Vol. 15, No. 4
ORIGINAL PAPER

MEDICINE

MEDICAL CHANNEL
OCTOBER - DECEMBER 2009

# LIPID PROFILE IN PRIMARY HYPOTHYROIDISM, AT CHANDKA MEDICAL COLLEGE, LARKANA

1. **BASHIR AHMED SHAIKH**
2. **AKBAR ALI SOOMRO**
3. **MUHAMMAD ASLAM SOOMRO**
4. **ZAFAR ALI PIRZADO**
5. **GHULAM AKBER SOLANGI**
6. **HAKIM ALI ABRO**
7. **SYED AFTAB HUSSAIN SHAH**
8. **MAJID AHMED SHAIKH**

1. ***Assistant Professor of Medicine***
CHANDKA MEDICAL COLLEGE LARKANA
2. ***Assistant Professor of Pathology***
CHANDKA MEDICAL COLLEGE LARKANA
3. ***Assistant Professor of Medicine***
CHANDKA MEDICAL COLLEGE LARKANA
4. ***Professor of Biochemistry***
CHANDKA MEDICAL COLLEGE LARKANA
5. ***Professor of Medicine***
CHANDKA MEDICAL COLLEGE LARKANA
6. ***Associate Professor of Medicine***
CHANDKA MEDICAL COLLEGE LARKANA
7. ***Associate Professor of Medicine***
CHANDKA MEDICAL COLLEGE LARKANA
8. ***Assistant Professor of Medicine***
CHANDKA MEDICAL COLLEGE LARKANA

***Corresponding Address:***
**DR. BASHIR AHMED SHAIKH**
ASSISTANT PROFESSOR OF MEDICINE
B-7, DOCTORS COLONY, VIP ROAD LARKANA
E - Mail. sbashirahmed@yahoo.com
Cell# 0300-3417017

**ABSTRACT**

OBJECTIVE: *The objectives of our study were to collect the local data and to determine the serum lipid profile in-patients of primary hypothyroidism, in relation to different TSH levels.*
DESIGN: *It was cross sectional analytic type.*
PLACE AND DURATION OF STUDY: *Study conducted in the Department of Medicine, Pathology and Biochemistry, Chandka Medical College and Hospital Larkana. The period of study was two year from 1st January 2007 to 31st December 2008.*
SUBJECT AND METHODS: *Two hundred and forty consecutive cases of primary hypothyroidism were included. A detailed history and physical examination with special emphasis on fasting lipid profile and other relative investigations made and all the findings observed were noted in previously made Performa. The data was stratified in four (4) groups on the basis of serum TSH levels. Group I with levels of 6-20 ìIU/ml, Group II with levels of 21-40 ìIU/ml, Group III with levels of 40-60 ìIU/ml. Group IV with levels above 60 ìIU/ml.*
RESULTS: *Primary hypothyroidism was found to be 4 times more common in female patients, with male to female ratio of 1:4, the age of patients was ranged between 11 to 76 years. In group-I subject the mean levels of T-Chol, LDL-C, HDL-C and triglycerides were found to be 194 ± 9.5, 137.6 ± 32.1, 44.6 ± 0.8 and 139 ± 8.7 mg/dl, respectively. In group-II subjects the mean value of total cholesterol, LDL-C, HDL-C and triglycerides were found to be 213±10, 189±23.9, 42.2±2.2 mg/dl and 198.3±8.6 respectively. In group III the mean levels of total serum cholesterol, LDL-C, HDL-C and Triglycerides were found to be 247.7±39, 201±6.6, 38.7±2.9 and 217±13.3 mg/dl, respectively. In group-IV patients the mean value of total cholesterol, LDL-C, HDL-C and triglycerides were found to be 282.4±38.5, 214±11.4, 35.1±1.6 mg/dl and 230.7±17.9, respectively.*
CONCLUSION: *Our data statistically suggest that the effect of hypothyroidism on the serum concentration of lipids is more marked in patients with higher serum TSH levels. Therefore the clinicians should remain highly suspicious in the middle aged females, with Hypothyroidism.*

