

## PREVALENCE OF THYROID DYSFUNCTION IN PATIENTS WITH TYPE 2 DIABETES MELLITUS IN TERTIARY CARE CENTRE

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**ABSTRACT: BACKGROUND:** Diabetes mellitus (DM) and thyroid dysfunction are the two most common endocrine disorders in clinical practice. The unrecognized thyroid dysfunction may adversely affect the metabolic control and add more risk to an already predisposing scenario for cardiovascular diseases. The objective of this study was to investigate the prevalence of thyroid dysfunction in patients with type 2 diabetes mellitus. **OBJECTIVES:** To study the prevalence of thyroid dysfunction in type 2 diabetes mellitus in tertiary care hospital. **METHODS:** This study was conducted in Department of General medicine, ESIC-MC & PGIMS, Rajajinagar, Bangalore. 100 type 2 diabetes patients and 100 non diabetes controls were included in the study. Fasting blood glucose, Glycosylated hemoglobin (HbA1c), triiodothyronine (T3), thyroxine (T4), thyroid stimulating hormone (TSH) levels are measured both in case and control groups. **RESULTS:** Out of 100 patients studied 8 (4%) patients had clinical hypothyroidism, 15 (7.5%) had subclinical hypothyroidism, 3 (1.5%) had clinical hyperthyroidism. Out of 100 controls studied 4 (2%) had clinical hypothyroidism, 7 (3.5%) had subclinical hypothyroidism, 1 (0.5%) had clinical hyperthyroidism. In both the study groups no subjects had subclinical hyperthyroidism. Subclinical hypothyroidism is the frequently found thyroid dysfunction. **CONCLUSION:** Our study shows that prevalence of thyroid dysfunction is much higher in diabetes patients as compared to non-diabetes controls. We conclude that screening for thyroid dysfunction among patients with diabetes mellitus should be routinely performed considering the prevalence of new cases diagnosed and the possible aggravation the classical risk factors such as hypertension and dyslipidemia, arising from an undiagnosed thyroid dysfunction.

**KEYWORDS:** Diabetes mellitus, Thyroid dysfunction, FBS, HbA1c, T3, T4, TSH.

**INTRODUCTION:** Diabetes mellitus is the most commonly occurring endocrine disorder with thyroid dysfunction being the second most common.<sup>1</sup> Therefore it is appropriate to evaluate the potential interrelationship between the two disease entities.

The diagnosis of subclinical hypothyroidism has been quantified by measuring the T3, T4 and TSH levels

Subclinical hypothyroidism	- TSH < 20mu/l
Overt hypothyroidism	- TSH >20 mu/l

Subclinical hyperthyroidism is defined as a low serum TSH with normal circulating T3 and T4 in clinically asymptomatic patients.

The prevalence of thyroid dysfunction is increased in both type 1 and type 2 diabetes especially subclinical or overt hypothyroidism.<sup>2</sup> The association with type 1 diabetes is to be expected because of the autoimmune nature of the both the diseases. The relationship with the type 2 diabetes is unexplained.<sup>3</sup>

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Thyroid disease is a pathological state that adversely affects diabetic control and is commonly found in most forms of DM which is associated with advanced age in type 2 diabetes and autoimmune diseases in type 1 diabetes.<sup>4,5</sup> DM appears to influence thyroid function in two sites; firstly at the level of hypothalamic control of TSH release and secondly at the conversion of T4 to T3 in the peripheral tissue.<sup>6,7,8</sup> Marked hyperglycemia causes reversible reduction of the activity and hepatic concentration of T4-5-deiodinase, low serum concentration of T3, elevated levels of reverse T3 and low, normal, or high level of T4.<sup>9</sup>

The epidemic of type 2 diabetes mellitus is increasing worldwide especially in the developing countries. The relationship between thyroid dysfunction and DM is characterized by complex interaction of interdependence. Screening of thyroid dysfunction, especially the subclinical dysfunction, in patients with DM is justified because most patients can be asymptomatic. Determine the prevalence of clinical and subclinical thyroid disease in diabetic patients in our country and its implications in the course of diabetes and known factors for cardiovascular risk is necessary. The aim of this study is to investigate the prevalence of thyroid dysfunction in patients with type 2 diabetes mellitus.

