

### **Dyslipidemia In Thyroid Disorders**

Pradeep agarwal<sup>1</sup>, Satish Pandey<sup>2</sup>

<sup>1,2</sup> M D Medicine, Consultant Physician

<sup>1</sup>Pratik Hospital and Research Center Bhilwara.

<sup>2</sup> Ram snehi Hospital, Bhilwara.

**Corresponding Author:** Satish Pandey, M D Medicine, Consultant Physician, Ram snehi Hospital, Bhilwara.

**Type of Publication:** Original Research Paper

**Conflicts of Interest:** Nil

#### **Abstract**

**Background:** Thyroid disease, namely hypothyroidism and hyperthyroidism, constitutes the most common endocrine abnormality in recent years, diagnosed either in subclinical or clinical form. Thyroid hormones play an important role in regulating lipid metabolism; and thyroid dysfunctions can result in lipid abnormalities which increase the risk of endothelial dysfunction, hypertension and cardiovascular disease.

**Methods:** A cross-sectional study was conducted on 100 patients with suspicion of thyroid disorders were taken as cases. One hundred patients with normal thyroid profile and no history of other chronic diseases were taken as control group.

**Results:** The serum TC, TG and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group.

**Conclusion:** We conclude that, dyslipidemias are associated with thyroid disorders, so biochemical screening for thyroid dysfunction in all dyslipidemic patients. Therefore, patients presenting with dyslipidemia

are recommended for investigation to explore thyroid dysfunction.

**Keywords-**Total cholesterol, Triglycerides and LDL..

#### **Introduction**

Thyroid disease, namely hypothyroidism and hyperthyroidism, constitutes the most common endocrine abnormality in recent years, diagnosed either in subclinical or clinical form. According to the 6-year duration NHANES III Study, the prevalence of hypothyroidism was 4.6% (0.3% clinical and 4.3% subclinical) and of hyperthyroidism 1.3% (0.5% clinical and 0.7% subclinical), in population aged at least 12 years, showing an age and sex dependence.<sup>1-2</sup>

Thyroid hormones play an important role in regulating lipid metabolism; and thyroid dysfunctions can result in lipid abnormalities which increase the risk of endothelial dysfunction, hypertension and cardiovascular disease<sup>3</sup>. It is well known that alterations in thyroid functions result in changes in the composition and transport of lipoproteins<sup>4</sup>.<sup>6</sup> In hyperthyroidism, the metabolic effects include the increased utilization and oxidation of all major fuel substrates that is, protein, glucose and lipids. The metabolic effects of hypothyroidism are not well characterized. The condition is characterized by increased

fasting plasma cholesterol and triglycerides <sup>7,8</sup>. The effects of hypothyroidism on HDL cholesterol level has been contradictory. HDL cholesterol levels have been reported to be increased <sup>8</sup> decreased <sup>9</sup> and normal <sup>10</sup> in hypothyroidism. It is well-known that hypothyroidism is associated with hypercholesterolemia and increases the risk of atherosclerosis <sup>11,12</sup>

Hyperlipidemia observed in hypothyroidism is a metabolic result currently treatable with thyroid hormone. Before the availability of sensitive thyroid hormone analysis, increased serum or plasma cholesterol level was accepted as important evidence supporting the diagnosis of hypothyroidism <sup>13</sup> Classical signs and symptoms of clinical hypothyroidism may not be observed when it is mild or moderate. The present study was planned to assess the levels of total cholesterol (TC), LDL-cholesterol, VLDL-cholesterol, HDL-cholesterol and triglyceride (TG) in patients with thyroid dysfunction (hypo and hyperthyroidism) and to study the association between thyroid dysfunction and lipid profile.

