

**CLINICAL AND METABOLIC STUDY OF THYROID DISORDER IN PATIENTS  
WITH TYPE 2 DIABETES MELLITUS**

**Dr Suresh Bendwal, Dr Ikraz Patel, Dr. Kavita Bendwal,**

<sup>1</sup>Associate Professor, <sup>2</sup>JR3, <sup>3</sup>Associate Professor

Department of Medicine, RD Gardi Medical College Ujjain Madhya Pradesh

Corresponding Author: Dr. Kavita Bendwal(kavitabendwal2010@gmail.com)

**ABSTRACT**

**Introduction:** Diabetes mellitus and thyroid dysfunction are two of the most prevalent endocrine disorders found in clinical practice. The prevalence of TD in the general population varies greatly, from 6.6 percent to 13.4 percent. This study aim to find the clinical and metabolic profile of patients with this dual endocrine disorder.

**Material and Methods:** A total of 122 patients of type 2 DM, who were not known to have thyroid disorder, were included in the study who were attending OPD as well as in patients admitted in RD Gardi Medical College & Hospital, Ujjain, Department of Medicine were taken for study. A detailed history and examination was done, blood samples of all the subjects were taken. HbA1c of all the patients was done. Diabetic patients were evaluated for thyroid dysfunction by testing thyroid profile (Free T3, Free T4 and TSH).

**Result:** In our study, out of 122 included patients, thyroid disorders were seen in 17 patients. The prevalence of thyroid disorder in our study was 17 (13.9%). Subclinical hypothyroidism was seen in 11 (9%) patients, clinical hypothyroidism was seen in 3 (2.5%) patients, subclinical hyperthyroidism was seen in 2 (1.6%) patients and clinical hyperthyroidism was seen in 1 (0.8%) patient.

**Conclusion:** In our study the prevalence of thyroid disorders in patients with type 2 diabetes mellitus was 13.9%. Also, there was no significant correlation ( $P=0.241$ ) between HbA1C levels and TSH. It can be concluded that there is no association between long term T2DM and Subclinical Thyroid dysfunction. Subclinical hypothyroidism being asymptomatic, normal levels of circulating free thyroid hormone and slight elevations in thyroid-stimulating hormone (TSH) are generally observed. Therefore, regular screening for the same in T2DM should be practiced for a clear picture.

**Key words:** Thyroid disorders, Type 2 diabetes mellitus.

**INTRODUCTION**

Diabetes mellitus and thyroid dysfunction are two of the most prevalent disorders found in clinical practice.<sup>1</sup> The prevalence of thyroid disorders (TD) varies with age in the general population. The prevalence of TD in the general population varies greatly, from 6.6 percent to 13.4 percent.<sup>2,3</sup>

Diabetic patients frequently have thyroid disease, which is linked to aging, especially in type 2 diabetes, and to underlying autoimmune disease in type 1 diabetes.<sup>4</sup> The most prevalent thyroid condition in adults is hypothyroidism, which affects more women than men. The threat of developing other autoimmune

disorders is higher in patients with one organ-specific autoimmune disease. Numerous epidemiological studies depict that people with type 2 diabetes mellitus (T2DM) have a higher prevalence of overt hypothyroidism than people without the condition.<sup>5,6</sup>

It is debatable whether subclinical hypothyroidism (SCH) and type 2 diabetes are related.<sup>7</sup> Although SCH, a mild form of hypothyroidism, is asymptomatic, normal levels of circulating free thyroid hormone are seen along with mild increases in thyroid-stimulating hormone (TSH).<sup>8</sup> Numerous studies indicate that SCH is connected to high blood pressure, high cholesterol, and abnormal homocysteine levels and that SCH patients are at an increased risk for metabolic syndrome, atherosclerosis, cardiovascular events, and mortality.<sup>9</sup>

Thyroid disease is a pathological state that can adversely affect glycemic control in diabetics and has the potential to affect their health. Insulin and thyroid hormones are intimately involved in cellular metabolism and thus excess or deficit of either of these hormones result in the functional derangement of the other. The relationship between thyroid dysfunction and Diabetes

mellitus is characterized by a complex interaction of interdependence.<sup>10,11</sup>

Subclinical hypothyroidism is defined as serum TSH > 4.2  $\mu$ IU/ml, with normal levels of serum free T4 (0.93–1.7 ng/dl). Subclinical hyperthyroidism is defined as serum TSH < 0.27  $\mu$ IU/ml, with normal levels of serum free T3 (2.0 – 4.4 pg/ml) and serum free T4 (0.93 – 1.7 ng/dl). The degree of TSH elevation is helpful in determining which patients should be treated. Those with higher TSH levels more closely resemble patients with overt hypothyroidism and those with lower TSH levels more closely resemble euthyroid individuals.

