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Original Research Article

The Prevalence of Subclinical Hypothyroidism in Newly Detected Type 2 Diabetes Mellitus in a Tertiary Hospital

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Abstract: This cross sectional study was aimed at estimating the prevalence of subclinical hypothyroidism in newly detected type 2 diabetes mellitus patients. The study included 140 newly detected type 2 diabetics taken from outpatient department of medicine and diabetology, kilpauk medical college and hospital (Chennai). In the study, 25% of newly detected diabetics had thyroid dysfunction. In patients with abnormal thyroid function, 23.6% had subclinical hypothyroidism. It was found there is significant correlation between thyroid dysfunction and female gender, body mass index, family history of diabetes and dyslipidemia. Materials used include questionnaire, BMI calculation, blood pressure, FBS, PPBS, blood urea, serum creatinine, urinalysis, ECG, fasting lipid profile, thyroid profile.
Keywords: Diabetes mellitus, hypothyroidism, subclinical hypothyroidism, coronary artery disease, dyslipidemia.

INTRODUCTION

The underlying pathology of thyroid dysfunction intersects with that of diabetes [1]. Thyroid problems are seen frequently in diabetics compared to general population [2]. Patients who have one autoimmune disease are more susceptible to contract another autoimmune disease. Postpartum thyroiditis is more commonly seen in diabetic women than non diabetics. Thyroid dysfunction also leads to insulin resistance. In hyperthyroidism, glucose control becomes very difficult and even insulin requirements become higher. Abdel Rahman *et al.* [5] found that overall prevalence of thyroid diseases was 12.5% in type 2 diabetes mellitus group.

Proces S, *et al.* [7] found that in diabetic patients TSH was lower than in non diabetic subjects. They concluded that besides age and drugs, thyroid function tests can also be altered in diabetes mellitus and obesity.

Handisurya G, *et al.* [8] "effects of t4 replacement therapy on glucose metabolism in subjects with subclinical (sh) and overt hypothyroidism (oh)," concluded that in both of them, the basal levels of insulin is decreased whereas glucose stimulated insulin secretion is increased [3].

Dimitriadis P, *et al.*, [4] "insulin action in adipose tissue and muscle in hypothyroidism," concluded that in hypothyroidism: 1) glucose intake in both muscle and adipose tissue becomes resistant to insulin; 2) inhibition of lipolysis by insulin is maintained; and 3) increased triglyceride levels is due to decreased clearance by the adipose tissue. Purpose of this study is to estimate the prevalence of subclinical hypothyroidism in newly detected type 2 diabetes mellitus patients in a tertiary hospital at Chennai, India, with the following patients excluded:

- Patients not willing for study
- Known diabetics
- Patients with known thyroid disease
- Patients with chronic renal failure and diabetic nephropathy.
- Patients with acute illness(sepsis, acute mi, severe heart failure, recent admission in intensive care unit)
- Patients with hepatic dysfunction.
- Pregnancy
- Patients on treatment with drugs interfering with thyroid function (amiodarone, propranolol, corticosteroids and oral contraceptives)

All patients in the study group were selected without any bias for sex, duration. A thorough history was recorded with particular emphasis on symptoms of diabetes, hypothyroidism and hyperthyroidism. The presence of associated illness like coronary artery disease, hypertension and cerebrovascular accident were noted. Family history regarding diabetes mellitus was also included.

METHODS

All patients who are newly diagnosed as diabetic will be taken for study. After getting consent, under aseptic precautions, 10 ml of venous blood will be collected from each patient and sent to the department of biochemistry, KMCH.

- 4ml – thyroid function kit
- 2ml - fbs,renal function test
- 2ml - liver function test
- 2ml – lipid profile

BMI calculation

Body mass index (BMI) is calculated with height and weight of the subject using the following formula.

BMI= weight (kg) / height (m)2

Blood sugar

Both fasting and postprandial blood sugar are estimated by Glucose oxidase method and read at 505/670 nm.

Renal function test

The Blood Urea in this study was estimated using DAM method (Diacetyl Monoxime). Serum creatinine was estimated using Modified Jaffe's method.

Urinalysis

Urine sample is collected for urine routine analysis which includes sugar, protein, cytology and urinary sediments.

Lipid Profile

- Total cholesterol, Triglyceride (TGL), levels will be analysed in the early morning fasting Blood Sample. Methods used: Total cholesterol- CHOD POD METHOD
- Triglycerides - Enzymatic calorimetric method

Thyroid Profile

Estimation done in fasting serum sample.