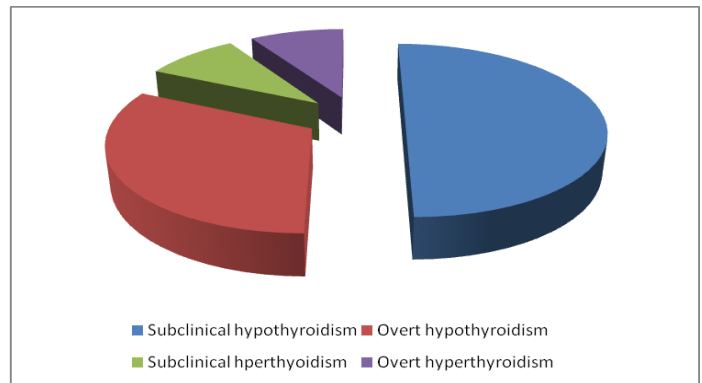
**Materials and Methods**

A cross-sectional study was conducted on 100 patients with suspicion of thyroid disorders were taken as cases. One hundred patients with normal thyroid profile and no history of other chronic diseases were taken as control group. Detailed informations of the patients were collected after taking informed consent with the help of pre-test proforma that included age, sex and family or personal history of chronic diseases.

After 12 hours overnight fasting, 5 ml blood was collected by standard venipuncture method, and the serum was separated. T3, T4 and TSH were quantitatively estimated by Enzyme linked immunosorbent assay (ELISA) method.

**Results**

Graph 1:



Graph 2:

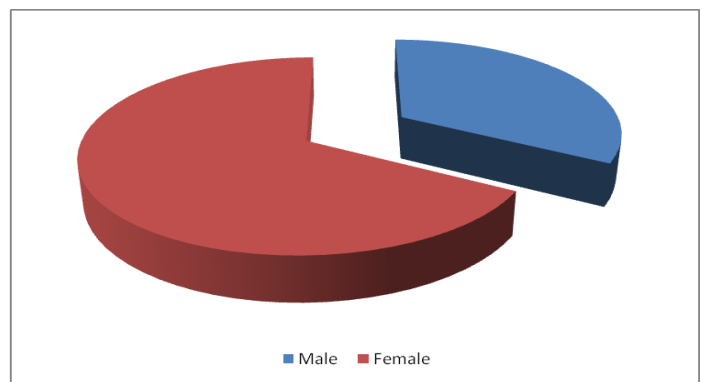


Table .1 Comparison of biochemical parameters in case and controls.

Parameters	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hyperthyroidism	Overt hypothyroidism	Control
TC	262.11±68.06	295.15±75.06	179.58±60.02	144.80±11.08	135.12±12.06
LDL	97.56±15.87	118.52±36.58	90.87±21.98	80.98±7.40	80.10±11.08
HDL	45.10±13.08	32.58±7.06	36.40±6.12	37.06±6.12	53.98±13.72
TG	207.56±46.28	238.24±38.06	116.54±24.02	59.84±4.06	80.12±11.84

The serum TC, TG and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group.

**Discussion**

Thyroid dysfunction, along with a higher prevalence of goiter, is a major public health problem in India population. In this study, the prevalence of hypothyroidism was higher than hyperthyroidism similar

finding observed by findings by Baral et al.<sup>14</sup> and Holowell et al.<sup>15</sup>

The serum TC and LDL levels in hypothyroid individuals (both overt and subclinical) were significantly higher than euthyroid subjects but the levels were comparable between hyperthyroid and euthyroid group in our study.

Jung<sup>16</sup> found mean plasma total cholesterol and LDL cholesterol levels elevated in hypothyroid cases than in normal controls.

In another study, average serum total cholesterol level was found elevated in primary and secondary hypothyroidism<sup>17</sup>.

Keyes & Heimberg<sup>18</sup>, Laker & Mayes<sup>19</sup> found triglyceride level elevated in hypothyroid patients. Thompson<sup>20</sup> and Abrams & Grundy<sup>21</sup> have stated decreased activity of LDL receptors as the main cause of hypercholesterolemia in hypothyroidism.

### Conclusion

We conclude that, dyslipidemias are associated with thyroid disorders, so biochemical screening for thyroid dysfunction in all dyslipidemic patients. Therefore, patients presenting with dyslipidemia are recommended for investigation to explore thyroid dysfunction. As our sample size was small and duration of study was limited, another study with large sample size and longer duration is also recommended.

