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Comparison of Dyslipidemia Between Overt and Subclinical Hypothyroidism

Medical Science

KEYWORDS : Dyslipidemia, Subclinical hypothyroidism, Overt hypothyroidism

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ABSTRACT

Background: *Hypothyroidism is a common metabolic disorder in the general population, especially in older women; Hypothyroidism leads to many effects on the cardiovascular system including hypertension as well as dyslipidemia which are major causes of atherosclerosis and coronary heart disease.*

Objective: *Our survey was to study comparison of dyslipidemia between overt and subclinical hypothyroidism.*

Methods: *The present study was carried out in the department of General Medicine at L N medical college and research centre Bhopal, (M.P) with 380 patients (221 Subclinical hypothyroidism and 159 Overt hypothyroidism patients). Thyroid Profile- was done with CLIA (chemiluminescence immunoassay) system. Lipid Profile was done with semiautomated analyser.*

Results: *The results showed a statistically non significant difference in mean Total cholesterol, LDL and TG of subclinical and overt hypothyroidism cases.*

Conclusion: *No direct correlation was found between TSH levels and degree of dyslipidemia. No significant difference was seen in lipid parameters in subclinical and overt hypothyroidism subgroups.*

INTRODUCTION:-

Hypothyroidism is a common metabolic disorder in the general population, especially in older women; 9.5% of the participants of the Colorado prevalence study had elevated levels of thyroid stimulating Levels of total and LDL cholesterol tend to increase as the thyroid function declines[1]. Hypothyroidism is defined as failure of the thyroid gland to produce sufficient thyroid hormone to meet the metabolic demands of the body. Untreated hypothyroidism can contribute to hypertension, dyslipidemia, infertility, cognitive impairment, and neuromuscular dysfunction. The prevalence increases with age, and is higher in females than in males[2].

In general, overt and subclinical hypothyroidism is associated with hypercholestrolemia mainly due to elevation of low density lipoprotein (LDL) cholesterol levels, whereas high density lipoprotein(HDL) cholesterol concentration is usually normal or even elevated[3-5].These changes in the lipid profile are explained by the regulatory effect of thyroid hormones on the activity of some key enzymes of lipoprotein metabolism. Specifically, the thyroid hormone stimulates the hepatic de novo cholesterol synthesis by inducing the 3-hydroxy-methyl glutaryl –coenzyme A(HMG-CoA) reductase that catalyzes the conversion of HMG-CoA to mevalonate, the first step in the biosynthesis of cholesterol[3]. Although thyroid substitution therapy is beneficial for patients with overt hypothyroidism, the question of whether subclinical hypothyroidism must be treated remains unanswered.

Subclinical hypothyroidism (SH), defined as the clinical status of mildly elevated serum TSH levels (up to 10 mU/L) with normal levels of FT4 and FT3, is a far more common disorder than overt hypothyroidism with a higher prevalence among women and older subjects [6-7]. In a cross-sectional study. Efstathiadou et al[8] evaluated the serum lipid parameters of 66 patients with SH and 75 age- and sex-matched euthyroid controls and found SH had significantly higher levels of total cholesterol, LDL cholesterol, apolipoprotein B and Lp(a), whereas levels of triglycerides, HDL cholesterol and apolipoprotein did not differ significantly compared to euthyroid controls .

A recent Indian study by Marwaha RK et al[9] on dyslipidemia in subclinical hypothyroidism in an Indian population shows that no atherogenic lipid abnormalities were found in adult subjects with subclinical hypothyroidism with TSH < 10.0mIU/L, however significant correlation has been found, when the TSH is between 10.1mIU/L and 20 mIU/L in subjects with subclinical hypothyroidism.

The aim of our survey was to study comparison of dyslipidemia between overt and subclinical hypothyroidism.

MATERIAL AND METHODS:

The present study was carried out in the department of General Medicine at L N medical college and research centre Bhopal, (M.P) with 380 patients (221 Subclinical hypothyroidism and 159 Overt hypothyroidism patients). The period of the study between December 2014 to June 2016. All the patients venous blood sample was withdrawn after overnight fasting for investigation of Total tri- iodo-thyronine(T3), Total thyroxine (T4) and thyroid stimulating hormone(TSH), and in Lipid profile-Total cholestrol, LDL, Triglyceride, Cholesterol, HDL,VLDL was done. After explaining the nature, procedure, purpose and other relevant details of the study, verbal informed consent were taken from the subjects.

Thyroid Profile- was done with CLIA (chemiluminescence immunoassay) system. Lipid Profile was done with semiautomated analyser.

The following guide lines for detection of thyroid dysfunction was considered:

Normal when T3, T4 and TSH were within the normal range.

Primary hypothyroidism- when TSH is more than 5.2 micro IU/ L and T3, T4 is less than the normal value.

Subclinical hypothyroidism – when TSH is more than 5.2 micro IU/L and T3, T4 is within the normal range.

INCLUSION CRITERIA :

Patients aged 20 to 60 years.

Patients who are willing to participate in the study.

Patients with the hypothyroidism.

EXCLUSION CRITERIA:-

Subjects with known dyslipidemia.

Patients taking lipid lowering medicine.

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Diseases associated with dyslipidemia like nephrotic Syndrome.

Ethical approval was granted by the Institutional Ethics Committee (IEC). All the data were entered and analyzed by using statistical packages for social science (SPSS) software version 20.

RESULTS:-

The study was conducted in L N Medical College & J.K. Hospital in BHOPAL During this study period, from Dec 2014 to June 2016 a total of 380 patients were enrolled in this study.