**OBJECTIVE OF THE STUDY:** To study the prevalence of thyroid dysfunction in type 2 diabetes mellitus in tertiary care hospital

**METHOD OF COLLECTION OF DATA:**

**Design:** A hospital based study was done for 2 years from September 2010 to September 2012.

**SETTING:** ESIC Medical College & Post Graduate Institute of Medical Science & Research Rajajinagar, Bengaluru. Patients will be subjected to detailed history and complete physical examination. Data will be collected in a predesigned proforma. Patients taken in the study will be tested for FBS, PPBS, T3, T4, and TSH levels. Antithyroid peroxidase (TPOAb) and Antithyroglobulin (TgAb) are also done in patients with thyroid dysfunction to exclude autoimmune thyroiditis patients.

**Inclusion Criteria:**

1. Type 2 Diabetes mellitus patients with duration of treatment greater than 5 years.
2. BMI greater than 25kg/m<sup>2</sup>

**Exclusion Criteria:**

1. All type 1 diabetes mellitus patients.
2. Patients with autoimmune thyroiditis.

**Statistical Methods:** To find the association between the study group and control group Z-test for proportion was applied.

Data obtained were analyzed using SPSS software. In all the test 'P' value less than 0.05 was taken to be statistically significant.

The study was approved by the institutional review board and all the participants gave written informed consent.

**Investigations:**

1. Blood sugars –Fasting (FBS) and Postprandial (PPBS).
2. Hemoglobin.
3. ECG.
4. Urine- Albumin, sugar.
5. Thyroid profile- T3, T4 and TSH levels.
6. Antimicrobial antibodies(only in patients with thyroid dysfunction)
  - a) Antithyroid peroxidase (TPOAb)
  - b) Antithyroglobulin(TgAb)

**Diagnostic Criteria Employed:** WHO criteria was employed for the diagnosis of diabetes mellitus.

FBS > 126mg/dl

PPBS > 200mg/dl

Fasting blood sugars were done after 12 hrs. of overnight fasting. Post prandial blood sugars were done 2 hrs. after 75 gm. of glucose load.

Thyroid profile: In the present study for the measurement of T3, T4, TSH radioimmunoassay and enzymatic immune assay were employed.

SL. No.	T3	T4	TSH	Thyroid function status
1	Normal (70-190 ng/ dl)	Normal (5-12ug/ dl)	Normal (0.4- 5uU/ ml)	Euthyroid
2	Normal	Normal	Elevated	Subclinical Hypothyroidism
3	Normal	Normal	Elevated	Overt Hypothyroidism
4	Normal	Normal	Low	Subclinical Hyperthyroidism
5	Elevated	Elevated	Low	Overt Hyperthyroidism

Table no. 1: Reference range of thyroid profile for thyroid dysfunction

**RESULTS:** A total number of 200 cases were suitable for analysis. 100 cases of type 2 diabetes mellitus and 100 non diabetes cases were taken as control groups.

**Prevalence of Thyroid Dysfunction in both Groups was as Follows:** 26 cases (13%) in type 2 diabetes and 12 cases (6%) in controls had thyroid dysfunction as shown in table 2 and fig. no.1.

Thyroid status	Group A N= 100	Group B N=100
Euthyroid	74	88
Thyroid dysfunction	26	12

Table no. 2: prevalence of thyroid dysfunction in group A (type2 DM) and group B (controls)

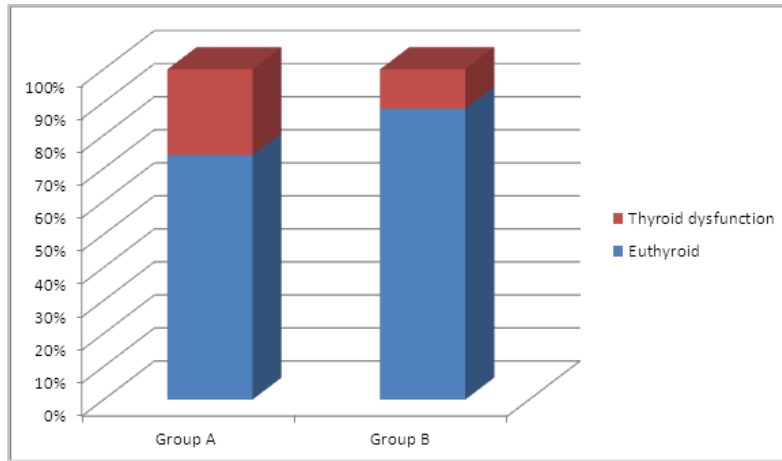
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Confidence interval for type 2 DM is + 8.6(17.4%- 34.6%)

Confidence interval for controls is + 6.37(5.63% - 18.37%).