**KEY WORDS:** Hypothyroidism, LDL-C, HDL-c and Triglycerides.

## INTRODUCTION

Hypothyroidism is defined as a deficiency of thyroid activity, which results from reduced secretion of both T4 and T3, irrespective of cause [(1)].
Hypothyroidism is the most common pathologic hormone deficiency among the endocrine disorders, thyroid disease ranks second only to diabetes mellitus in prevalence, affecting over 1% of the general population and about 5% of individuals over age 60 years[(2,3)]
Thyroid diseases are common in our country, where incidence of hypothyroidism is twice that of hyperthyroidism. The hypothyroidism may be due to primary disease of the thyroid gland itself or lack of pituitary TSH[(4)].
The prevalence of primary hypothyroidism is 9/1000 in female and 1.5/1000 in male. Primary hypothyroidism can be seen at all ages [(4, 5)].
Clinically hypothyroidism may present with variety of symptoms and signs involving major systems of the body like, endocrine, cardiovascular, central nervous system, musculoskeletal, hematological, reproductive, gastrointestinal and dermatological [(6)].
Thyroid hormones have significant effects on the synthesis, mobilization and metabolism of lipids. Overt hypothyroidism is associated with significant increases in circulating concentrations of total and low density lipoprotein cholesterol (LDL-C), leading to

coronary artery disease. Hypercholesterolemia is favored due to the hormone deficit and to the decreased activity of the lipoprotein lipase [7,8,9].

**OBJECTIVE**

The objectives of this study were to collect the local data and to determine the serum lipid profile in primary hypothyroidism, in relation to different TSH levels.

**MATERIAL AND METHODS**

The present study was a cross sectional analytic type that was conducted in the Department of Medicine, in collaboration with Department of Pathology and Department of Biochemistry, Chandka Medical College and Hospital Larkana.

The period of study was two year from 1st January 2007 to 31st December 2008. A detailed Performa was prepared and proper protocol was designed.

Informed consent was taken from the patients. A detailed history and physical examination with special emphasis on fasting lipid profile and other relative investigations made and all the findings observed were noted in previously made Performa.

First 240 patients meeting the inclusion criteria were included in the study.

**Inclusion criteria**:

Criterion of Primary hypothyroidism was defined by:

Clinical features of hypothyroidism

Elevated serum TSH levels

Depressed serum T4 level

**Exclusion criteria**:

All patients with past history of thyroid disease, drugs, malignancy, or radiotherapy to chest and neck areas, pregnant, patients with chronic illness (CLD/CCF) and with familial lipid disorders, were excluded from the study.

Serum TSH, T4 and T3 were performed on the immunoradiometric technique, using Immulite 2000.

Patients with TSH level of 6 ìIU/ml and above were considered to be having hypothyroidism.

The data was stratified in four (4) groups on the basis of serum TSH levels.

Group I with levels of 6-20 ìIU/ml,

Group II with levels of 21-40 ìIU/ml,

Group III with levels of 40-60 ìIU/ml .

Group IV with levels above 60 ìIU/ml.

This resulted in a sampling distribution different from the general population.

The serum lipid profile was measured by a timed-end point method (using Colorimetric / Selectra Hitachi 912).