TABLE NO-1:- Showing distribution of subclinical and overt hypothyroidism cases respondent by sex

SEX	Subclinical hypothyroidism	Overt hypothyroidism
MALE	98	64
FEMALE	123	95
TOTAL	221	159

Above table shows that in 380 cases, 221 cases belonged to subclinical and 159 cases belonged to overt hypothyroidism. Out of this 221 Subclinical cases, majority were females (55.6%). Similarly out of 159 cases of overt hypothyroidism , majority were females (59%).

TABLE NO-2:- Showing age wise distribution among males and females of subclinical and overt hypothyroidism

SEX	SEX	20-30 years	31-40 years	41-50 years	51-60years
Subclinical hypothyroidism	Male	12	26	22	38
	Female	10	25	37	51
Overt hypothyroidism	Male	5	13	17	29
	Female	15	13	22	45

Above table shows that among the age group of 20-60 years, majority were females respectively.

TABLE NO-3 :- Showing distribution of cases according to TSH levels range (n=380)

TSH Level mIU/L	No. of cases
<5.5	37
5.6-10.9	122
11-30	155
31-60	21
61 & Above	45

The above table Shows distribution of cases according to different TSH levels (n=380). The majority of cases (40%) having TSH values in the range of 11-30 and 122 cases (32%) had TSH levels in the range of 5.6-10.9.

Table No -4: showing mean value of Total cholesterol, LDL and TG levels in subclinical and overt hypothyroidism cases

Clinical profile	Numbers	LDL		TG		Total Cholesterol	
		Mean	S D	Mean	S D	Mean	S D
Subclinical	221	128.93	42.02	143.73	43.32	207.13	35.53
Overt	159	118.11	33.37	134.24	62.70	188.52	42.23
P value		0.374(not significant)		0.609 (not significant)		0.168(not significant)	

The above table shows statistically non significant difference in mean Total cholesterol, LDL and TG of subclinical and overt hypothyroidism cases

DISSCUSION:

This study conduct in department of General Medicine at L N medical college and research centre. Hypothyroidism is the second most common ailment affecting patients attending medicine outpatient departments. Increase in serum TSH level is the key laboratory finding for early detection of thyroid failure. Hypothyroidism leads to many effects on the cardiovascular system including hypertension as well as dyslipidemia which are major causes of atherosclerosis and coronary heart disease.

Our study included 380 cases of subclinical and overt hypothyroidism who underwent lipid profile estimation. 221 cases belonged to subclinical and 159 cases belonged to overt hypothyroidism. Out of 221 Subclinical cases, majority were females (55.6%). Similarly out of 159 cases of overt hypothyroidism, majority (59%) were females. This shows female preponderance of this clinical condition in this age range.

Mean age of subclinical and overt hypothyroidism cases. The female having lower mean age as compared to males suggestive of relatively early presentation in females. Mean total cholesterol in between SCH and overt hypothyroidism patients was found to be non significant. Sharma et al[10] in which TSH showed statistically significant positive correlation with total Cholesterol ($r = 0.434$, $p < 0.0164$). The Rotterdam study reported that total cholesterol was not elevated in SCH[11]. In subclinical hypothyroidism the depletion of the thyroid hormones leads to reduced numbers of LDL receptors on the liver cell surface, resulting in decreased uptake and degradation of LDL-C. Majority of studies suggest a normalization of total and LDL cholesterol levels after thyroxine substitution therapy.

We found statistically no significant difference in total TG levels between SCH and overt hypothyroidism patients. Sharma et al[10] concluded that The correlation between TSH was statistically not significant for Triglyceride. This observation was similar to our study result. A quite recent study showed that transfer of triglycerides to HDL and phospholipids was lower in patients with subclinical hypothyroidism than that in controls while transfer of free and esterified cholesterol to HDL, HDL particle size, and paraoxonase 1 activity did not exhibit any difference[12].

In our study we found that the Mean LDL levels between SCH and overt hypothyroidism patients was found to be statistically non significant. In a study by Asranna A et al ,Mean total cholesterol and mean LDL levels were significantly higher in SH compared to controls, but there was no statistically significant difference in the mean HDL, VLDL, and triglyceride levels[13]. Dr. Shivaleela M Biradar[14] reported that significant reduction in the levels of TC and LDL-C following levothyroxine therapy, decreases the incidence of coronary artery diseases, stroke and peripheral vascular disease in subclinical hypothyroidism.

The issue of lipid abnormalities in patients with subclinical hypothyroidism and overt hypothyroidism has not been fully addressed. Shashi et al[15] study reported that serum total cholesterol, triglycerides and LDL were significantly increased, while activity of hepatic lipase and concentration of HDL was decreased in subjects with Clinical hypothyroidism in comparison to euthyroid controls. Some studies have shown that subclinical hypothyroidism dyslipidemia may also be accompanied by increased triglycerides (Milionis et al[16]., 2005; Toruner et al[17]., 2008) and decreased HDL levels (Erdem et al[18]., 2008).

CONCLUSION:-

Majority of cases were females and presentation was early as compared to male cases. Mean serum total cholesterol levels were high in hypothyroidism group. No direct correlation was found between TSH levels and degree of dyslipidemia. No significant difference was seen in lipid parameters in subclinical and overt hypothyroidism subgroups. The ability to diagnose and treat unsuspected dyslipidemia in these patients may greatly enhance the quality of life. Hence the need to detect such cases where dyslipidemia contributes to morbidity and where it is the cause for poor control of the associated conditions.

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