

Lipid Profile in Patients of Primary Hypothyroidism

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Abstract

The present study was designed to estimate the lipid profile i.e TC, TG, LDL-c and HDL-c in patients of primary hypothyroidism. Eighty subjects (both males and females, age range 18 – 40) were recruited for this study. Patient group (B) was of 40 subjects, while the remaining 40 subjects were healthy age, BMI and sex matched individuals constituting control group (A). Study subjects were selected from Atomic Energy Medical Centre (CENUM) Mayo Hospital Lahore.

Conclusions: Serum T₃ and T₄ levels are decreased (highly significant) in patients of primary hypothyroidism as compared to control group. Serum TSH level is increased (highly significant) in patients of primary hypothyroidism when comparing with the control group. Serum TC, TG and LDL-C levels are increased (highly significant) in patients of primary hypothyroidism as compared with the control group.

Key Words: Cholesterol, HDL-C, Hypothyroidism.

Introduction

Thyroid gland diseases are the most common endocrine disorders.¹ Thyroid status is an important factor in the regulation of lipid metabolism. Disorders of thyroid gland influence lipoprotein metabolism and are associated with changes in serum lipid levels resulting in ischaemic heart disease.² Overt hypothyroidism is associated with an increased risk of cardiovascular diseases. Hypothyroidism is the generic term for exposure of the body tissues to a subnormal amount of thyroid hormones. Hypothyroidism is a risk factor for atherosclerosis and coronary heart disease due to its potential association with atherogenic lipid profile. Hypothyroid condition can even cause premature atherosclerosis. In humans untreated hypothyroidism is a frequent cause of reversible hyperlipidaemia.³ Dyslipidemia is also seen in NIDDM and kidney diseases.⁴ Atherogenic dyslipidemia seen in hypothyroidism was independent of BMI.⁵

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Methodology

Eighty subjects (both males and females) were recruited for this study. Patient group (B) was of 40 subjects, while the remaining 40 subjects included were healthy subjects constituting control group (A). Study subjects were selected from the individuals who were referred to Atomic Energy Medical Centre (CENUM), Mayo Hospital Lahore.

Selection Criteria

Inclusion Criteria

In a total of 40 subjects diagnosed as patients of primary hypothyroidism (TSH > 1 Oulu) with age range 18 – 40 years were selected. 40 age, body mass index (8MI) and sex matched euthyroid subjects were selected as controls.

Exclusion Criteria

- Diabetes mellitus.
- Drug therapy that could alter lipid metabolism and thyroid function.
- Postmenopausal females.
- Patients with secondary hypothyroidism, or surgically induced hypothyroidism.
- Subjects with smoking habits.
- Family history of dislipidaemia.

History proforma of every subject was completed with details of personal and family history. Detailed general physical and systemic examination was carried out. All the subjects were advised to be on normal routine diet strictly avoiding extra fatty meals.

All the subjects were advised to continue their usual lifestyle.

Control Group (Group A)

In this group, 40 subjects age, body mass index and

sex matched euthyroid were selected as control group. This group was strictly selected qualifying the above inclusion / exclusion criteria.

Patient Group (Group B)

In a total of 40 patients with primary hypothyroidism were included.

Collection of Samples

Antecubital venous blood samples (10 ml, from all subjects of patient groups (B) were taken during morning hours (0800 – 1000), after an overnight fast (12 – 14 hours) and 30 minutes of supine rest. Serum was obtained by centrifugation for ten minutes at 4000 rpm and stored at -20°C in two portions one for lipid and other for the thyroid profile. All the samples were stored in dry and clean serum storage tubes with caps. The samples of the control group (group A) were collected for lipid and thyroid profile following the same guide lines as laid down for the patient group.

Serum samples were analyzed for the following biochemical parameters;

- Triiodothyronine (T_3), Thyroxine (T_4), Thyroid stimulating hormone (TSH), Total Cholesterol (TC), Triglyceroid (TG), Low density Lipoprotein cholesterol (LDLc), High density Lipoprotein cholesterol (HDLc).

Table 1: Comparison of T_3 , T_4 , TSH in group A and B.

