



## Thyroid dysfunction among type 2 diabetes mellitus patients: A study from rural hospital

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### Abstract

**Background:** *Insulin and thyroid hormones acts as antagonists in cellular metabolism and change in level of any one can result in functional derangement of the other. The objective was to find the prevalence of thyroid dysfunction in type 2 diabetes mellitus patients.*

**Method:** *100 type 2 diabetes mellitus patients were included in this study. Study protocol included detailed clinical history, examination and investigations. Fasting plasma glucose, post prandial plasma glucose, HbA1c, lipid profile, and thyroid profile of these subjects were determined.*

**Result:** *In this study thyroid dysfunction was present in 32% of the study population. Subclinical hypothyroidism was present in 18% and overt hypothyroidism in 8% of the 100 subjects with type 2 diabetes. Subclinical hyperthyroidism was detected in 1% and overt hyperthyroidism in 5% of the patients.*

**Conclusion:** *Thyroid dysfunction is more common in type 2 diabetes mellitus patients.*

*More case control studies with a larger population are needed to confirm this association.*

**Keywords:** *Hyperthyroidism, Hypothyroidism, Thyroid dysfunction, Type 2 diabetes mellitus.*

### Introduction

Diabetes is a common non communicable disease and emerging as a serious medical and social problem. The prevalence of type 2 diabetes mellitus (T2 DM) is rapidly increasing worldwide. The prevalence of diabetes, as well as prediabetes, has significantly increased in India during recent years<sup>1</sup>. Thyroid diseases are second most common endocrine disorders affecting general population.

Therefore it is common for a person to be affected by both diabetes and thyroid disease<sup>2</sup>. Previous studies have showed higher prevalence of thyroid dysfunction in diabetes patients<sup>3,4,5,6,7</sup>. Thyroid hormones play an important role in development of insulin resistance and glucose metabolism<sup>8</sup>. Past studies have proved that subclinical hypothyroidism in diabetes causes more severe retinopathy<sup>9</sup>. Some studies have showed that early

detection of thyroid disorder and its treatment can delay the cardiovascular complications of T2DM and treatment of hypothyroidism improves renal function in diabetes<sup>10,11</sup>. Although diabetes is very common in south India, studies on thyroid dysfunction in T2DM patients from rural Indian areas are lacking. Therefore, the aim of this study was to find out the prevalence of thyroid dysfunction in rural south Indian subjects with T2DM.

### Material and Methods

This was cross sectional hospital based study. Consecutive 100 adult type 2 diabetes mellitus patients admitted in the medicine department of territory care hospital were considered for this study. After taking consent, patients were subjected for blood investigations. Study protocol included detailed clinical history and examination and investigations. A detailed clinical work up incorporating details of age, diet, smoking, alcohol consumption, physical activity, reproductive history, socioeconomic status, body mass index and pedigree chart was made. Height, waist and hip circumference were measured in centimetres by using a non-stretchable standard tape with a metal buckle at one end over the light clothing. Waist circumference was measured in the centre of the iliac crest and the coastal margin, and hip circumference was measured at the widest point on buttocks below the iliac crest. Patients were divided in to non-obese and obese on the basis of body mass index (BMI). Ethics committee approval was taken for the study.

### Inclusion Criteria

- Patients aged more than 30 years with type2 diabetes mellitus

### Exclusion Criteria

- Patients with Proven thyroid disorder and under treatment
- Patients with renal disease both acute and chronic
- Patients with Very sick or critically ill patients
- Patients with type 1 DM

- Patients with Gestational DM
- Patients who had undergone surgery of the thyroid gland
- Patients who had exposure to radiation of the thyroid gland

**Definition of terms:** Patients on oral hypoglycemic drugs, Insulin or those having fasting blood sugar > 126 g/dl or 2 h PLBS >200 mg/dl or Symptoms of diabetes and random plasma glucose concentration >200 mg/dl were regarded as having diabetes mellitus.

