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A CROSS SECTIONAL STUDY ON LIPID PROFILES IN HYPOTHYROID PATIENTS

General Medicine

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ABSTRACT

An essential metabolic disease known as hypothyroidism is linked to numerous biochemical abnormalities. Numerous investigations, including ones on the lipid profile, were conducted on the biochemical condition of hypothyroid individuals. But disputes continue to exist. In order to compare the lipid profile status of hypothyroid patients to otherwise healthy, euthyroid people who were age and sex matched, a cross-sectional study of our population was conducted. In our investigation, the mean serum total cholesterol, LDL cholesterol, and triacylglycerol levels in cases and controls were 241.5660.05 mg/dL vs 146.9423.21 mg/dL, 151.9659.60 mg/dL vs 71.4326.83 mg/dL, and 212100.73 mg/dL vs 98.8739.69 mg/dL, respectively,with p values< 0.001, while HDL cholesterol was found to be considerably The findings of our investigation imply that dyslipidemias and hypothyroidism are related. Therefore, it is advised that individuals who present with dyslipidemia undergo an evaluation to rule out hypothyroidism.

KEYWORDS

HYPOTHYROIDISM, LIPID PROFILE

INTRODUCTION

A clinical syndrome called hypothyroidism results from a thyroid hormone deficit, which in turn causes ageneralised metabolic process sluggishness[1]. It is a metabolic condition prevalent in the general population[2]. The Age-related thyroid dysfunction is more prevalent, particularly inwomen[3].

Numerous biochemical anomalies are linked to hypothyroidism. As thyroid function deteriorates[2], levels of total cholesterol and low density lipoprotein cholesterol often rise. As a result, secondary dyslipidemia[4] is significantly caused by hypothyroidism. Despite HMG CoA reductase's decreased activity, blood total cholesterol concentration frequently rises in hypothyroid individuals, mostly as a result of elevated levels of serum LDL and intermediate density lipoprotein (IDL) cholesterol[5]. Reduced thyroid secretion significantly raises plasma cholesterol levels as a result of lower bile cholesterol secretion rates and subsequently lower faecal cholesterol elimination as a result of fewer low density lipoprotein receptors on liver cells[6]. The primary cause of the hypercholesterolemia seen in hypothyroidism is decreased LDL receptor activation, which results in decreased receptor-mediated catabolism of LDL and IDL[7].

High density lipoprotein cholesterol levels were found to be significantly higher in euthyroid and previously reported hypothyroid cases who were taking thyroid replacement therapy, whereas serum HDL cholesterol levels were significantly lower in newly diagnosed hypothyroid patients with values greater than 40 mg/dL in subclinical or clinical hypothyroidismwhere as lower HDL cholesterol seen among euthyroid and who were on thyroid replacement therapy[8]. High density lipoprotein cholesterol (HDL-C) levels are often higher in hypothyroid patients, mostly as a result of an increased concentration of HDL2 particles[9].Confronting findings of high density lipoprotein cholesterol levels in hypothyroidism can be found in various studies. There was a 25.9% drop in HDL-C levels in thyroidectomized rats, pointing to a problem with HDL metabolism[10]. Other investigations on hypothyroid patients revealed lower HDL cholesterol levels[9].

Triglyceride levels in plasma are significantly raised when thyroid output is reduced[6]. According to Nikkilia& Kekki[11], hypertriglyceridemia in hypothyroidism is caused by a reduction in lipoprotein lipase (LPL) activity, which in turn causes a reduction in the clearance of triglyceride-rich lipoproteins.

A well-known risk factor for cardiovascular disorders is dyslipidemia. Rising plasma cholesterol levels, and in particular, rising total cholesterol to high density lipoprotein (HDL) cholesterol ratios, increase the risk of coronary heart disease and other types of atherosclerotic vascular disease. Additionally, there is a marginally positive connection between plasma triglyceride levels and coronary heart disease[12].

The mortality and morbidity of dyslipidemic cardiovascular disorders might be considerably decreased with early identification and appropriate therapy. Lowering total and LDL cholesterol lowers the incidence of cardiovascular events such angina, myocardial infarction, and stroke and also lessens the need for revascularization, according to numerous large-scale randomised trials[12].

Many studies have been conducted to assess the lipid profile status of hypothyroid patients. However, disagreements remain, and they must be resolved. As a result, we designed this study in our population to evaluate the lipid profile in hypothyroid patients, which may be useful for clinical management of hypothyroid patients with dyslipidemia.