Tests	Control Group (A) (n = 40)	Patients Group (B) (n = 40)	Level of Significance (A vs B)
T_3	1.78 \pm 0.33	0.57 \pm 0.32	P < 0.01 (HS)
T_4	114.08 \pm 24.15	19.86 \pm 8.11	P < 0.01 (HS)
TSH	3.40 \pm 0.78	109.31 \pm 23.95	P < 0.01 (HS)

Table 2: Comparison of TC, TG, HDL-c, LDL-c in Groups A and B.

Tests	Control Group (A) (n = 40)	Patients Group (B) (n = 40)	Level of Significance (A vs B)
Cholesterol	178.48 \pm 12.87	304.95 \pm 45.39	P < 0.01 (HS)
Triglyceride	125.85 \pm 11.24	209.50 \pm 43.80	P < 0.01 (HS)
HDL-c	44.60 \pm 5.72	47.53 \pm 12.10	P > 0.05 (NS)
LOL-c	106.25 \pm 13.63	213.10 \pm 41.66	P < 0.01 (HS)

Results

The details of results were given in tables 1, 2.

Discussion

Serum Cholesterol Level

In the present study, serum total cholesterol (TC) was found to be increased in patients of primary hypothyroidism (group B). When compared with control group (A), the difference between group A and B was highly significant statistically (p < 0.01).

The findings of this study are consistent with results of Pazos et al (1995)⁶ Ness et al (1998)⁷ Erem et al (1999)⁸; and Diekman et al (2000),⁹ Tagami – T et al¹⁰ who also observed increased TC level in patients of primary hypothyroidism.

This increased TC in patients of primary hypothyroidism may be due to effect on LDL receptor protein. In hypothyroidism there seems to be decrease in the number and activity of LDL receptor protein. This decrease in number and activity may be responsible for decreased clearance of cholesterol leading to increased cholesterol level in patients of primary hypothyroidism.

Serum LDLc Level

In the present study, serum LDLc levels were found to be increased in patients of primary hypothyroidism (group B). When compared with control group (A), the difference between group A and B was highly significant statistically ($p < 0.01$).

The findings of this study are in favour of results of Diekman et al (2000),⁹ Erem et al (1999),⁸ and Huesca et al (2002)¹¹ who also observed increased LDLc levels in patients of primary hypothyroidism.

This increased LDLc in patients of primary hypothyroidism (group B) may be due to effect on the LDLc receptor. Thyroid hormones regulate lipid metabolism through various mechanism but the key role may be played by the LDL receptor pathway. In hypothyroidism there may be decrease in the number and activity of LDL – receptor. This decrease in number and activity may be responsible for the decrease clearance of LDL leading to increased LDLc level in patients of primary hypothyroidism. In hypothyroidism LDLc abnormalities may be mediated by the variation in activity and impairment of LDLc clearance due to down regulation of cell surface LDL receptor.

Serum HDLc Level

In the present study, serum HDLc levels were found to be increased normal or decreased in patients of primary hypothyroidism (group B). When compared with control group (A), the difference between A and B was non-significant statistically ($p > 0.05$).

The results of this study are consistent with the results of Erem et al (1999),⁸ Weintraub et al (1999)¹² and Becerra et al (1999)¹³ who also reported decreased level of HDLc. The increased HDLc levels in this study are in consistent with results of Diekman et al

(2000)⁷ who reported increased HDLc level.

The lipoprotein lipase (LPL) may also be responsible for altered metabolism of HDLc in primary hypothyroidism. The activity of heparin sensitive lipase from the liver is also decreased during hypothyroidism. A decreased in LPL activity may also be responsible for an increase in HDLc in hypothyroidism.

Serum Triglyceride Level

In the present study, serum TG levels were found to be increased in patients of primary hypothyroidism (group B). When compared with control group (A), the difference between group A and B was highly significant statistically ($p < 0.01$).

The findings of this study are consistent with the results of Ness et al (1998),⁷ Liu et al (1998)¹⁴ and Petersson et al (2001)¹⁵ who also observed higher TG levels in patients of primary hypothyroidism.

The increased TG levels in patients of primary hypothyroidism may be due to effect on the enzymes involved in metabolism of TG. The activity of lipoprotein lipase enzyme seems to be decreased in patients of primary hypothyroidism, this decrease in the activity of LPL may be responsible for increased level of TG.

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