A body mass index (BMI) of 29.9 Kg/m<sup>2</sup> or more in subjects indicates obesity.

BMI=Body weight (Kg)

Height<sup>2</sup> (meters)

Thyroid dysfunction was classified as clinical hypothyroidism (C-Hypo) if thyroid stimulating hormone (TSH) levels were greater than 4.20 µUI/mL and free thyroxine (FT4) levels were lower than 0.93 ng/dL; subclinical hypothyroidism (SC-Hypo) if TSH levels were greater than 4.20 µUI/ml and FT4 levels ranged from 0.93 µUI to 1.7 ng/dL, subclinical hyperthyroidism (SC-Hyper) if TSH levels were lower than 0.27 µUI/ml and FT4 levels ranged from 0.93 and 1.7 ng/dL and clinical hyperthyroidism (C-Hyper) if TSH levels were lower 0.27 µUI/ml and FT4 levels were higher than 1.7 ng / dL.

### Data Analysis

Data were compiled and tabulated by using standard appropriate statistical technique, which includes numbers and percentages.

### Results

In our study 54 were males and 46 were females (Table 1). Abnormal thyroid function was found in 32 (32%) patients and 68(68%) patients had normal thyroid function (Table 2). Out of the 100 diabetic subjects 8 had overt hypothyroidism and 18 had Sub-clinical hypothyroidism. Overt Hyperthyroidism was noted in 5 people. Subclinical hyperthyroidism was observed in one person (Table 3).

**Table 1:** sex distribution

Sex	Number	Percentage
Male	54	54%
Female	46	46%
Total	100	

**Table 2:** Thyroid function tests

Thyroid function tests	Number of patients	Percentage
Abnormal	32	32%
Normal	68	68%

**Table 3:** Spectrum of thyroid dysfunction

Thyroid dysfunction	Number of patients	Percentage
Hypothyroidism	8	8%
Subclinical Hypothyroidism	18	18%
Hyperthyroidism	5	5%
Subclinical Hyperthyroidism	1	1%

## Discussion

Insulin and thyroid hormones, both act on cellular metabolism of carbohydrates, proteins and lipids. T2DM alters thyroid function at two sites. First T4-5-deiodinase activity and concentration are reduced by hyperglycemia. Second hypothalamic control of TSH is altered<sup>12</sup>. The knowledge of relation between thyroid disease and diabetes is of importance to guide clinicians on the optimal management of both these conditions. In present study thyroid dysfunctions were found in 32% of diabetic patients. The prevalence of thyroid disorder was 45% in Type 2 diabetics, in a study conducted by Pasupthi et al<sup>12</sup>. Vinu V et al demonstrated an overall prevalence of 28.75% of thyroid diseases in diabetics<sup>13</sup>. Navneet A et al study recorded 27.8% of thyroid dysfunction in patients with type 2 DM. Diez et al study from Spain reported 32.4% prevalence of thyroid dysfunction<sup>14</sup>. Radaideh et al study reported that the overall prevalence of thyroid dysfunction in T2DM patients was 12.5% in Jordan<sup>15</sup>. In Perros et al study 13.4% diabetes patient had thyroid dysfunction<sup>16</sup>. In present study subclinical hypothyroidism is most common thyroid disorder constituting 18% of diabetes as compared to overt hyperthyroidism 5%, subclinical hyperthyroidism

1% and overt hypothyroidism 8%, similar finding observed in Vaghasiya K et al study<sup>5</sup>. Many previous studies showed subclinical hypothyroidism was most common thyroid disorder in diabetes<sup>5,7,10,13,15</sup>.

## Conclusion

This study concludes that thyroid dysfunction is observed in high prevalence among T2DM patients. More longitudinal cohort studies are needed to give high level of evidence to confirm this association in order to establish the need to be more aggressive in risk factor control in these individuals. The main limitation of our study is small sample size. More population based studies with large sample size needed in future; various geographical areas and populations should be considered.

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