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PREVALENCE OF DYSLIPIDEMIA AND ASSESSMENT OF BLOOD PRESSURE IN PATIENTS WITH SUBCLINICAL HYPOTHYROIDISM IN A TERTIARY CARE HOSPITAL - A CASE CONTROL STUDY

Cardiology

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ABSTRACT

Introduction: The THYROID gland has been incriminated to cause a spectrum of diseases that involve almost every system of the human body. Subclinical thyroid disorders can be rightly said to be the forerunners of these clinical scenarios. One pole constitutes subclinical hypothyroidism, the other end being subclinical hyperthyroidism. 'Subclinical hypothyroidism' is defined as a condition with elevated serum TSH and normal serum T3 and T4 in the absence of overt clinical signs and symptoms. It is quite common in the community. **Aims:** Estimation of the prevalence of dyslipidemia among cases of subclinical hypothyroidism and Estimation of the prevalence of hypertension among cases of subclinical hypothyroidism. **Materials And Methods:** The present study was Observational study. This Study was conducted from January 2012 to June 2014(18 months) at N.R.S Medical College and Hospital, Kolkata. 100 patients were included in this study. **Result:** In this study, SH has been found to be more prevalent among elderly female.81% of total SH cases were female and 61% of the cases were aged above 50 years. Most (70%) of the SH cases had TSH value > 10 micro IU/ml. These findings correlate with the results of the Wickham survey, although the prevalence of cases with higher TSH value was more than that of the Colorado Thyroid Disease Prevalence Study. **Conclusion:** Hypertension was more prevalent among SH cases than control population. Systolic and diastolic both blood pressure means were higher among SH cases although diastolic blood pressure was more affected. Mean arterial blood pressure was also higher among SH cases than euthyroid control.

KEYWORDS

Hypertension, cardiovascular risk, Subclinical hypothyroidism and THYROID.

INTRODUCTION

The THYROID gland has been incriminated to cause a spectrum of diseases that involve almost every system of the human body. Subclinical thyroid disorders can be rightly said to be the forerunners of these clinical scenarios. One pole constitutes subclinical hypothyroidism, the other end being subclinical hyperthyroidism.

'Subclinical hypothyroidism' is defined as a condition with elevated serum TSH and normal serum T3 and T4 in the absence of overt clinical signs and symptoms. It is quite common in the community. In iodine sufficient areas it occurs in 4% to 9.5% among general population, although more frequent in women and with increasing age [1]. In iodine deficient areas, prevalence is much higher [2]. The proportion of patients presenting to the outpatient departments with subclinical hypothyroidism is the tip of the iceberg as the condition is often asymptomatic and thereby mostly overlooked.

In adults, subclinical hypothyroidism increases the risk of dyslipidemia, insulin resistance and subclinical inflammation and thereby augmenting the risk of coronary artery disease. Higher the TSH value, higher the association.

Subclinical hypothyroidism has been found to be associated with [3]-

- Increased systemic vascular resistance
- Increased prevalence of diastolic hypertension
- Endothelial dysfunction

The following risk factors in subclinical hypothyroidism are incriminated to accelerate atherogenecity -

- Hypertension
- Atherogenic lipid profile
- Endothelial dysfunction
- Arterial stiffness

Decreased nitric oxide (NO) production is held responsible for endothelial dysfunction.It has been also found that subclinical hypothyroid patients treated with levothyroxin have significant decrease in cardiovascular mortality and morbidity [4].

Overt hypothyroidism is associated with hypertension, but it is uncertain whether the same is true of subclinical hypothyroidism. According to a study in 2010, the prevalence of hypertension in subclinical hypothyroid patients was significantly higher than the euthyroid group in females, but there was no statistical significance in males. Few studies even decline any association between subclinical hypothyroidism and hypertension [5] .Studies are sparse regarding the prevalence of hypertension in subclinical hypothyroid patients especially in Eastern India.

This study was therefore designed to assess the changes in lipid profile and blood pressure in subclinical hypothyroid patients of our community and to analyze as well as compare them to the data revealed from previous studies amongst western population.

AIMS AND OBJECTIVES

Studies exploring the effects of subclinical hypothyroidism on lipid profile and blood pressure have mostly been quoted from Western literature .The current clinical scenario in our community is not well understood-hence this attempt to characterize the metabolic derangements specifically on lipid profile and blood pressure in subclinical hypothyroid state.

Specific Objectives

1. Estimation of the prevalence of dyslipidemia among cases of subclinical hypothyroidism.
2. Estimation of the prevalence of hypertension among cases of subclinical hypothyroidism.

MATERIALS AND METHODS

Study Area: Both rural and urban catchment area of N.R.S Medical

College and Hospital, Kolkata.

