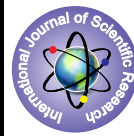


The Study of Prevalence of Subclinical Hypothyroidism (SCH) in Patients with Well Controlled Type 2 Diabetes Mellitus



Medical Science

KEYWORDS : diabetes mellitus; subclinical hypothyroidism (SCH); prevalence

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ABSTRACT

Thyroid disease is a pathological state that can adversely affect metabolic parameters of diabetes mellitus like LDL cholesterol triglycerides and blood glucose levels. The relation between Type 2 DM and thyroid dysfunctions is not clearly identified. In diabetics due attention is not given in trying to detect presence of thyroid dysfunctions. It is important because the present consensus of opinion is to treat subclinical hypothyroidism (SCH). Hence there is need for screening for SCH in diabetic patients.

Objective: To identify the prevalence of SCH in Type 2 Diabetes Mellitus (T2DM) patients with good glycemic control.

Study design: Cross sectional study design. Study setting: S.S. Institute of medical science and research centre Davangere. Study participants: The thyroid profile was done on 60 eligible patients who fulfilled the inclusion criteria and exclusion criteria. Statistical Analysis: The results were analyzed using chi-square test and tests of proportion. Results: Out of sixty patients, 17(28.35%) were detected to have thyroid dysfunction. 43 (71.6%) were euthyroid, 11 (18.33%) were SCH, 5(8.33%) had primary hypothyroidism and 1 patient was subclinical hyperthyroid. Thus the prevalence of SCH was 18.33% in this study. Females had higher prevalence of SCH than males (29.6% vs 9.09%) P value was found to be statistically significant. Prevalence of SCH was more in the > 50 years age group as compared to ≤50 years (22.2% Vs 6.69%) P value was not significant. Prevalence of SCH increased with increasing duration of DM. Prevalence of SCH was higher in patients with BMI >25, hypertensive diabetics and those with associated IHD (Ischaemic Heart Disease) as compared to those with BMI ≤ 25, normotensive diabetics and those without IHD respectively.

Conclusion: The study shows 18.33% prevalence of SCH in T2DM patients with good glycemic control. This finding indicates that SCH was common in T2DM patients and a need for screening for the same in them

Introduction:

The worldwide prevalence of diabetes mellitus has risen dramatically over the past two decades from an estimated 30 million cases in 1985 to 177 million in 2000. Based on current trends >360 million individuals will have diabetes by the year 2030¹.

The WHO estimated that there were 31.7 million persons with diabetes in India in 2000 and that this number is likely to be 71.4 million in 2030. India has the distinction of having the largest number of diabetics in the world. Diseases of the thyroid gland are also amongst the most abundant endocrine disorders in the world, second only to diabetes².

All over the world researchers have found that there is a higher incidence of thyroid dysfunctions among diabetic patients. Although the prevalence is much more in cases of type 1 DM, a significant prevalence is also found in the type 2 DM population, which is far higher than that found in the general population. However the figures that have been published by various researchers tend to vary. It has been reported that up to 13.4% of patients have thyroid dysfunctions, with the highest prevalence in patients with type 1 DM (31.4%) and lowest in patients with type 2 DM (6.8%). Studies in India have shown that 28-30 % of patients with T2DM have thyroid dysfunctions, mainly in the form of clinical or subclinical hypothyroidism^{3,4}.

Subclinical hypothyroidism (SCH) is defined as an asymptomatic condition with high TSH levels and normal free thyroid hormone levels⁵.

Researchers have also found that one of the reasons for patients to be having inadequate control of diabetes might be an underlying thyroid dysfunction, which if controlled might automatically facilitate the control of diabetes⁶.

SCH has also been suggested as a risk factor for atherosclerotic cardiovascular disease, and metabolic disorder such as hyperlipidemia, hypertension, low grade inflammation and hypercoagulability may accompany this process⁷⁻⁹. Only clinical assessment might not be able to detect all the cases of thyroid dysfunctions as a large percentage of them are subclinical, which can only be diagnosed by biochemical assessment.

Identification of associated hypothyroidism and early intervention may significantly reduce risk of adverse cardiovascular and cerebrovascular events in diabetic patients.