MATERIALS AND METHODS

Conducted this cross-sectional study in department of general medicine ,Narayana medical college , nellore. assessed the lipid profile ofhypothyroid patients and to determine the relationship between Dyslipidemia with hypothyroidism severity Clinicallyand newly diagnosed hypothyroid patients based on biochemistryboth sexes, aged 20 to 60 years, with no thyroxine historyand hypolipidemic drugs in the previous three (three) monthsincluded in the research Patients suffering from chronic renal failure,Diabetes, liver disease, and chronic diseases ,Pregnancy and ages less than 20 and greater than 60 years were factors excluded.

Clinical examination, history, and relevant laboratory tests and Investigations suggesting hypothyroidism are included in this study.The study included 111 subjects in total, with 80 overt hypothyroid patients classified as cases (Group I) and 31 euthyroid subjects classified as normal controls (Group II). Cases were divided into three groups based on their serum TSH concentration: Group A (TSH level 5.01-50.00 mIU/L), Group B (TSH level 50.00-100.00 mIU/L), and Group C (TSH level >100.00 mIU/L).Fasting samples were collected and allowed to clot before being separated and analysed for total cholesterol, triacylglycerol, and HDL cholesterol levels. Friedewald's equation was used to calculate LDL cholesterol levels.

STATISTICALANALYSIS

SPSS for Windows version 12.0 was used for statistical analysis. The findings' mean values were compared within and between groups. The significance of the groups was determined using the analysis of variance (ANOVA) test and the unpaired 't' test, respectively. The Pearson correlation coefficient test was used to assess the relationship between biochemical parameters and the severity of hypothyroidism. 'p' values < 0.05 were deemed significant.

RESULTS

Table I compares the lipid profile parameters between the cases and controls. Cases had higher mean total cholesterol, HDL cholesterol, LDL cholesterol, and triglyceride levels than controls. HDL cholesterol was found to be significantly lower in cases when compared to controls.

Table II displays the lipid profile parameters in various case groups. Serum total cholesterol levels did not differ significantly between groups, but there was a rising trend from Group A to Group C. Significant differences in HDL cholesterol levels were observed among the groups, with Group B having the highest and Group C having the lowest. Mean LDL cholesterol levels differed significantly between groups, with the highest in Group C and the lowest in Group A. There was no significant difference in mean serum triglyceride levels between groups.

Table III shows the relationship between serum free thyroxine levels.Case level and lipid profile parameters FT4 has demonstrated a significant inverse relationship with serum total cholesterol, Triglyceride and LDL cholesterol levels There was no correlation found. between serum FT4 levels and serum HDL cholesterol level.

Table IV depicts the relationship between serum TSH levels and Case lipid profile parameters LDL and total cholesterol cholesterol were discovered to have a significant positive effect. Relationship with serum TSH However, TSH was discovered to be present. There is no relationship between serum HDL cholesterol and serum level of triglyceride.

Table 1

Parameters	Cases (n= 80)	Controls (n=31)	'p' values
Total cholesterol (mg/dL)	241.56 ± 60.05	146.94 ± 23.21	< 0.001
HDL cholesterol (mg/dL)	49.59 ± 11.69	55.89 ± 11.70	< 0.05
LDL cholesterol (mg/dL)	151.96 ± 59.60	71.43 ± 26.83	< 0.001
Triglycerides (mg/dL)	212.28 ±100.73	98.87 ± 39.69	< 0.001

Table 2

Parameters	Group A (n=14)	Group B (n= 29)	Group C (n= 37) values	'p' values
Total cholesterol (mg/dL)	215.93 ± 43.25	237.10 ± 64.49	254.76 ± 59.61	> 0.05
HDL cholesterol (mg/dL)	51.36 ± 9.84	53.34 ± 13.01	45.97 ±10.35	< 0.05
LDL cholesterol (mg/dL)	119.64 ± 45.00.41	150.41 ± 61.28	165± 59.57	< 0.05
Triglycerides (mg/dL)	224.36 ± 88.83	221.16 ± 112.39	221.16 ± 112.39	> 0.05

Table3

FT4 HDL cholesterol	Lipi d profile in mg/dL	r values	p values
	Total cholesterol	- .278	< 0.05
	HDL cholesterol (in pmol/L)	.020	> 0.05
	LDL cholesterol	- .238	<0.05
	Triglycerides	-.278	< 0.05

Table 4

TSH (in mIU/L)	Lipid profile(mg/dl)	r values	'p'values
	Total cholesterol	.221	< 0.05
	HDL cholesterol	- .026	> 0.05
	LDL cholesterol	.261	< 0.05
	Triglycerides	-.138	> 0.05

DISCUSSION

Among metabolic disorders, hypothyroidism is quite common. Inclusion of patients with subclinical hypothyroidism (normal T4, increased TSH) may increase the prevalence of primary hypothyroidism from 1:100 to 5:10013. Hypothyroidism is a prevalent condition with a prevalence rate of up to 20%, according to a study by Sawin[14]. The prevalence of subclinical hypothyroidism was 19.7% in another cross-sectional study with 1212 participants of both sexes and 20–60 years of age[15].