Study Population
Patients of subclinical hypothyroidism selected randomly from Endocrinology and Medicine Out Patient Departments, on the basis of their thyroid profile report. All of them are aged more than 12 years.

A group of age and sex matched normal controls are taken from the same catchment area.

Study Period
From January 2012 to June 2014(18 months)

Sample Size: 100 patients and 100 controls.

Sample Design
Simple random selection

Study Design: Observational study.

Inclusion Criteria
Patients (aged >12years) of subclinical hypothyroidism with biochemical work up revealing normal level of T3 (Triiodothyronin) and T4 (Thyroxin), but raised TSH (thyroid stimulating hormone) above 4 mU/L but less than 15 mU/L.

A group of age and sex matched normal controls are taken from the same catchment area.

Exclusion Criteria
- Recent(within last 6months) Myocardial Infarction
- Recent(within last 6months) Cerebrovascular event
- Recent(within last 6months) angiography with stent placement
- Serious infection in the month before recruitment
- Any use of contrast media in last 6 months
- Loss of more than 5% body weight during last 6 months
- Cardiac arrhythmias
- Active malignant diseases
- Previous thyroid diseases
- Pregnancy within last 12 months
- Nephrotic syndrome
- Chronic renal failure
- Chronic liver disease
- Chronic psychiatric illness
- Any disease/ medication likely to alter the protein binding of thyroid hormones.
- Central hypothyroidism (history of pituitary tumor, cranial irradiation, surgery involving hypothalamic pituitary region)
- Diabetes mellitus
- Familial hypercholesterolemia
- Drugs affecting thyroid profile-eg.lithium,amiodarone etc

RESULT AND DISCUSSION
Prevention of the complication by diagnosing disease at the preclinical state is the order of the day. Just as Pre-diabetes or stage 1 Chronic Kidney Disease, SH is receiving much attention as intervention at a preliminary stage prevents many deleterious sequelae. It was found that SH was associated with the risk of dyslipidemia, insulin resistance, increased systemic vascular resistance, increased prevalence of diastolic hypertension, endothelial dysfunction and subclinical inflammation and thereby augmenting the risk of coronary artery disease. Higher the TSH value, higher the association. The risk factors incriminated to accelerate atherogenecity in subclinical hypothyroidism were hypertension, atherogenic lipid profile, endothelial dysfunction, arterial stiffness. Decreased nitric oxide (NO) production was held responsible for endothelial dysfunction. Overt hypothyroidism is associated with hypertension, but it is uncertain whether the same is true of subclinical hypothyroidism. My study concentrated on dyslipidemia and blood pressure alteration.

In this study, SH has been found to be more prevalent among elderly female.81% of total SH cases were female and 61% of the cases were aged above 50 years. Most (70%) of the SH cases had TSH value > 10 micro IU/ml. These findings correlate with the results of the Wickham survey, although the prevalence of cases with higher TSH value was more than that of the Colorado Thyroid Disease Prevalence Study. The prevalence of subclinical hypothyroidism has been reported to be between 4% to 10% of adult population samples in three important large studies (the Wickham survey, the National Health and Nutrition Examination Survey III, and the Colorado Thyroid Disease Prevalence Study).This condition increases significantly with age, so that by the ninth decade of life the prevalence may be 15%-20%. In the Colorado study, 75% of individuals with subclinical hypothyroidism had serum TSH levels between 5 and 10 mIU/L. Earlier study by Bandhopadhyay SK et al [6] over the eastern part of India also showed the female predominance (78%) in SH cases. The Colorado study found that mean total cholesterol and LDL cholesterol progressively increased with increasing serum TSH levels. Moreover even with the reference range for TSH, higher TSH was associated with dyslipidemia [7].