Statistics: Discrete variables were presented

**Chart No: 1**

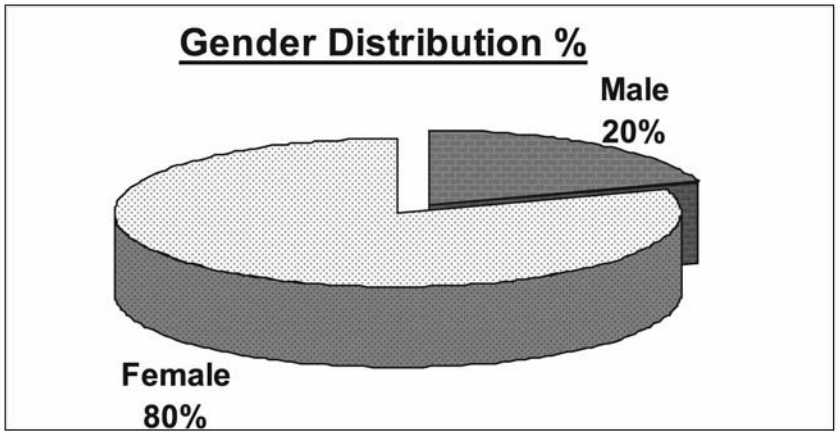



**Chart No: 2**

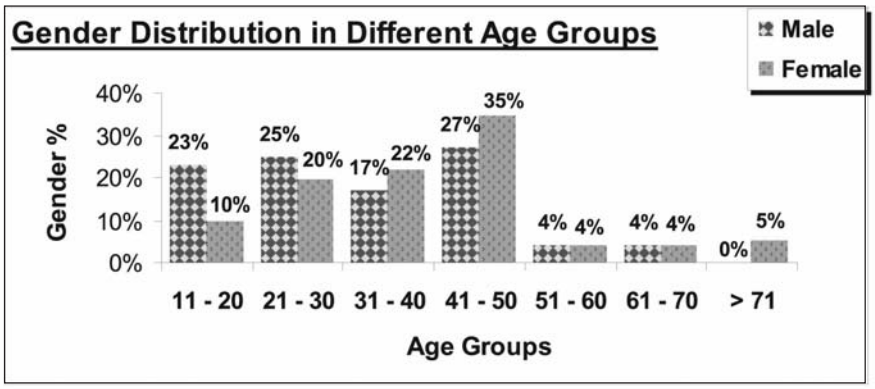



**Table No: 1**

| Parameters | Normal range | Group-I n=50 | Group-II n=60 | Group-III N=60 | Group-IV n=70 |
|---|---|---|---|---|---|
| T3 (ng/ml) | 0.8-1.9 | 1±0 | 0.9±0.2 | 0.8±0.2 | 0.6±0.2 |
| T4 (ug/ml) | 5.0-13.0 | 4.7.8±0.5 | 2.6±0.9 | 2±0.3 | 1.9±0.5 |

**Table No: 2**

| Parameters | Normal Range | Group-I n=50 | Group-II n=60 | Group-III n=60 | Group-IV N=70 |
|---|---|---|---|---|---|
| T.Cholesterol(mg/dl) 95% Confidence Interval | 130-220 | 196±37.22 (13.31) | 203±36.40 (18.42) *p=<0.05 | | 301±70.40 (35.65) *p=<0.05 |
| Triglyceride(mg/dl) 95% Confidence Interval | 35 –160 | 144±67.93 (24.30) | 144±69.52 (35.18) | | 223±63.91 (32.34) |
| HDL(mg/dl) 95% Confidence Interval | 35-55 | 41±7.48 (2.67) | 38±7.29 (3.69) | | 42±10.64 (5.38) |
| LDL(mg/dl) 95% Confidence Interval | up to 150 | 126±29.17 | 136±37.33 (18.89) *p=<0.05 | | 214±61.64 (31.19) *p=<0.05 |

as percentages and continuous variables were presented as mean & standard deviation. Two groups mean was analyzed by student t-test whereas ANOVA was used to analyze the significance in more than two group means. P-value < 0.05 was considered as statistically significant. Analyses were performed through statistical package SPSS V.13

**RESULTS AND OBSERVATIONS**

The study included 240 patients, 48(20%) were males 192(80%) of females (chart-1), with male to female ratio of 1:4, the age of patients was ranged between 11 to 76 years (chart-2).

The mean age of the male was 38.5± SD 7.6 years and females' 44.5± SD 8.2 years. In group-I subject the mean value of T3 and T4 was found to be 1 ± 0 ng /ml and 4.7 ± 0.5 ìg/dl, respectively (table-1).

The mean levels of Total serum cholesterol (T-Chol), Low density lipid cholesterol (LDL-C), High density lipid cholesterol (HDL-C) and triglycerides (TGs) were found to be 194 ± 9.5, 137.6 ± 32.1, 44.6 ± 0.8 and 139 ± 8.7 mg/dl, respectively (table-2).

In group-II subjects the mean T3 and T4 0.9±0.2 ng/ml and 2.6±0.9 ìg/dl, respectively (table-1).

The mean value of total cholesterol, LDL-C, HDL-C and triglycerides were found to be 213±10, 189±23.9, 42.2±2.2 mg/dl and 198.3±8.6 respectively (table-2).