### References

1. Shaikh BA. Clinical features of primary hypothyroidism: A year experience at Chandka medical college, Larkana. Medical Channel.2008;14(1): 72-5.
2. V. Sunanda, S. Sangeeta, B. Rao P. Int J Biol Med Res. 2012; 3(1): 1373-6.

3. Liberopoulos EN, Elisaf MS. Dyslipidemia in patients with thyroid disorders. Hormones 2002, 1(4):218-23.
4. Stone NJ. Secondary causes of hyperlipidemia. Med Clin North Am 1994; 78:117-41.
5. Guyton AC, Hall JE. The thyroid metabolic hormones. In: Textbook of medical physiology. 10th edn. New York: W B Saunders Company, 2000:858-68.
6. Thompson GR, Soutar AK, Spengel F A, Jadhav A, Gavigan S, Myant NB. Defects of the receptor mediated low density lipoprotein metabolism in homozygous familiar hypercholesterolemia and hypothyroidism in vivo. Proct Natl Acad Sci USA 1981; 78:2591-5.
7. Nikkilia EA, Kekki M. Plasma triglyceride metabolism in thyroid disease. J Clin Invest 1972; 51:2103-14.
8. Allian CC, Poon LS, Chan CSG, Richmond W, Fu P. Enzymatic determination of total serum cholesterol. Clin Chem 1974; 20(4): 470-5.
9. Trinder P, Ann Clin Biochem. 1969; 6: 24-7.
10. Burstein M, Scholnick HR, Morfin R. Rapid method for the isolation of lipoproteins from human serum by precipitation with polyanions. J Lipid Res 1970; 11(6): 583-95.
11. Tietz N, (Ed) Fundamentals of Clinical Chemistry, W. B. Saunders, Philadelphia, PA, 1998.
12. Beyer IW, Karmali R, DeMeester-Mirkine N, Cogan E, Fuss MJ. Serum creatine kinase levels in overt and subclinical hypothyroidism. Thyroid 1998; 8:1029-31.
13. World Medical Association declaration of Helsinki. Ethical Principles for Medical Research involving Human subjects. World Medical Association available from; <http://www.wma.net/e/policy/b3html>.

14. Baral N, Lamsal M, Koner BC, Koirala S. Thyroid dysfunction in eastern Nepal. *South Asian J Trop Med Public Health* 2002; 33: 638-41.
15. Hollowell JG, Staehing NW, Flanders WD et al. Serum TSH, T4, and thyroid antibodies in the United States Population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). *J Clin Endocrinol Metabol* 2002; 87: 489-99.
16. Jung CH, Sung KC, Shin HS, Rhee EJ, Lee WY, Kim BS, Kang JH, Kim H, Kim SW, Lee MH, Park JR, Kim SW. Thyroid dysfunction and their relation to cardiovascular risk factors such as lipid profile, hsCRP and waist hip ratio in Korea. *Korean J Intern Med* 2003;18:146-153.
17. Skanse B. On the difference in serum cholesterol between hypothyroidism of pituitary and of thyroid origin. In: Pitt-Rivers R, Green R, Tata JR, McCartney W, Taylor S, Pochin EE, Trotter WR (eds). *The fourth international goitre conference*. London: Pergamon Press, 1961:108-118.
18. Keyes WG, Heimberg M. Influence of thyroid status on lipid metabolism in the perfused rat liver. *J Clin Invest* 1979;64:182-190.
19. Laker ME, Mayes PA. Effect of hyperthyroidism and hypothyroidism and carbohydrate metabolism of the perfused rat. *Biochem J* 1981;96:247-255.
20. Thompson GR, Soutar AK, Spengel F A, Jadhav A, Gavigan S, Myant NB. Defects of the receptor-mediated low density lipoprotein metabolism in homozygous familial hypercholesterolemia and hypothyroidism in vivo. *Proc Natl Acad Sci USA* 1981;78:2591-2595
21. Abrams JJ, Grundy SM. Cholesterol metabolism in hypothyroidism and hyperthyroidism in man. *J Lipid Res* 1981;82:323-338.