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RESEARCH ARTICLE

COMPARATIVE STUDY OF LIPID PROFILE IN HYPOTHYROIDISM PATIENTS

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ABSTRACT

Thyroid dysfunction is relatively a common disease which affects people, irrespective of their age and gender. Hypothyroidism is a graded disorder, it may be severe with obvious myxoedema, or mild to moderate or can be sub-clinical hypothyroidism, resulting in a generalized slowing down of the basal metabolic rate (BMR). It results from reduced secretion of total thyroxine (T4) and triiodothyronine (T3). Biochemical decrease in T4 and T3 lead to hyper secretion of pituitary thyroid stimulating hormone (TSH) and an amplified increase in serum TSH levels. This is a key laboratory finding, particularly in the early detection of thyroid failure. Thyroid hormones have significant effects on the synthesis, mobilization and metabolism of lipids. They affect serum cholesterol mainly by altering lipoprotein metabolism. The prevalence of hypothyroidism is increasing all over the world. Worldwide prevalence is estimated to be between 4.6% (USA) and 34% (Nepal). The incidence of clinical hypothyroidism is 0.5-1.9% in women and <1% in men. A total of 2500 subjects were surveyed for this study and finally, out of 2500 subjects, 850 patients (34%) were selectively diagnosed as hypothyroidism and out of 850 hypothyroidism patients, 31 subjects (3.64%) were selectively diagnosed as clinical hypothyroidism on the basis of thyroid and lipid profile tests and another 31 subjects were included as normal subjects in this study. The thyroid stimulating hormone (TSH) and low density lipoprotein (LDL) values in all three experimental groups were significantly higher, whereas T3, T4 values were in a decreasing order with that of control group. The trend of our result indicates that the rate of clinical hypothyroidism of our study population were significantly higher. Hence, from the findings of our study, we can conclude that the rate of clinical hypothyroidism is quite high in Nepalese population.

Keywords: Hypothyroidism, TSH, Lipid profile

INTRODUCTION:

Thyroid dysfunction is relatively a common disease which affects people, irrespective of their age and gender [1]. Hypothyroidism is a graded disorder, it may be severe with obvious myxoedema, or mild to moderate or can be sub-clinical hypothyroidism, resulting in a generalized slowing down of the basal metabolic rate (BMR) [2]. It results from reduced secretion of total thyroxine (T4) and triiodothyronine (T3) [3]. Biochemical decrease in T4 and T3 lead to hyper secretion of pituitary thyroid stimulating hormone (TSH) and an amplified increase in serum TSH levels. This is a key laboratory finding, particularly in the early detection of thyroid failure [4]. Thyroid hormones have significant effects on the synthesis, mobilization and metabolism of lipids. They affect serum cholesterol mainly by altering lipoprotein metabolism [5]. Hypothyroidism affects the cardiovascular, pulmonary, renal, neuromuscular, nervous and the reproductive systems [6]. A majority of the cardiovascular signs and symptoms are associated with a derangement in the lipid metabolism [1].

Overt and sub-clinical hypothyroidism are associated with hypercholesterolemia mainly due to elevation of Low-Density Lipoprotein (LDL-C) levels, whereas High Density Lipoprotein (HDL-C) can be normal or elevated. On the other hand, hyperthyroidism is accompanied by a decrease in serum levels of total LDL-C and HDL-C [2]. Hypercholesterolemia is favoured due to the hormone deficit and to the decreased activity of lipoprotein lipase [7]. The prevalence of hypothyroidism is increasing all over the world. In view of the above the present study was aimed to assess the association of lipid profile in clinical hypothyroidism.

MATERIAL AND METHODS:

This study was conducted in the Department of Biochemistry of Chitwan Medical College, Bharatpur,

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Nepal. Venous blood samples were drawn from the patient of hypothyroidism as well as from normal healthy subjects and serum were separated. The serum sample was analyzed for lipid and thyroid profile in all the experimental and control samples.

Serum T3, T4 and TSH were measured according to the method as described elsewhere by AW and Yap [8]. Serum total cholesterol was measured by cholesterol oxidase-PAP end point method [9], triglycerides by glycerol oxidase enzymatic method [10] and HDL by phosphotungstic acid precipitation method [11]. LDL- Cholesterol &VLDL was calculated by using Friedwald formula[12].

STATISTICAL ANALYSIS:

In this study statistical software SPSS (version 17) was used for data analysis. The mean values of all the parameters of thyroid profile and lipid profile tests were analyzed. Data were expressed as mean ± SD. Unpaired student's t-test was used for group wise comparisons and p-value of <0.001 was considered statistically significant.

Table 1: Serum levels of T3, T4 and TSH of control and experimental groups.

Parameters	Control group	Experimental Group I	Experimental Group II	Experimental Group III
T3 (pg/ml)	1.29± 0.15	0.85 ± 0.22	0.60 ± 0.16	0.30 ± 0.19
T4 (ng/ml)	1.61± 0.37	0.60 ±0. 06	0.37 ±0.07	0.32 ±0.06
TSH (µIU/ml)	2.42± 1.57	10.07 ± 3.07	32.24 ± 5.39	45 .06 ± .06

Values are expressed as mean ± SD (n= 31).