This study is undertaken to find the prevalence of associated thyroid dysfunction especially subclinical hypothyroidism (SCH) in patients with T2DM.

Materials and methods:

OBJECTIVE: To study the prevalence of SCH in T2DM patients with good glycemic control.

Source of Data:

All cases of T2DM were admitted to the medical wards of S.S. Institute of medical science and research centre Davangere, during one year of working period from 1st January 2010 to 31st December 2010.

Study design: Cross sectional study.

Study participants: The thyroid profile was done on 60 eligible patients who fulfilled the inclusion criteria and exclusion criteria.

Inclusion Criteria:

- Patients who had Type 2 DM who were on treatment either oral hypoglycemic agents or insulin and had good glycemic control as defined by American Diabetic Association (ADA)

guidelines of FBS (90-130mg %) and PPBS (<180mg %) on presentation to hospital for follow up.

Exclusion Criteria:

- Patients of Type 2 DM with poor control of blood sugars.
- Patients receiving any medication like amiodarone, antithyroid drugs, iodine and other drugs that may alter thyroid functions were excluded.
- Pregnant women
- Patients with severe liver disease
- Patients with nephrotic syndrome.
- Sepsis, trauma.
- Patients with overt hypothyroidism or on treatment for hypo/hyperthyroidism.

Sample size:

Complete enumeration was done. A total of 60 cases of T2DM who fulfilled inclusion and exclusion criteria during the study period from 1st January 2010 to 31st December 2010 were enrolled.

Methodology:

The patients of T2DM were included in to study after taking informed written consent. The patients were interviewed and complete clinical examination was done considering inclusion and exclusion criteria.

The eligible patients who fulfilled the inclusion and exclusion criteria were selected for study. Selected patients were investigated with random blood sugar (RBS), fasting blood sugar (FBS), and post prandial blood sugar (PPBS) for assessing good glycemic control. Thyroid profile with free T4 (FT4) and thyroid stimulating hormone (TSH) was done by enhanced pulse chemiluminescence technology.

Normal range of TSH was 0.34-4.25μIU/L. Normal range of FT4 was 0.8-1.7ng/dl. FBS of 90-130mg%, PPBS <180mg% were taken for deciding glycemic control. Patient was considered hypertensive if either he/she was already on treatment or detected to be hypertensive (BP> 140/90mmof hg). BMI was calculated using standard formula. BMI= Weight in kgs/ (Height in meter)² Other relevant investigations were done to rule out exclusion criteria wherever needed.

The results were analyzed with appropriate statistical methods.

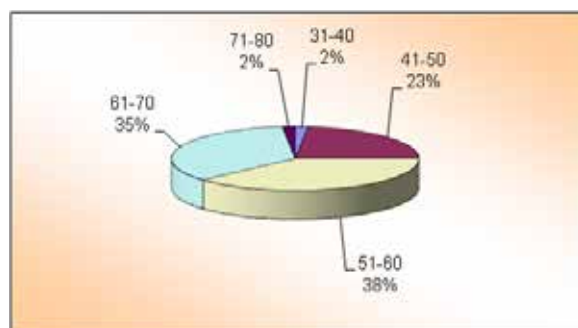
Statistical analysis:

Statistical analyses was done using SPSS 12 software. Descriptive statistics were used to summarise the quantitative variables such as age, duration of diabetics etc. Qualitative variables were expressed in terms of proportion. Chi-square test was used to test for difference in the proportions.

Results:

Total of 60 cases were evaluated during the study, at hospital of S.S.I.M.S and RC Davanagere. In this study 38.33% of patients were between 51-60 yrs, 35% were between 61-70 yrs age. 55% patients were males and rest were females. The minimum age in the study group was 37 yrs and the maximum age was 75 yrs. The average age of the group was 56.81 with a SD of 8.98.

Fig 1: Age wise distribution of study population (in yrs)



Out of 60 patients totally 17 patients (28.35%) were detected to be having any thyroid dysfunction, 43 patients (71.6%) were euthyroid, 11 patients (18.3%) were SCH, 5 patients (8.3%) had primary hypothyroidism and 1 patient (1.6%) was subclinical hyperthyroid.

