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Biochemistry

A STUDY ON DYSLIPIDEMIA IN SUBCLINICAL HYPOTHYROIDISM IN A TERTIARY CARE HOSPITAL – A CASE CONTROL STUDY

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ABSTRACT Thyroid hormones play an important role in lipid metabolism. Lipid abnormalities are becoming important in primary hypothyroidism. Subclinical hypothyroidism represents the earliest form of thyroid dysfunction. This study attempts to find the association of dyslipidemia in subclinical hypothyroidism patients and hence the cardiovascular risk in long run. It is a case control study done on 50 subjects of subclinical hypothyroidism and 50 healthy controls. Blood samples collected from the subjects in fasting state, centrifuged and serum separated. TSH, FreeT4, Serum Total cholesterol, Serum Triglyceride, HDL-Cholesterol levels estimated in all subjects. LDL -Cholesterol was calculated by the Friedewald's Formula. Total cholesterol is higher in subclinical hypothyroidism compared to controls which was statistically significant ($p<0.05$). Calculated LDL -Cholesterol is higher in subclinical hypothyroidism compared to controls which was statistically significant ($p<0.05$). Triglyceride levels are higher in Subclinical hypothyroidism than control groups but does not reach statistically significant value. HDL -Cholesterol showed no statistical significance in the groups. This study showed an association between subclinical hypothyroidism and dyslipidemia thereby contributing to cardiovascular morbidity and mortality.

KEYWORDS : Subclinical Hypothyroidism, Total Cholesterol, Low Density Lipoprotein -cholesterol.

INTRODUCTION

Thyroid hormones play an important role in lipid metabolism by regulating cholesterol and lipoprotein metabolism.[1] Subclinical Hypothyroidism is a mild thyroid dysfunction and it's prevalence in the general population is 3-8 %. Genderwise it's prevalence is more in women than in men and the prevalence increases with age. It has been noted that subclinical hypothyroidism affects 7.5-8.5 % of women and 2.8-4.4 % of men. The most important concern of subclinical hypothyroidism is the high likelihood of progression to clinical hypothyroidism. Clinical hypothyroidism is characterized by dyslipidemia but the knowledge regarding the lipid levels in subclinical hypothyroidism and its clinical significance as a cardiovascular risk factor is still under debate. The present study is carried out to find the association of dyslipidemia in Subclinical Hypothyroidism patients.[2][3]

The aim of the study is to find the association of dyslipidemia in subclinical hypothyroidism patients compared to healthy controls and hence to find out its clinical significance as a cardiovascular risk factor contributing to atherosclerosis.

MATERIALS AND METHODS

This is a case control study conducted on 100 subjects in coimbatore medical college hospital. Among 100 subjects, 50 subjects were subclinical hypothyroid patients who attended medicine OPD and 50 subjects were healthy controls.

Sample Collection

Blood samples collected from the subjects in fasting state in a plain tube. Serum is separated by centrifugation at 3000 rpm for 10 minute. Thyroid Stimulating Hormone, FreeT4, Serum Total cholesterol, Serum Triglyceride, High Density Lipoprotein-Cholesterol levels estimated in all subjects. Low Density Lipoprotein -Cholesterol was calculated by the Friedewald's Formula. Thyroid stimulating hormone is estimated in CLIA. Free T4 by the ELISA method. Serum Total Cholesterol was estimated by cholesterol oxidase phenol 4-aminoantipyrine peroxidase (CHOP-PAP) method. Serum. Triglycerides was estimated by glycerol phosphate oxidase phenol-4-aminoantipyrine peroxidase (GPO-PAP) method. HDL-C by PEG/CHOD-PAP method. Serum Total cholesterol, Serum Triglyceride, High Density Lipoprotein-Cholesterol levels estimated in fully automated analyzers.

Inclusion Criteria

- Age group between 20-50years.
- Subclinical hypothyroidism patients with elevated TSH and normal free T4.

Exclusion Criteria

- Age group <20years and >50years.
- Pregnant women.
- Diabetes mellitus.
- Kidney disorder.
- Alcoholic individuals.

Case Definition

Subclinical hypothyroidism represents the earliest form of thyroid dysfunction. Here patients presents with raised TSH (above the reference range) and normal free T4 (within the reference range).

RESULTS:

Table 1 – Mean and SD of parameters in two groups

PARAMETERS	Subclinical Hypothyroid Cases			Controls			Mean difference	Student Independent t-test P value
	N	Mean score	SD	N	Mean score	SD		
AGE	50	39.14	5.95	50	39.38	5.41	-0.24	t=0.21 p=0.83(NS)
TSH	50	10.59	8.08	50	3.34	0.78	7.256	t=8.62 p=0.001***(S)
Free T4	50	0.9992	0.1233	50	0.9826	0.1330	-0.0166	t=0.65 p=0.52(NS)
Total Cholesterol	50	204.55	13.18	50	140.85	11.23	63.70	t=23.26 p=0.001*** (Significant)
LDL-Cholesterol	50	129.63	10. 56	50	95.32	12.30	34.30	t=13.37 p=0.001*** (Significant)
Triglycerides	50	128.60	7.22	50	125.50	7.45	3.10	t=1.88 p=0.06(NS)
HDL-Cholesterol	50	41.78	3.99	50	41.05	4.28	0.73	t=0.78 p=0.43(NS)

S- significant, NS – Non-significant.

