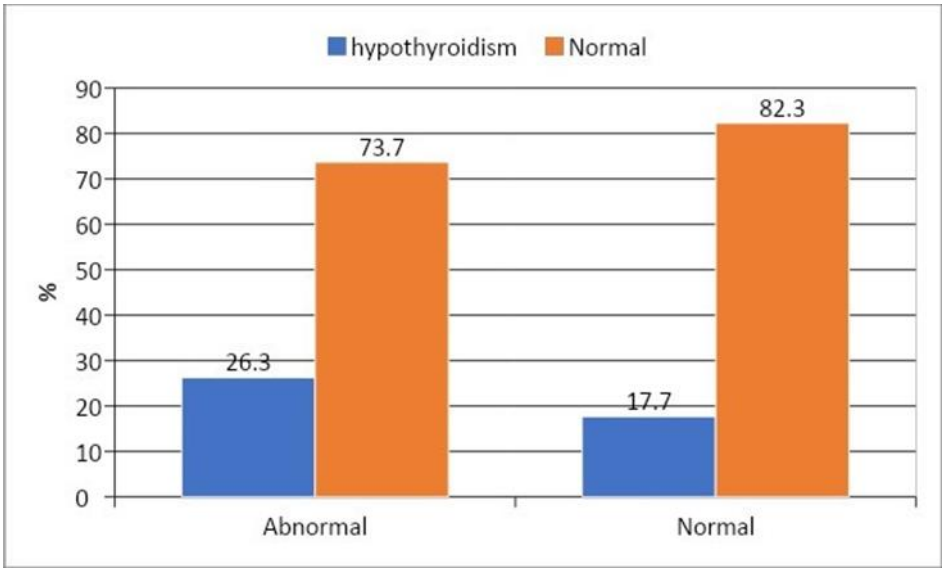

Figure 3: Distribution of patients according to total cholesterol and its association with hypothyroidism

4. Discussion

The goal of the current study was to investigate hypothyroidism with elevated triglyceride levels and HDL cholesterol. It was carried out at the "Department of General Medicine, Santosh Medical College and Hospital, Ghaziabad, Uttar Pradesh". The study involved a total of 100 patients.

38% of patients had abnormal total cholesterol, and the frequency of hypothyroidism was higher among those patients (26.3%) than among those with normal total cholesterol (17.7%). But there was no statistically significant ($p>0.05$) link between the prevalence of hypothyroidism and total cholesterol.

"The prevalence of hypothyroidism was 21 percent in the current study. This is in line with the findings of other trials. That have been conducted from India. [13,14] 28% of MetS patients were diagnosed with hypothyroidism in the study by Deshmukh et al (2018)" [15]. In line with the findings of this study, a similar prevalence of hypothyroidism was observed, which was also recorded in other Indian studies in the MetS population, viz., Kota et al (2013) [16] (26 percent) and Shanthaet al (2009) [17] (29.3percent).

5. Conclusion

This has a negative impact on hyperthyroid patients' fasting serum LDL cholesterol and total cholesterol readings, in particular. The overall result in patients with overt hypothyroidism is an increase in triglyceride, ApoB, Lp(a), LDL cholesterol, and serum total cholesterol levels. All overtly hypothyroid patients need to start receiving L-T4 treatment since it will reverse these abnormalities. There is little consensus regarding how subclinical hypothyroidism affects serum lipid levels. The overwhelming body of research indicates that patients with subclinical hypothyroidism have higher "levels of total cholesterol, LDL cholesterol, and perhaps triglycerides while their levels of HDL cholesterol and Lp(a)" are stable.

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