In group III The mean values of T3 and T4 was found to be 0.8±0.2 ng/ ml and 2.0 ± 0.3 ìg/dl, respectively (table-1).

The mean levels of total serum cholesterol, LDL-C, HDL-C and Triglycerides were found to be 247.7±39, 201±6.6, 38.7±2.9 and 217±13.3 mg/dl, respectively (table-2).

In group-IV patients the mean T3 and T4 was 0.6±0.2 ng/ml and 1.9±0.5 ìg/dl, respectively (table-1).

The mean value of total cholesterol, LDL-C, HDL-C and triglycerides were found to be 282.4±38.5, 214±11.4, 35.1±1.6 mg/dl and 230.7±17.9, respectively (table-2).

**Table No: 3**

| Variables | TSH Groups | N | Minimum | Maximum | Mean ± SD | P - value |
|---|---|---|---|---|---|---|
| T3 (ng/ml) | i. (6 – 20) | 50 | 1 | 1 | 1 ± 0 | < 0.001 |
| | ii. (21-40) | 60 | 0.5 | 1.2 | 0.9 ± 0.2 | |
| | iii. (41-60) | 60 | 0.45 | 1 | 0.8 ± 0.2 | |
| | iv. (>60) | 70 | 0.45 | 1 | 0.6 ± 0.2 | |
| T4 (ug/ml) | i. (6 – 20) | 50 | 3.9 | 5.5 | 4.7 ± 0.5 | < 0.001 |
| | ii. (21-40) | 60 | 2 | 4.5 | 2.6 ± 0.9 | |
| | iii. (41-60) | 60 | 1.5 | 2.6 | 2 ± 0.3 | |
| | iv. (>60) | 70 | 1.5 | 3 | 1.9 ± 0.5 | |

P - value shows that there was highly significant difference between TSH groups among tested variables (T3, T4)

**Table No: 4**

| Variables | TSH Groups | N | Minimum | Maximum | Mean ± SD | P - value |
|---|---|---|---|---|---|---|
| T. Chol (mg/dl) | i. (6 – 20) | 50 | 180 | 209 | 194 ± 9.5 | < 0.001 |
| | ii. (21-40) | 60 | 204 | 233 | 213 ± 10 | |
| | iii. (41-60) | 60 | 210 | 330 | 247.7 ± 39 | |
| | iv. (>60) | 70 | 220 | 330 | 282.4 ± 38.5 | |
| LDL-C (mg/dl) | i. (6 – 20) | 50 | 120 | 201 | 137.6 ± 32.1 | < 0.001 |
| | ii. (21-40) | 60 | 156 | 220 | 189 ± 23.9 | |
| | iii. (41-60) | 60 | 190 | 212 | 201 ± 6.6 | |
| | iv. (>60) | 70 | 200 | 240 | 214.4 ± 11.4 | |
| HDL-C (mg/dl) | i. (6 – 20) | 50 | 44 | 46 | 44.6 ± 0.8 | < 0.001 |
| | ii. (21-40) | 60 | 40 | 46 | 42.2 ± 2.2 | |
| | iii. (41-60) | 60 | 36 | 43 | 38.7 ± 2.9 | |
| | iv. (>60) | 70 | 33 | 38 | 35.1 ± 1.6 | |
| TGs (mg/dl) | i. (6 – 20) | 50 | 125 | 150 | 139 ± 8.7 | < 0.001 |
| | ii. (21-40) | 60 | 180 | 205 | 198.3 ± 8.6 | |
| | iii. (41-60) | 60 | 200 | 235 | 217.5 ± 13.3 | |
| | iv. (>60) | 70 | 200 | 250 | 230.7 ± 17.9 | |

P - value shows that there was highly significant difference between TSH groups among tested variables (T. Chol, LDL-c, HDL-C, TGs )

**DISCUSSION**

In this study, primary hypothyroidism was more common in female patients, the male to female ratio was 1:4 and that is in contrast to a ratio of 1:2 quoted by Baldwin et al[10] and 1:28 quoted by Turnbridge et al[11], however Khuram. IM[12], reported male to female ratio of 1:4.92, which is more in consonance with this study.