The aim of this study was to study the clinical and metabolic profile of patients with this dual endocrine disorder.

## **MATERIAL AND METHODS**

A total of 122 patients of type 2 DM, who were not known to have thyroid disorder, were included in the study who were attending OPD as well as in patients admitted in RD Gardi Medical College & Hospital, Ujjain were taken for study after considering the inclusion and exclusion criteria.

**INCLUSION CRITERIA: 1.** Patients who had been detected with diabetes mellitus after 28 years of age. 2.

Patients who were not known cases of thyroid disease. **EXCLUSION**

**CRITERIA:** 1. Patients detected to have diabetes mellitus before 28 years of age. 2. Patients on drugs known to alter thyroid hormonal levels. 3. Seriously ill patients. 4. Type 1 Diabetes mellitus patient.

A detailed history and examination was done, blood samples of all the subjects were taken. HbA1c of all the patients was done. Diabetic patients were evaluated for thyroid dysfunction by testing thyroid profile (Free T3, Free T4 and TSH). The correlation of prevalence of thyroid disorder with HbA1C was then done. The observations and interpretations were recorded and results obtained were statistically analyzed. Thyroid function tests including serum free T3, free T4 and TSH were evaluated apart from routine investigations. Diagnosed patients data and all the data observed on individual cases entered in Case Record Proforma and in Master Chart of observation for calculations and analyses.

**OBSERVATION AND RESULTS**

In the present study majority of the patients were in the age group 51-60 years, followed by 61-70 years. There were 63 (51.6%) females and 59

(48.4%) males in the study. Females slightly were more in number as compared to the males.

In our study, out of 122 included patients, thyroid disorders were seen in 17 patients. The prevalence of thyroid disorder in our study was 17 (13.9%). Hypothyroidism was seen in 11 (9%) patients, clinical hypothyroidism was seen in 3 (2.5%) patients, subclinical hyperthyroidism was seen in 2 (1.6%) patients and clinical hyperthyroidism was seen in 1 (0.8%) patient.

Table 1: Distribution of patients with clinical and thyroid disorder according to FBS, HbA1C and PPBS.

Parameter		Number of Patients	Percentage
FBS	Abnormal (>126mg/dl)	17	100
	Normal	0	0
PPBS	Abnormal (>200mg/dl)	17	100
	Normal	0	0
HbA1C	Abnormal	17	100
	Normal	0	0

The table 1 shows the distribution of patients with clinical and thyroid

disorder according to FBS, PBS and HbA1c. All 17 (100%) patients had abnormal fasting blood sugar levels, PPBS and HbA1C.

TABLE 2: Distribution of clinical and subclinical thyroid patients according to serum Anti-TPO.

Serum Anti TPO	Number of Patients	Percentage
Negative	9	52.9
Positive	8	47.1
Total	17	100

The table 2, shows the distribution of patients with subclinical thyroid disorder according to serum Anti-TPO. In 9 (52.9%) patients, the serum Anti-TPO was negative and in 8 (47.1%) patients, the serum Anti-TPO was positive.

Table 3: Distribution of patients with clinical and thyroid disorder according to various parameter.

Parameter		Number of Patients	Percentage
Serum Blood Urea	Normal	5	29.4
	Abnormal	12	70.6
Serum Creatinine	Normal	4	23.5
	Abnormal	13	76.54
Serum Total Cholesterol	Normal	16	94.1
	Abnormal	1	5.9
Serum LDL Cholesterol	Normal	15	88.2
	Abnormal	2	11.8
Serum HDL	Normal	3	17.6

Cholesterol	Abnormal	14	82.4
Serum Triglycerides	Normal	8	47.1
	Abnormal	9	52.9

The table 3 we showed the distribution of patients with thyroid disorder according to various parameter. Serum blood urea was abnormal in 12 (70.6%) patients and normal in only 5 (29.4%) patients. Serum creatinine was abnormal in 13 (76.5%) patients and normal in 4 (23.5%) patients. Serum total cholesterol was abnormal in 1 (5.9%) patient and normal in 16 (94.1%) patients. Serum LDL cholesterol was abnormal in 2 (11.8%) patients and normal in 15 (88.2%) patients. Serum HDL cholesterol was abnormal in 14 (82.4%) patients and normal in 3 (17.6%) patients. Serum triglycerides were abnormal in 9 (52.9%) patients and normal in 8 (47.1%) patients.