In 15 patients with age group ≤ 50 yrs, 13 patients (86.6%) were euthyroid, 1 was SCH (6.67%) and 1 was primary hypothyroid (6.67%).

In 45 patients with age group > 50 yrs, 30 patients (66.6%) were euthyroid, 10 were SCH (22.2%) and 4 (8.8%) were primary hypothyroid. (p value 0.178) .

Table 1: Showing different thyroid dysfunctions in two age groups

Age group (yrs)	Euthyroid n(%)	SCH n(%)	Primary Hypothyroid n(%)	Others n(%)	Total n(%)
≤ 50	13(21.6%)	1(1.6%)	1(1.6%)	0(0%)	15(25%)
> 50	30(50%)	10(16.6%)	4(6.6%)	1(1.6%)	45(75%)
Total	43(71.6%)	11(18.3%)	5(8.3%)	1(1.6%)	60(100%)

P=0.178 Not significant

Of 27 female patients, 10 patients (37.0%) had thyroid dysfunctions of various types of which 17 (62.9%) were euthyroid, 8 patients (29.6%) were SCH, and 2 patients (7.4%) were having primary hypothyroidism.

Of 33 males patients, 7 patients (21.2%) had thyroid dysfunctions of various types of which 26 (78.7%) were euthyroid, 3 patients (9.0%) were SCH, and 1 patient (3.0%) was detected to have subclinical hyperthyroidism.

Table 2: Thyroid dysfunctions in different genders.

Thyroid dysfunction (%)	Euthyroid n(%)	SCH n(%)	Primary hypothyroid n(%)	Others n(%)
Female n=27	17 (62.9%)	8(29.6%)	2(7.4%)	0(0.0%)
Male n=33	26 (78.7%)	3 (9.0%)	3 (9.0%)	1 (3.0%)

P value for SCH 0.041.

Overall of 60 patient studied 30 patients (50%) were hypertensive. Among 43 euthyroid patients 16 (37.2%) were hypertensive. Among 11 patients with SCH 9 (81.8%) were hypertensive and among 5 patients with primary hypothyroidism 4 patients (80%) were hypertensive.

Among 60 pts studied 23 patients had (38.3%) associated IHD. In 43 euthyroid patients 11 patients (25.58%) had associated IHD. In 11 patients with SCH 8 patients (72.7%) had associated IHD. Of 5 patients with primary hypothyroidism 4 patients (80%) had associated IHD.

In 43 euthyroid patients with DM the mean BMI was 25.42 kg/m² with SD of 1.59. In 11 SCH patients with DM the mean BMI was 26.68 kg / m² with SD of 1.82.

In 5 primary hypothyroid patients with DM the mean BMI was 27.28 kg/m² with SD of 0.97. Overall in 60 patients studied the mean BMI was 25.76 kg/m² with SD of 1.73. The mean BMI in patients with age group ≤50 yrs was 26.11±1.54 and in age group >50 yrs was 25.68±1.80.

The duration of DM that these patients had been suffering ranged from 1 yr up to 23 yrs. The mean duration of diabetes was approximately 9.25 years with a SD of 6.23yrs.

Ten of patients were on insulin and remaining on oral hypoglycemic agents.

Of 60 patients studied 20 patients (33.3%) were with duration of DM 0-5 yrs, 19 patients (31.66%) with duration 6 -10 yrs, 7 patients (11.66%) with duration 11-15 yrs, 11 patients

(18.33%) with duration 16-20 yrs and 3 patients (5%) with duration > 20 yrs.

Table 3: Association of other variables with SCH

	SCH n(%)	Euthyroid n(%)	P for SCH
HTN N=30	9(30.0%)	21(70.0%)	0.020 (Significant)
IHD N=23	8 (34.7%)	15(65.2%)	0.009 (Significant)
BMI > 25 N=37	8(21.6%)	29(78.3%)	0.404(Not significant)
Duration of DM > 10 yrs N=21	13(61.9%)	8(38.0%)	0.004(Significant)

Discussion:

Limitations of the study

1. This study was a cross sectional design which might limit conclusions about the mechanism or temporal relation. Prospective study would provide information about behaviour of these patients in future with relation to thyroid function.
2. Ideally glycated hemoglobin (HbA1c) is better to decide the good glycemic control status, but in our study the follow up FBS and PPBS within control range were considered because of limited resources.
3. Our study did not have controls for comparison with general population.