In our study, 67% of SH cases had total cholesterol value > 200 mg/dl and most of them had TSH value > 10 micro IU/ml and were elderly female aged > 50 years. 61% and 59% SH cases had serum triglyceride value > 150 mg/dl and LDL cholesterol value > 100 mg/dl respectively. In both occasions cases with higher TSH value were worst affected. These prevalence among SH cases were much higher than our euthyroid control population. Mean values of total cholesterol, LDL cholesterol and serum triglyceride were found higher among SH cases than our control population. Though mean HDL value was significantly raised among elderly (age > 50 years) SH cases, there was no statistically significant difference in HDL cholesterol values among younger SH cases than control population. These findings are at par with the studies by Monzani et al and Luboshitzky R et al [8,9]. Bakker et al and Luboshitzky R et al showed the positive association with raised LDL cholesterol and larger cardiovascular risk. Efstathiadou et al documented elevated Apo B and Lipoprotein (a) to be associated with subclinical hypothyroidism although serum Triglyceride, HDL and apo A1 were not significantly different from control. Sridevi A et al showed that subclinical hypothyroidism is associated with elevation of TC, LDL-C and non-significant increase in TG and insulin resistance whereas both lipid profile and insulin resistance did not correlate with severity of hypothyroidism. Atthans et al, Jung CH et al and Monzani et al showed positive correlation between subclinical hypothyroidism and dyslipidemia. In our study significant differences between the cases and the controls were more prominent with higher TSH values. This correlation is similar to the findings of the Colorado study. Marwaha RK et al [10] and Arsanna A et al [11] also found the higher prevalence of dyslipidemia among SH cases with higher TSH values. Marwaha RK and their work showed that atherogenic lipid abnormalities were observed in adult subjects with TSH>10.0mIU/L, and not in subjects who had TSH<10.0mIU/L in Indian population. In our study we found that 67 out of 100 cases (67%) of SH had total cholesterol value > 200mg/dl, of which only 16 cases (24%) were aged below 50 years. Most of them (65 out of 67, i.e, 97%) had TSH > 10 micro IU/ml and most of them were female (53 out of 67, i.e, 79%). 61% of SH cases had serum triglyceride value > 150mg/dl, of which 51 cases (84%) were aged > 50 years. Prevalence is more (59 out of 61) among those with TSH > 10 micro IU/ml. 59 SH cases had LDL cholesterol value >100 mg/dl, of which mostly (81.4%) were aged > 50 years (48 out of 59) and female (47 out of 59, i.e, 80%). 94.91% (56 out of 59) had TSH > 10 micro IU/ml.

Asranna A et al compared 54 subclinical hypothyroid patients with 56 healthy controls and showed that 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. It was found that the higher prevalence of dyslipidemia among females aged >40 years. In the North Indian population based study higher mean VLDL was found among SH cases, but interestingly in our study over this part of the country we did not find any statistically significant elevated VLDL cholesterol value.

In our observational study, we have found that 48% and 60% of SH cases had systolic blood pressure (SBP) > 140 mm of Hg and diastolic blood pressure (DBP) > 90 mm of Hg respectively, whereas prevalence was much lower among control population. D Liu et al had also shown the definite association between SH and higher blood pressure [12]. In our study mean SBP, mean DBP and MABP were significantly higher among SH cases than control population.

Cases with higher TSH (>10 micro IU/ ml) value and elderly SH cases were more affected. Out of SBP and DBP, DBP was found to be the worst affected. Velkoska et al found that approximately 29% of subclinical hypothyroid patients had diastolic hypertension [13]. In our study prevalence was much higher both for SBP and DBP. Luboshitzky et al have shown that women with SCH have a mean diastolic blood pressure higher than control group [14].

CONCLUSION

Subclinical hypothyroidism (SH) was found to be more prevalent among females than males (M: F=1:4). Prevalence increases with age. Dyslipidemia was more common in SH cases than euthyroid matched controls. Mean total cholesterol, mean LDL cholesterol and mean serum triglyceride values were found to be much higher in SH cases than control population. Significantly higher mean HDL cholesterol was present among those cases aged more than 50 years of age. VLDL cholesterol was not significantly altered in SH when compared with control.

Hypertension was more prevalent among SH cases than control population. Systolic and diastolic both blood pressure means were higher among SH cases although diastolic blood pressure was more affected. Mean arterial blood pressure was also higher among SH cases than euthyroid control.

Prospective, outcome studies are necessary to address the role of treating the SH cases with levo-thyroxin to evaluate the impact of treatment on long term cardiovascular morbidity and mortality among them.

Distribution of Mean lipid values among cases and controls aged < 50 years

Mean Values(mg/dl)	SH cases aged < 50 years	Controls aged < 50 years	P value
Mean Total Cholesterol	198.44	156.08	<0.0001
Mean Serum Triglyceride	146.23	89.69	<0.0001
Mean LDL Cholesterol	91.72	65.15	<0.0001
Mean HDL Cholesterol	51.23	50.26	0.3027(>0.05)
Mean VLDL Cholesterol	26.28	26.14	0.4507(>0.05)

Distribution of Mean blood pressure values among cases and controls aged < 50 years

Mean Values (mm of Hg)	SH cases aged < 50 years	Controls aged < 50 years	P value
Mean systolic blood pressure (SBP)	124.92	116.56	=0.0017(<0.05)
Mean diastolic blood pressure (DBP)	84.31	72.36	<0.0001
Mean of mean arterial blood pressure (MABP)	97.85	87.1	<0.0001

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