**DISCUSSION**

The associations between thyroid disorders and diabetes have long been reported and have been shown to influence each other mutually. The primary objective of our study was to evaluate the prevalence of subclinical thyroid disorders in type 2 diabetes mellitus patients.

In our study, the prevalence of clinical and thyroid disorder was 17 (13.9%) out of 122 included patients. The mean ( $\pm$

SD) age of the patients was 52.24 ( $\pm$  11.55) years (range: 35 to 71 years). Clinical Hyperthyroidism was seen in one patient, clinical hypothyroidism was detected in 3 patients, subclinical hypothyroidism in 11 patients, and subclinical hyperthyroidism in 2 patients.

The present study showed that in a sample of type 2 diabetic patients, the prevalence of subclinical/clinical thyroid disorders was 13.9%. A study by Perros et al<sup>12</sup>. on a randomly selected group of 1,310 diabetic adults estimated that the prevalence of thyroid dysfunction was 13.4%. The most common diagnosis was subclinical hypothyroidism (4.8%), followed by hypothyroidism (0.9%), hyperthyroidism (0.5%), and subclinical hyperthyroidism (0.5%) which is similar to our findings. In another study by M J Smithson et al<sup>13</sup>., the prevalence of thyroid dysfunction in diabetic patients was 10.8%, where five patients were diagnosed with primary hypothyroidism (2.5%), 4 with subclinical hypothyroidism (2%), 1 with hyperthyroidism (0.5%), and 1 with subclinical hyperthyroidism(0.5%). In Jordan, a study conducted by Radaideh et al. at the National Center for Diabetes

found that the overall prevalence of thyroid dysfunction was 12.5% in type 2 diabetic patients. Out of 908 type 2 diabetic patients, fifty-three (5.9%) already had thyroid disease, and new thyroid disease cases were diagnosed in 6.6% of patients while screening.<sup>14</sup>

According to the reports of this study, the prevalence of subclinical hypothyroidism was 8.6% and associated with anti-TPO status and age, but there were no independent associations with serum cholesterol and HbA1c. The prevalence of subclinical hypothyroidism is more likely to be detected in older women.<sup>14</sup> A study by Díez JJ et al. found that the co-existence of type 2 diabetes with subclinical hyperthyroidism was significantly related to increasing age and the presence of goiter.<sup>15</sup>

Our study found no significant correlation between HbA1C levels and TSH (P=0.241). In our study, total serum cholesterol was normal in 12 (92.3%) patients and abnormal in 1 (7.7%). In 2 (15.4%) patients, serum LDL cholesterol was abnormal, and normal in 11 (84.6%) patients. Serum HDL cholesterol abnormality was

detected in 11 (84.6%) patients, while it was normal in 2 (15.4%) patients. Serum triglycerides were abnormal in 7 (53.8%) patients and normal in 6 (46.2%) patients. However, in a study by Bazrafshan H.R et al., the mean concentration of HbA1c in patients with hypothyroidism was significantly higher than that of euthyroid participants ( $11\pm 2.5$  vs.  $9\pm 2.5$ ,  $P<0.005$ ). The correlation between HbA1c concentration and TSH levels ( $R=0.2$ ,  $P<0.01$ ) was significantly positive. The association between thyroid dysfunction and type 2 diabetes mellitus was associated with HbA1c concentration and TSH levels.<sup>16</sup> A study by Papazafiropoulou et al. found that the type 2 diabetic patients with thyroid disorder had higher values of HDL-cholesterol levels ( $P = 0.01$ ) and lower values of LDL-cholesterol levels ( $P = 0.001$ ) compared with euthyroid patients.<sup>17</sup>

## CONCLUSION

In our study the prevalence of subclinical thyroid disorders in patients with type 2 diabetes mellitus was 13.9%. Also, there was no significant correlation ( $P=0.241$ ) between HbA1C levels and TSH. It can be concluded that

there is no association between long term T2DM and Subclinical Thyroid dysfunction.

Subclinical hypothyroidism being asymptomatic, normal levels of circulating free thyroid hormone and slight elevations in thyroid-stimulating hormone (TSH) are generally observed. Therefore, regular screening for the thyroid disorder in T2DM should be done in our clinical practice.

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