Z= 2.523

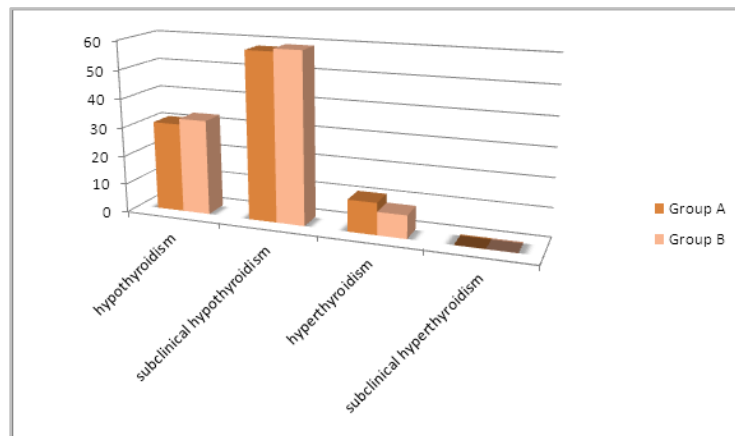
'P' value is 0.01174, significant at P <0.05, Z test for proportion was significant at 95% confidence limits.



**Figure 1: Prevalence of thyroid dysfunction in group A(type2 DM) and group B (controls)**

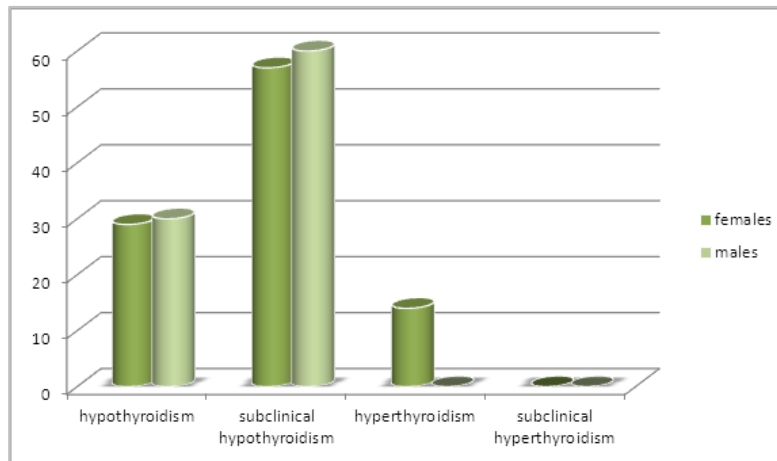
SL. No.	Thyroid dysfunction	Group A		Group B	
		N= 26	percentage	N= 12	Percentage
1	hypothyroidism	8	31	4	33
2	Subclinical hypothyroidism	15	58	7	59
3	hyperthyroidism	3	11	1	8
4	Subclinical hyperthyroidism	0	0	0	0

