

# Evaluation of Lipid Profile in Patients of Primary Hypothyroidism Visiting Cenum

AZAM ALI, ABDUS SATTAR\*, ABDUL HAMEED\*\*, MUHAMMAD FAROOQ\*\*\*,

## ABSTRACT

**Aim:** To estimate the lipid profile in patients of primary hypothyroidism.

**Place of study:** Atomic Energy Medical Centre (CENUM), Mayo Hospital Lahore.

**Methods:** Eighty subjects were recruited for this study. 40 subjects were of primary hypothyroidism (B), while the remaining 40 subjects were healthy control group (A). 40 subjects diagnosed as primary hypothyroidism (TSH >10 $\mu$ lu) with age range 18-40 years were selected. 40 age and sex matched euthyroid subjects were selected as controls. The subjects having diabetes mellitus and ischemic heart disease were excluded. The individuals who were on any drug therapy that could alter lipid metabolism and thyroid function were also excluded. 10 ml Antecubital venous blood samples were taken during morning hours (0800-1000), after an overnight fast (12-14 hours) and 30 minutes of supine rest. Serum was obtained for the thyroid profile. Serum samples were analyzed for T3, T4, TSH, TC, TG, LDL-c and HDL-c.

**Results/Conclusion:** Serum TC levels is increased (highly significant) in patients of primary hypothyroidism as compared with control group. Serum TG level is increased (highly significant) in patients of primary hypothyroidism as compared with control group. Serum LDL-c level is increased (highly significant) in patients of primary hypothyroidism as compared with the control group.

**Key words:** Hypothyroidism, Cholesterol, LDL-c.

## INTRODUCTION

Thyroid gland disorders are the most common endocrine abnormalities. Abnormalities in thyroid functions affect 5-10% of individuals over a lifespan. Thyroid diseases are common, disruptive, expensive, treatable and also preventable<sup>1</sup>. Thyroid hormones effect almost all facets of metabolism. Thyroid status is an important factor in the regulation of lipid metabolism and disorders of the thyroid gland influence lipoprotein metabolism and are associated with changes in serum lipid levels. Hypothyroidism is the generic term for exposure of 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 conditions can cause premature atherosclerosis<sup>2</sup>.

## METHODOLOGY

Eighty subjects were recruited for this study. 40 subjects were of primary hypothyroidism (B), while the remaining 40 subjects were healthy control group (A). Study subjects were selected from the individuals who were

referred to Atomic Energy Medical Centre (CINUM), Mayo Hospital Lahore. 40 subjects diagnosed as patients of primary hypothyroidism (TSH>10 $\mu$ lu) with age range 18-40 years were selected. 40 with age and sex matched euthyroid subjects were selected as controls. The subjects having diabetes mellitus and ischemic heart disease were excluded. The individuals who were on any drug therapy that could alter lipid metabolism and thyroid function were also excluded. No female was postmenopausal. Subjects with smoking habits and with family history of dyslipidaemias were also excluded. 10 ml Antecubital venous blood samples 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 4000rpm for the thyroid profile. Serum samples were analyzed for T3, T4, TSH, TC, TG, HDL, LDL.

## RESULTS

The detail of results are given in tables 1 and 2

Table 1: Comparison of T3, T4, TSH in groups A & B

Tests	Control Group (A) (n = 40)	Patient Group (B) (n = 40)	Level of Significance (A vs B)
T 3	17.8 $\pm$ 0.3	0.60 $\pm$ 0.3	P<0.01(HS)
T 4	114.1 $\pm$ 24.2	19.9 $\pm$ 8.1	P<0.01(HS)
TSH	3.4 $\pm$ 0.8	109.3 $\pm$ 23.9	P<0.01(HS)

\* Assistant Professor Medicine, KEMU/Mayo Hospital, Lahore

\*\*APMO, DHQ Hospital, Muzaffar Ghar, \*\*\*Emergency Pathology Lab. SIMS/SHL, Lahore

Correspondence to: Dr. Azam Ali, Assistant Professor Biochemistry, KEMU, Lahore

Table 2 : Comparison of TC, TG, HDL-c, LDL-c in groups A &amp; B

Tests	Control Group (A) (n= 40)	Patient Group (B) (n = 40)	Level of Significance(A vs B)
Cholesterol	178.5±12.9	304.9±45.4	P<0.01(HS)
Triglyceride	125.8±11.2	209.5±43.8	P<0.01(HS)
HDL-C	44.6±5.7	47.5±12.1	P>0.05(NS)
LDL-C	106.3±13.6	213.1±41.7	P<0.01(HS)

## DISCUSSION

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) and 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)<sup>3</sup>; Engler and Riesen (1993)<sup>4</sup>; Martinez et al (1998)<sup>5</sup>; Ness et al (1998)<sup>6</sup>; Petersson and Kjellstrom (2001)<sup>7</sup>; Morris (2001)<sup>8</sup>; 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.