The prevalence of thyroid dysfunction as represented by hypothyroidism, hyperthyroidism, subclinical hypothyroidism etc, in the general population, was examined in the adult population in the Whickham survey and was reported to be about 6.6%¹⁵. But till date there is no definite consensus among the experts as to the degree of association between the most common endocrinal diseases, viz Type 2 diabetes mellitus and thyroid dysfunctions especially SCH.

In 1970's Gray et al¹³ studied a British population selected at random from the outpatient clinic and found elevated TSH in 17% of female and 6.1% of male T1DM patients, and in 6% of T2DM patients.

In another Scottish centre, Feely and Isles¹² reported that 33% of a smaller mixed population of T1DM and T2DM had subclinical or overt hypothyroidism.

In the largest study done in their field, Perros et al¹⁰ studied 1310 patients attending a diabetic outpatient clinic and found out that overall prevalence of thyroid disease was found to be 13.4% and was highest (31.4%) in Type I diabetic females and lowest in Type 2 diabetic males (6.9%). The commonest diagnosis was SCH (4.8%), followed by hypothyroidism (0.9%), hyperthyroidism (0.5%) and subclinical hyperthyroidism (0.5%).

Mehmet Uzunlulu et al¹⁴ studied 220 patients of metabolic syndrome and 190 patients without metabolic syndrome. SCH was found in 36 (16.4%) cases in metabolic syndrome group and 11 (5.8%) cases in control group (p=0.001). Only female gender was associated with the presence of SCH.

In the present study total 60 patients of diabetes mellitus with good glycemic control were screened for SCH. The result showed that 17 patients (28.35%) were having any thyroid dysfunction, 11 patients (18.33%) were SCH, 5 patients (8.33%) had primary hypothyroidism. 1 patient (1.66%) was subclinically hyperthyroid and 43 patients (71.6%) were euthyroid.

Patients with age group >50 yrs showed more prevalence of SCH, 10 out of 45 (22.2%) as compared to those with age group ≤ 50 yrs, one patient was SCH out of 15 (6.67%) P value =0.178 (NS). The trend showed that elder patients had more abnormal thyroid profile as compared to younger patients but it was not statistically significant.

Prevalence of SCH was more common in female patients, 8 out 27 (29.6%) as compared to male patients 3 out of 33 (9.09%) P value being 0.041 significant.

Prevalence of SCH was more common in diabetic patients with BMI > 25, 8 out of 37 (21.6%) as compared to those with BMI ≤ 25, 3 out of 23 (13.04%). Though P value was not significant with P = 0.404.

Among diabetic hypertensives the prevalence of SCH was more common, 9 out of 30 (30%) as compared to non hypertensives, 2 out of 30 (6.67%) P = 0.020.

Similarly among diabetic patients with IHD prevalence of SCH was more common, 8 out of 23 (34.78%) as compared to diabetic patients without IHD, 3 out of 37 (8.1%). P value = 0.009.

Prevalence of SCH appeared to be more as duration of diabetes mellitus increased. Among patients with duration of diabetes > 10 yrs prevalence was 38.09%, 8 out of 21 and among patients with duration of diabetes ≤ 10 yrs, prevalence of SCH was 7.69 % 3 out of 39 p value = 0.004.

In this study though patients with overt hypothyroidism features were excluded, still 5 patients (8.33%) showed thyroid profile suggestive of primary hypothyroidism.

This was probably because these patients had mild hypothyroidism.

Though the diabetic patients with age > 50 yrs had higher prevalence of SCH than those with age ≤ 50yrs (22.2% Vs 6.67%), it was not statistically significant P value 0.178. This is probably because most of the patients in this study were elderly and sample size was very small.

Also though prevalence of SCH was more among patients with BMI > 25 as compared to those with BMI ≤25 (21.6% Vs 13.04%) it was not statistically significant P value 0.404 probably because of small sample size.

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