Table 2: Serum levels of total cholesterol, TG, LDL, HDL and VLDL of control and experimental groups.

Parameters	Control Group	Experimental Group I	Experimental Group II	Experimental Group III
Total cholesterol (mg/dl)	160 ± 11.20	196.43 ± 24.72	231.83 ± 15.30	284.54 ± 23.38
Triglyceride(mg/dl)	139.61 ±11.56	172 .70 ± 41.23	212.83 ± 26.81	212.36 ± 49.11
LDL(mg/dl)	96.90 ± 12.09	123 ± 29.49	146.48 ± 12.01	201.57 ± 22.19
HDL(mg/dl)	35.39 ± 4.04	42 ± 6.16	39.60 ± 4.81	39.78 ± 8.28
VLDL(mg/dl)	27.92 ± 2.31	34.53 ± 8.24	42.56 ± 5.36	43.18 ± 11.98

Values are expressed as mean ± SD (n= 31).

RESULTS AND DISCUSSION:

Patients with TSH level above 6.16 µIU/ml were considered to be having hypothyroidism. Clinical hypothyroidism was diagnosed as increased TSH level with lowered T3 and T4 levels. The study groups were classified as: normal healthy euthyroidism as control, Group I-TSH levels of 6 -20 µIU/ml, Group II-TSH levels of 21- 40 µIU/ml and Group III -TSH level > 40 µIU/ml. A total of 2500 subjects were surveyed for this study and finally, out of 2500 subjects, 850 patients (34%) were selectively diagnosed as hypothyroidism. Further, out of 850 hypothyroidism patients, 31 subjects (3.64%) were selectively diagnosed as clinical hypothyroidism. The plasma T3, T4, TSH, total cholesterol, LDL, HDL and VLDL tests were performed in control and all experimental groups for screening of hypothyroidism. Finding of plasma T3, T4, TSH, total cholesterol, LDL, HDL and VLDL were tabulated in Table 1 and 2. The TSH and LDL values of all three experimental groups were significantly higher (P<0.001) whereas T3, T4 values were significantly decreased (P<0.001) than the control group. The trend of our result indicates that the rate of hypothyroidism (34%) as well as clinical hypothyroidism (3.6%) of our study population was higher which

corroborates well with the earlier report [13]. Hence, from the findings of our study, we can conclude that the rate of clinical hypothyroidism is quite high in Nepalese populations which are in accord with the world hypothyroidism data [14].

REFERENCES:

1. Ravi S, Srinivas CH, Das MC. Lipid profile in newly diagnosed and on treatment hypothyroid. J Clin Diagn Res 2011; 5(5): 998-1000.
2. Krishnaveni DV. Study of variations in serum lipid profile and transaminase level in overt hypothyroidism. Inter J Pharma and Biosci 2011; 2(3): 224-230.
3. Seely EW, Williams GH. The heart in endocrine disorder. In: Eugene Braunwald, Douglas P Zipes ed. Heart Disease. Edi 6. WB Saunders Company, Philadelphia. 2001. pp 2151-2171.
4. Galesanu C, Lisnic N, Teslara R, Apotsa L, Zbranca E. Lipid profile in a group of hypothyroid patients vs treated hypothyroid patients. Rev Med Chir Soc Med Nat Lasi 2004; 108(3): 554-560.
5. Erem C. Blood coagulation, fibrinolytic activity and lipid profile in subclinical thyroid disease: subclinical hyperthyroidism increase plasma factor X activity. Clin Endocrinol 2006; 64(3): 323-329.
6. Toft A. Hypothyroidism. Study of lipid profile in hypothyroidism. Med Intern 1989; 8: 2596-2600.
7. Jawed S, Khawaja TF, Sultan AM. Alterations in lipid profile in old age hypothyroid patients. Ann King Edward Med Coll 2005; 11(3): 311-313.
8. TC AW, Clementine YF Yap. Department of Lab Medicine, Changi General Hospital, Proceedings of Singapore Healthcare 2011; Vol 20(2): 132-137.
9. Allian CC, Poon LS, Chan CSG, Richmond W, Fu P. Enzymatic determination of total serum cholesterol. Clin Chem1974; 20(4): 470-475.
10. Madhumita D and M Saikia. Estimation of reference interval of lipid profile in Assamese population. Ind J Clin Biochem 2009; 24(2): 190-193.
11. 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): 583-595.
12. Johnson R, McNutt P, Mac Mahon S, Robson R. Use of the Friedwald Formula to estimate LDL-cholesterol in patients with chronic renal failure on dialysis. Clinical Chemistry 1997; 43(11): 2183-2184.
13. Rohil V, Mishra AK, Shrewastawa MK, Mehta KD, Lamsal M, Baral N, Majhi S. Subclinical hypothyroidism in eastern Nepal: a hospital based study. Kathmandu Univ Med J 2010: 8(30): 231-237.
14. Golden SH, Robinson KA, Saldanha I, Anton B, Ladenson PW. Prevalence and incidence of endocrine and metabolic disorders in the United States: a comprehensive review. *J Clin Endocrinol & Metab* 2009; 94(6): 1853-1878.