In the present study, serum LDL-c levels were found to be increased in patients of primary hypothyroidism (groups B) when compared with control group (A) and 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)<sup>9</sup>; Huesca et al (2002)<sup>10</sup> who also observed increased LDL-c levels in patients of primary hypothyroidism. This increased LDL-c in patients of primary hypothyroidism may be due to effect on the LDL-c receptor. Thyroid hormones regulate lipid metabolism through various mechanism but the key role may be played by the LDL receptor pathway.

In the present study, serum HDL-c levels were found to be increased normal or decreased in patients of primary hypothyroidism (group B) when compared with control group (A) and 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)<sup>11</sup> and Ascott (1994)<sup>12</sup> who also reported decreased level of HDL-c. However, the normal HDL-c levels in this study are in favour of results of Verdugo et al (1987)<sup>13</sup>.

These conflicting results (increased, normal or decreased) of HDL-c may be due to the thyroid status and related to changes in the lipolytic enzymes. The hepatic lipase (HL) activity, in particular, is low in severe hypothyroidism. As HL plays an important role in regulating HDL-c level so significant variation in plasma concentration of HDL-c can be expected

depending upon thyroid status. The HL activity is increased after hormone replacement therapy.

In the present study, serum Triglyceride levels were found to be increased in patients of primary hypothyroidism (group B) when compared with control group (A) and 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 Martinez et al (1998)<sup>5</sup>; who also observed higher Triglyceride level 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.

## REFERENCES

1. Becerra A, Bellido D, Luengo A, Piedrola G, De Luis DA. Lipoprotein (a) and other lipoproteins in hypothyroid patients before and after thyroid replacement therapy. *Clin Nutr* 1999; 18(3):319-22
2. Barbagallo CM, Aversa MR, Liotta A, Grutta S, Maggio C, Casimiro L. Plasma levels of lipoproteins and apolipoproteins in congenital hypothyroidism; effects of L-thyroxine substitution. *Metabolism* 1995; 10:1283-87
3. Pazos F, Alvarez JJ, Rubiespratt J, Varela C, Lasuncion MA. Long-term thyroid replacement therapy and levels of lipoprotein (a) and other lipoproteins. *J Clin Endocrinol Metab* 1995; 80:562-66
4. Engler H, Riesen WF. Effects of thyroid function on concentrations of lipoprotein (a) *Clin. Chem.* 1993; 39:2466-69
5. Martinez ML, Hernandez MA, Nguyen TT, Munoz ML, Pena H, Morillas. Effects of thyroid hormone replacement on lipoprotein (a), lipids, and apolipoprotein in subjects with hypothyroidism. *Mayo-Clin-Proc* 1998; 9:837-41
6. Ness GC, Lopez D, Chambers CM, Newsome WP, Cornelius P, Hardwood HJ. Effect of L-triiodothyronine and the thyromimetic an serum lipoproteins levels and hepatic low density lipoprotein receptor, 3-methylglutaryl coenzyme A reductase and apo A-I gene expression. *Biochem-Pharmacol.* 1998; 1:121-29
7. Petersson U, Kjellstrom T. Thyroid functions tests, serum lipids and gender interrelations in a middle aged population. *Scand J Prim Health care* 2001; 3:183-85.
8. Morris MS, Bostom AG, Jacques PF, Selhab J, Rosenberg IH. Hyperhomocysteinaemia and hypercholesterolemia associated with hypothyroidism

- in the third US National Health and Nutrition Examination Survey. *Atherosclerosis* 2001; 1:195-200
9. Diekman MM, Anghelascu N, Endert E, Bakkar O, Wiersinga WM. Changes in plasma low-density lipoprotein (LDL) and high density lipoprotein cholesterol in hypothyroid patients are related to changes in free thyroxine, not to polymorphisms in LDL receptor or cholesterol ester transfer protein genes. *J Clin Endocrinol Metab* 2000; 85:1857-62.
  10. Huesca GC, Franco M, Luc G, Montano LF, Masso F, Posactas RC et al. Chronic hypothyroidism induces abnormal structure of high density lipoproteins and impaired Kinetics of apolipoproteins A-I. *Metabolism* 2002; 51:443-50
  11. Erem C, Deger O, Bastan M, Orem A, Sonmez M, ulusoy S. Plasma lipoprotein (a) concentrations in hypothyroid, euthyroid and hyperthyroid subjects. *Acta-Cardio* 1999; 2:77-81
  12. Asami T, Ciomartan T, Uchiyama M. Thyroxine inversely regulates serum intermediate density lipoprotein levels in children with congenital hypothyroidism. *Pediatr Int* 1999; 41(3):266-9.
  13. Verdugo C, Perrot G, Ponsin G, Valentin C, Brethezene F. Time-course of alteration of high density lipoproteins (HDLc) during thyroxine administration to hypothyroid women. *Eur J Clin Invest.* 1987; 17:313-16..