Methods used

- TSH - ELISA
- FT3 & FT4 – ELISA

The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significance in categorical data Chi-Square test was used. In the above statistical tool the probability value .05 is considered as significant level.

BINARY LOGISTIC REGRESSION

- Binary logistic regression model was used to identify the risk factors
- Associated with abnormal thyroid profile in diabetic population.
- The dependent variable is abnormal thyroid profile.
- The independent variables tested are Sex, Duration of diabetes mellitus and Family history of diabetes mellitus.
- The analysis report showed significant correlation between altered thyroid profile and the female gender.

RESULTS AND DISCUSSION

In the study, 35 patients (25%) of newly detected diabetics had thyroid dysfunction. In patients with abnormal thyroid function, 33(23.6%) had subclinical hypothyroidism, 1 (0.7%) had overt hypothyroidism and remaining 1(0.7%) had subclinical hyperthyroidism. In the study, it was found there is significant correlation between thyroid dysfunction and female gender, BMI, family history of diabetes and dyslipidemia. In persons with abnormal thyroid profile, 80% were female and 20% were male. This is statistically highly significant. Many studies have shown that the prevalence of hypothyroidism is more in female.

No significant correlation was found between thyroid dysfunction and age, systemic hypertension, coronary artery disease. In the present study, patient's age group ranged from 26 years to 56 years. Majority of the patients were in the age group between 40 -50 years.

In the study population, 60% had positive family history of diabetes and 40 % did not have the family history. Majority of the patients around 52% were overweight and 5.6% were obese. Nearly 60% of the diabetics were found to have dyslipidemia in one form or the other and 40% had normal lipid profile. The correlation between dyslipidemia and thyroid dysfunction in diabetics is significant.

The prevalence of subclinical hypothyroidism in newly detected diabetics is found to be 23.6%.

In the present study, 25% (35) of the total 140 patients with newly detected diabetes mellitus had abnormal thyroid profile. The present study is slightly different from other previous studies. Abdel-Rahman *et al*. who in his study of 908 type 2 diabetic patients found that the prevalence of thyroid disease was 12.5%, 6.6% of whom were newly diagnosed and 5.9% had known thyroid dysfunction. Chubb *et al*. in a cross-sectional study of 420 patients with type 2 diabetes mellitus found that 8.6% of patients had subclinical hypothyroidism, whereas it is 25% in our present study which indicates that the prevalence of thyroid dysfunction has been increasing in the diabetics.

DISTRIBUTION OF THYROID ABNORMALITIES

In the present study, 23.6% (33) of the patients had report suggestive of sub clinical hypothyroidism, 0.7% (1) of the patients had report suggestive of overt hypothyroidism and 0.7% (1) had sub clinical hyperthyroidism.

Celani MF *et al*. [9] in their study of 290 type 2 diabetes mellitus patients found that 91 patients (31.4%) had abnormal TSH concentrations out of which 48.3% had subclinical hypothyroidism, 24.2% had subclinical hyperthyroidism, 23.1% had overt hypothyroidism and 4.4% had overt hyperthyroidism [5].

In another study, diabetic patients, when compared with the control group of normal patients in Whickham Study35 and a 20 years follow-up of whickham survey by Vanderpump MP *et al*. [10] 36 shows that the prevalence of altered thyroid profile in the study group is significant (p=0.0064) [6].

The presence of thyroid profile dysfunction in diabetic patients may be due to the fact that:

- In euthyroid individuals with diabetes mellitus, the serum T3 levels, basal
- TSH levels and TSH response to thyrotropin releasing hormone (TRH)
- May all be strongly influenced by the glycemic status?
- Poorly controlled diabetes may also result in impaired TSH response to
- TRH or loss of normal nocturnal TSH peak

CONCLUSION

- The prevalence of subclinical hypothyroidism in newly detected diabetics is found to be 23.6%.
- Prevalence of thyroid dysfunction is more common among newly detected type 2 diabetes mellitus patients.
- Prevalence of thyroid ysfunction in patients with type 2 diabetes mellitus is higher in females than in males.
- There is no significant correlation between Age, SHT, CAD. Routine screening for thyroid dysfunction in type 2 diabetes mellitus patients may be justified especially in females because the progression to overt thyroid dysfunction is associated with significant morbidity including the adverse effects on glycemic control, lipid parameters

LIMITATIONS

- Study population was small
- Thyroid autoimmunity was not evaluated due to constraints. So it was not able to refine the spectrum of thyroid dysfunction in type 2 diabetics.
- The natural history of subclinical thyroid dysfunction could not be assessed since follow up of patients was not done and it's effect on various parameters could not be assessed.

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