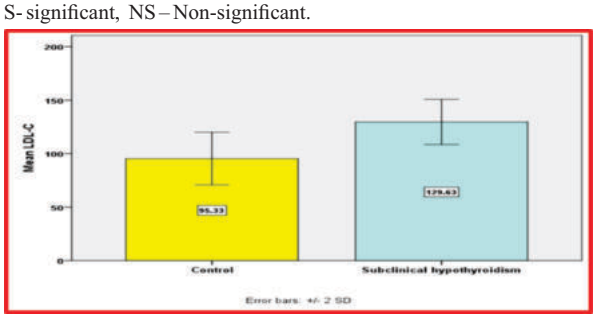

Figure No 1 Bar diagram of LDL-C cholesterol comparison between two groups

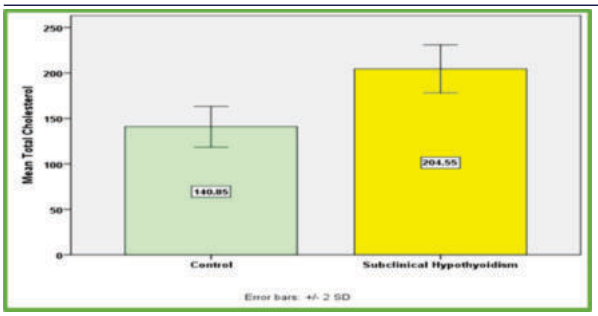

Figure No 2 Bar diagram of Total cholesterol between the two groups

DISCUSSIONS:

Hypothyroidism is a common progressive endocrine disorder. The most common form of hypothyroidism is Primary hypothyroidism which can be subdivided as subclinical hypothyroidism and clinical hypothyroidism.[4] Subclinical hypothyroidism – TSH levels are above the reference range and free Thyroid levels are within the reference range.[5] The Peak incidence of hypothyroidism is more between 30-60 years. This study population in all three groups are also in the middle age. Primary hypothyroidism is more common in females than males.

Dyslipidemia is defined as dysregulation in the plasma level of various lipid component including abnormally elevated plasma triglycerides, total cholesterol and LDL-cholesterol and decreased HDL-cholesterol. Dyslipidemia is a lipoprotein metabolism disorder that shows increasing cholesterol level, triglyceride level. Dyslipidemia is potential risk factors for developing cardiovascular disease.

Persistent dyslipidemia leads to lipid deposition in the various blood vessels leading the various consequences of atherosclerosis. Depending on the site of the vessel involved it leads to various manifestations such as ischemic heart disease, stroke, gangrene, hypertension and chronic kidney disease, vascular aneurysm and other embolic manifestations.

Dyslipidemia directly or indirectly promotes many other conditions such as impaired glucose tolerance, chronic kidney disease, diabetes mellitus, PCOS, menstrual irregularities, mental illness like schizophrenia, bipolar disorder, stress and physical inactivity, benign prostatic hyperplasia, and obesity.[6]

There is no statistical significant differences between the two groups in the age and free thyroid hormone levels, serum HDL-C, Serum triglycerides. But the statistical significant differences between the two groups are found in the Thyroid stimulating hormones (TSH), Total cholesterol and LDL-C (calculated). S.Total cholesterol in control and Subclinical hypothyroid were 140.85± 15.23 mg/dl,204. 55±13.18mg/dl respectively (P <0.05) . Calculated LDL-c in control and subclinical hypothyroid were 95.32 ±12.30mg/dl, 129.63±10.56 respectively(P<0.05).

Milionis HJ et al study have shown that SCH dyslipidemia may also be accompanied by increased TGs.[7] Efstathiadou Z et al showed patients with SCH had significantly higher levels of TC, LDL-C and Apo-B lipoprotein, whereas levels of TGs, HDL-C and Apo A-I did not differ significantly compared with euthyroid controls.[8] In this study, in SCH group there is mild increase in triglyceride levels also compared to healthy controls. Moreover, SCH may progress to overt hypothyroidism. The rate of progression is higher with the concomitant presence of thyro-peroxidase antibodies (TPO-Ab) or higher levels of TSH.[9]

In a population based sample of 2799 elderly black and white subjects, Kanaya et al.[10] reported that total cholesterol was significantly increased in subclinical hypothyroidism. In the largest cross-sectional study to date, Canaris et al.[11] examined thyroid function tests from 25,862 participants in a statewide health fair in Colorado. They documented elevated serum TSH levels in 9.5% of this population. The majority of this group (9.0% of the total) had normal serum T4 levels, consistent with subclinical hypothyroidism. There was a significant, gradual increase in fasting total cholesterol, triglyceride, and LDL cholesterol levels as thyroid function declined, with higher mean lipid levels in subclinical hypothyroid subjects than in euthyroid subjects.

Subclinical hypothyroidism has also been suggested to increased cardiovascular events. Two groups have recently reported an association between subclinical hypothyroidism and increased carotid artery intima-media thickness, which may be a marker for early atherosclerosis.[12]

CONCLUSIONS:

This study showed an association between subclinical hypothyroidism and dyslipidemia thereby contributing to cardiovascular morbidity and mortality. As thyroid dysfunction is a progressive disorder, it is advisable not to ignore subclinical hypothyroidism with elevated Thyroid Stimulating Hormone values alone untreated, as it is apparent that an enhanced cardiovascular risk could apply to these individuals and early, adequate and appropriate treatment and regular follow up will reduce the long-term complications of endothelial dysfunction, atherosclerosis and hence cardiovascular mortality. This would also suggest that dyslipidemia patients must be screened for thyroid profile as simple thyroxine replacement will have a favourable outcome of cardiovascular morbidity and mortality.

Conflict Of Interest: NIL

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