In this study primary hypothyroidism was more common 33.33% in the age group of 21-50 years, while the Shaikh et al quoted the highest incidence in the age group of 21-40 years[3].

Mild elevation in TSH in primary hypothyroidism was associated with raised Total serum cholesterol (T-Chol), Low density lipid cholesterol (LDL-C), triglycerides (TGs) triglycerides (TGs) and decrease in High density lipid cholesterol (HDL-C) (table-3 & 4), our figures are in consistent with the figures mentioned in local as well as in the international literature[9,13,14 & 15], although there is no clear evidence that hypothyroidism causes coronary artery disease but as Hypothyroidism increases the oxidation of plasma cholesterol mainly because of an altered pattern of binding, the increased levels of cholesterol presents as substrate for oxidative stress, simultaneously diastolic Blood Pressure commonly seen in hypothyroidism may promote atherosclerosis and may lead to coronary artery disease[15].

## CONCLUSION

In 240 consecutive patients of primary hypothyroidism, which were included in this study.

Primary hypothyroidism was found to be 4 times more common in female patients. Majority of patients were of age group 21-50 years.

Our data statistically suggest that the effect of hypothyroidism on the serum concentration of lipids is more marked in patients with higher serum TSH levels.

## RECOMMENDATION

Therefore it is suggested that the clinicians should remain highly suspicious in the middle aged females, with Hypothyroidism, for the increase in total plasma cholesterol, low density lipoprotein (LDL) and small decrease in high density lipoprotein (HDL), which may enhance the risk for development of atherosclerosis, leading to coronary artery disease.

## REFERENCES


1. Shaikh B A. et al. Clinical features of primary Hypothyroidism: A year experience at chandka medical college larkana. Medical channel 2008;14(1):72-5.
2. Schimke RN. Hyperthyroidism. the clinical spectrum. Postgrd Med J, 1992; 915: 229-36.
3. Fitzgerald PA, Endocrine disorder, In Mcphee SJ, Papadakis MA, CMDT: Mc: Graw Hill 2009:1079-51.
4. Shaikh Z. et al. Thyroid related disorders at CHK. JCPSP 1993;3: 26-8.
5. Ahmed B, Hussain T, Memon AR, Solangi GA. Clinical Presentation of Primary Hypothyroidism. JCPSP Nov 2001;11(11):676-8.
6. Toft. A. Hypothyroidism. Med Intern 8:1989: 5:2596-2600.
7. Cappola, A.R. & Ladenson, P.W. (2003) Hypothyroidism and atherosclerosis. Journal of Clinical Endocrinology and Metabolism;88:2438– 2444.
8. Jawed S, Khawaja TF, Sultan A, Mahmood T. Alterations in lipid profile in old age hypothyroid patients. Ann King Edward Med Coll Sep 2005;11(3):311-3.
9. Parkash A, Lal AK. Serum lipids in hypothyroidism: our experience. Indian Journal of Clinical Biochemistry 2006; 21 (2): 153-55.
10. Baldwin DB and Rowett D, Incidence of thyroid disorders in Connecticut. JAMA 1978; 239(8): 742-744.
11. Tunbridge WMG, Evered DC, Hall R, Appleton D, Brewis M, Clark Fetal. The spectrum of thyroid disease in a community. The Whickham survey. Clin. Endocrinol (Oxf) 1977; 7:481-930.
12. Khurram IM, Choudhry KS, Muhammad K, Islam N. Clinical presentation of Hypothyroidism: A case control analysis J Ayub Med Coll Abottabad Mar 2003;15(1):45-9.
13. O'Brien T; Dinneen SF; O'Brien PC; Palumbo PJ. Hyperlipidemia in patients with primary and secondary hypothyroidism. Mayo Clin Proc 1993 Sep;68(9):860-6.
14. Fowler PBS, Stubbs P. Asymptomatic hypothyroidism and hypercholesterolaemia. J R Soc Med 1992;85:244-5.
15. Walsh JP, Bremner AP, Bulsara MK, Leary PO, Leedman PJ, Feddema P, Michelangeli V. Thyroid dysfunction and serum lipids: A community-based study. Clin Endocrinol 2005;63(3):670-675.