In our study, mean total cholesterol, LDL cholesterol, and triglycerides were found to be significantly higher in cases compared to controls, whereas HDL cholesterol was shown to be significantly lower. Jung[16] discovered that the mean plasma levels of LDL cholesterol and total cholesterol were higher in hypothyroid patients than in healthy controls. In a different investigation, primary and secondary hypothyroidism were shown to have higher average serum total cholesterol levels[17]. Patients with hypothyroidism had higher triglyceride levels, according to Keyes & Heimberg18 and Laker & Mayes[19]. Therefore, the results of our investigation agreed with those of earlier research by other scientists.

According to Abrams & Grundy[20] and Thompson[7], mean total cholesterol has decreased in our study. LDL receptor activation as the primary contributor to hypothyroidism with hypercholesterolemia.

High density lipoprotein cholesterol levels in the blood were shown to be greater in patients with newly discovered hypothyroidism (clinical or subclinical), but these levels were significantly lower in patients with euthyroidism and in cases of previously identified hypothyroidism who were taking thyroxine replacement therapy[8]. Studies conducted by Michalopoulou[21], Diekman[22], Tsmihodimos[23], and Olukoga[24] demonstrated that subclinical or clinical hypothyroidism had greater average serum HDL concentrations. However, a research on thyroidectomy-affected rats found that HDL-C decreased by 25.9% in comparison to controls[10]. In a another study, rats with thyroidectomies had HDL cholesterol levels that were 25% lower than those of control rats[25]. In their experiments, Abrams & Grundy [20] have demonstrated a drop in HDL cholesterol in hypothyroidism. Our research so agrees with some studies while differing from others. To arrive at a definitive answer, a thorough investigation of those with overt hypothyroidism is advised.

The main cause of the rise in HDL cholesterol levels is an increase in HDL2 particle concentration9 According to Dullaart[26], reduced CETP (cholesteryl ester transport protein) activity prevents the transfer of cholesteryl esters from HDL to VLDL, raising HDL cholesterol levels. According to Lam[27], lower hepatic lipase activity in hypothyroid individuals results in less HDL2 particle catabolism and higher HDL levels. Therefore, the drop in HDL cholesterol level in our study may have been caused by hypothyroid individuals' enhanced CETP and lipoprotein lipase activity.

Although there was no difference in serum total cholesterol levels between the groups, there was a growing trend from Group A to Group C ($p = 0.0395$), which suggests that the severity of hypothyroidism is consistent with our findings. This trend appears to be strengthened by rising LDL values that correspond to the severity of hypothyroidism moving from Group A to Group C, as found in our study. Our findings that total cholesterol and LDL cholesterol levels are negatively correlated with FT4 and positively correlated with TSH further support this.

Serum HDL cholesterol levels significantly varied between the groups, with Group B having the highest levels and Group C having the lowest. This study suggests that the highest degree of hypothyroidism is associated with the lowest HDL levels. But this investigation was unable to establish the typical relationship between lowering HDL and rising hypothyroidism severity. Our discovery that HDL and FT4 or TSH do not correlate further supports this. Our tiny sample size could be the cause of this.

Lipid levels showed no significant difference across the groups, showing that the severity of hypothyroidism had no altering effects on triglyceride metabolism. Although it is asserted that thyroid hormones promote LPL activity[11], it is likely that there is a threshold beyond which further thyroid hormone reductions do not result in further inhibition of LPL.

In our investigation, there was a strong negative connection between FT4 and serum levels of triglycerides, LDL cholesterol, and total cholesterol. The levels of HDL cholesterol and FT4 in the blood did not correlate. It was discovered that serum TSH and total cholesterol and LDL cholesterol continue to have a strong positive connection.

However, it was discovered that the levels of serum HDL cholesterol and triglycerides and TSH did not correlate. A large-scale investigation is advised to clarify this since there is a sense of functional disharmony between FT4 and TSH and a significant negative connection of FT4 with triglycerides level but no correlation of TSH with triglycerides.

The findings of our investigation point to dyslipidemia in hypothyroid patients. Therefore, it is advised that individuals who present with dyslipidemia have their thyroid function tested. Another study with a higher sample size and longer length is also advised due to the small sample size and short study duration of ours.

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