**Table no. 3: Prevalence of type of thyroid dysfunction in Group A (type 2 DM) and Group B (controls)**

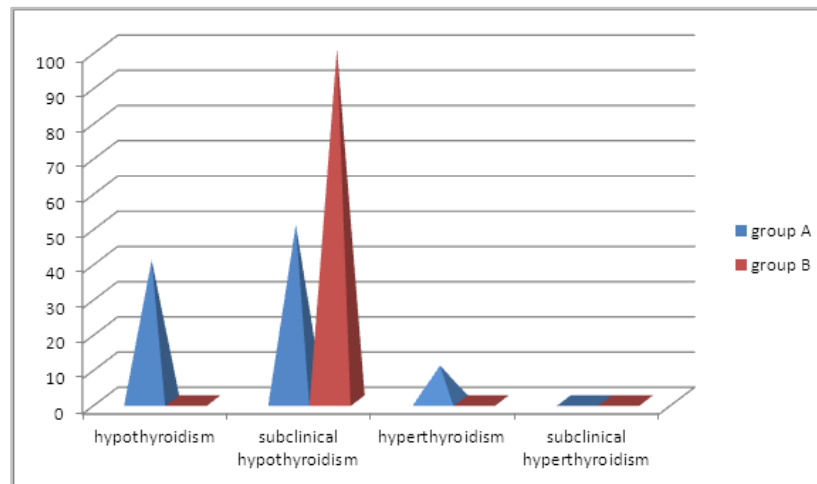


**Figure 2: Prevalence of type of thyroid dysfunction in Group A(type 2 DM) and Group B (controls)**

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**Figure 3: Sex wise distribution of thyroid dysfunction in group A (Type 2 DM)**



**Figure 4: sex wise distribution of thyroid dysfunction in group B (controls)**

**DISCUSSION:** Type 2 diabetes mellitus is the most commonly occurring endocrine disorder, followed by thyroid dysfunction being the second most common disorder. Poorly controlled diabetes mellitus is accompanied by alteration in the thyroid function.

The development of hypothyroidism in diabetes patients may cause a tendency to hypoglycemia, dyslipidemia and with adequate thyroxine replacement this risk will reduce.<sup>10</sup> When hyperthyroidism develops in a diabetes patients, metabolic control can deteriorate, with weight loss. Tachycardia and especially the atrial fibrillation in the older patients should raise the suspicion of thyrotoxicosis. Effective treatment of hyperthyroidism with carbimazole, surgery or radioiodine will stabilize diabetic control.<sup>11</sup>

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**Prevalence of Thyroid Dysfunction:** In our study 26% of type 2 diabetes mellitus patients showed thyroid dysfunction as compared to 12% in control groups. Other studies showing prevalence of thyroid dysfunction in type 2 diabetes mellitus is as follows.

	Kiran Babu <sup>12</sup>	Celani MF <sup>13</sup>	Rajan SK <sup>14</sup>	Present study 2013
Prevalence of thyroid dysfunction	28%	31.4%	15%	26%

**Table No. 4: Studies showing prevalence of thyroid dysfunction in type 2 diabetes mellitus**

**Prevalence of type of thyroid dysfunction:** Subclinical hypothyroidism is the commonest type of thyroid dysfunction seen in both type 2 diabetes and control groups in our study. Studies by Celani MF<sup>13</sup> et al had 48.3% and Rajani SK<sup>14</sup> et al had 73.3% of subclinical hypothyroidism in type 2 diabetes mellitus patients.

Overt hypothyroidism is the second most common thyroid dysfunction seen in our study. Studies by Kiran Babu<sup>12</sup> et al had 13.2%, Celani MF<sup>13</sup> had 23.1%, Rajan SK<sup>14</sup> had 7%, Ramasway M<sup>15</sup> et al had 26.6% of overt hypothyroidism in type 2 diabetes mellitus patients.

In our study overt hyperthyroid was observed in 3 out of 26 n type 2 diabetes and 1 out of 12 in control group. Studies by Celani MF<sup>13</sup> et al had 44%, Kiran Babu<sup>12</sup> et al had 8.8%, and Rajan SK<sup>14</sup> et al had 6.6% of overt hyperthyroid in type 2 diabetes patients. No case of subclinical hyperthyroidism was noted in type 2 diabetes or in control groups.

The findings in our study are corroborated well with findings of the previous studies though differences were noted from some of the studies. These differences could be attributed to different time of analysis, sampling from different geographical locations and various other unknown factors.

**CONCLUSION:** In conclusion, the results of this study showed a high prevalence of thyroid dysfunction in the diabetic population which indicates that screening for thyroid disease among patients with diabetes should be routinely performed. The prevalence of new cases of thyroid dysfunction diagnosed and the possible aggravation of classical risk factors such as hypertension, dyslipidemia and hypoglycemia arising from an undiagnosed thyroid dysfunction can lead to an increased cardiovascular risk in these patients.

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