

# To Study the Prevalence of Thyroid Dysfunction in Patients of Type II Diabetes Mellitus

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## ABSTRACT

**Introduction:** Diabetes mellitus (DM) and thyroid dysfunction (TD) are the two most common endocrine disorders in clinical practice. The unrecognized TD may adversely affect the metabolic control and add more risk to an already predisposing scenario for cardiovascular diseases. T

**Material and methods:** 100 patients with T2DM were selected from the Outpatient department and admitted in Inpatient department of Medicine in Subharti Medical College Meerut, participated in the study. Thyroid dysfunction was classified as Subclinical hypothyroidism (SCH) was defined as TSH- 4.5 to 10 mIU/ml with normal FT4. Overt hypothyroidism-TSH >10 mIU/ml with low FT4. Hyperthyroidism- <0.45 mIU/ml TSH with raised FT4 Subclinical hyperthyroidism- <0.45 mIU/ml TSH with normal FT4.

**Result:** The prevalence of Thyroid Dysfunction in all diabetic patients was 24%.function was 24% (16% had subclinical hypothyroidism, 6% of patients had overt hypothyroidism and only 2% of patients had overt hyperthyroidism

**Conclusion:** Our study emphasizes the need to check TSH levels in all type 2 diabetic patients, as subclinical hypothyroidism was most prevalent thyroid dysfunction in patients with diabetes.

**Keywords:** Diabetes Mellitus, Hypothyroidism, HbA1c, TSH

## INTRODUCTION

Thyroid diseases and Diabetes Mellitus are the two most common endocrinopathies encountered in clinical practice. The association of Diabetes and Thyroid dysfunction were first published in 1979. Two primary pathological conditions involving the thyroid gland are hyperthyroidism and hypothyroidism.<sup>1</sup> Due to the effect of thyroid hormones on nearly all major metabolic pathways, therein disease is associated with various metabolic pathways. Thyroid hormone regulate basal energy expenditure through action of proteins, carbohydrates, lipid metabolism.<sup>2</sup> Thyroid dysfunction is very known in Type I Diabetes Mellitus where it is due to autoimmune process. Recently few studies have shown that Thyroid dysfunction especially hypothyroidism is found in patients with Type II Diabetes Mellitus but the mechanism for this is largely unknown. Diabetic patients have a higher prevalence of thyroid disorders compared with the normal population and the most common amongst them is subclinical hypothyroidism.<sup>3</sup> Hyperthyroidism is typically associated with worsening glycemic control and increasing insulin requirements.<sup>4</sup> In hypothyroid patients there will be reduced rate of insulin degradation which may lower the exogenous insulin requirement.

Thyroid hormones are insulin antagonists, both insulin and thyroid hormones are involved in cellular metabolism and excess and deficit of any one can result in functional derangement of the other.<sup>5</sup> Thyroid disease is a pathological state that adversely affects diabetic control and is commonly found in most forms of diabetes mellitus which is associated with advanced age in Type II diabetes and auto immune disease in Type I diabetes. 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. Marked hyperglycemia cause 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>6</sup> Identification of associated thyroid dysfunction and early intervention may significantly reduce the risk of adverse cardiovascular and cerebrovascular accidents. Hence, this study aims to know the prevalence of thyroid dysfunction among Type II diabetes mellitus patients.<sup>4</sup>

## MATERIAL AND METHODS

Observational study was conducted in department of Medicine in Subharti Medical College Meerut. Patients for proposed study were selected from the Outpatient department and admitted in Inpatient department of Medicine in Subharti Medical College Meerut.

The patients were clearly explained about the study protocol and informed written consent duly signed by each subject was taken. The patient selection was based on the following criteria:

### Inclusion criteria

- Type II Diabetic patients of more than 30 years of age

### Exclusion criteria

- Insulin dependent Diabetes Mellitus patients

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Thyroid function	Frequency	Percentage
Euthyroid	76	76
Subclinical hypothyroidism	16	16
Overt hypothyroidism	6	6
Overt hyperthyroidism	2	2
Subclinical hyperthyroidism	0	0
Total	100	100

**Table-1:** Distribution of thyroid function in the study

Thyroid function	N	Mean (in %)	Std. deviation	F, p-value
Euthyroid	76	8.9	1.3	
Subclinical Hypothyroidism	16	8.0	0.9	2.75, 0.05
Overt hypothyroidism	6	9.0	1.7	
Overt hyperthyroidism	2	8.95	0.07	

**Table-2:** Comparison of mean HbA1C in each group

- Diabetic patient of less than 30 years and above 70 years of age
- Refusal to participate
- Known case of thyroid dysfunction
- Deranged renal functions

#### Study design

100 patients with type II diabetes mellitus were diagnosed as per ADA criteria. Each patient underwent a detailed history and clinical examination. The following investigations were done:

- TSH, T3 and T4
- HbA1c
- FBS

#### Definition used in the study

We classified patients as SCH, overt hypothyroidism, hyperthyroidism, subclinical hypothyroid based on the definitions as per ATA guidelines- SCH was defined as TSH- 4.5 to 10 mIU/ml with normal FT4

Overt hypothyroidism- TSH >10 mIU/ml with low FT4

Hyperthyroidism- <0.45 mIU/ml TSH with raised FT4

Subclinical hyperthyroidism- <0.45 mIU/ml TSH with normal FT4.

#### STATISTICAL ANALYSIS

The data generated from the study was analyzed by appropriate statistical analysis using SPSS 21.0 (windows). All data obtained was summarized and expressed as mean  $\pm$  SD or as percentages as required. The P value and chi square test were used wherever appropriate to analyze the data. Statistical significance was accepted at  $p < 0.05$ .

The prevalence of thyroid dysfunction in our study was 24%. Whereas 76% of patients were euthyroid. Among the Type 2 diabetic patients with thyroid dysfunction 16% (16/100) had subclinical hypothyroidism, 6% (6/100) of patients had overt hypothyroidism and only 2% (2/100) of patients had overt hyperthyroidism. None of the patient had subclinical hyperthyroidism (table-1).

Mean HbA1C was highest in patients with overt

hypothyroidism i.e 9% ( $\pm 1.7$ ). In case of patients with euthyroidism it was 8.9% ( $\pm 1.3$ ) whereas cases with subclinical hypothyroidism had mean HbA1C of 8.0% ( $\pm 0.9$ ), in patients with overt hyperthyroidism it was 8.95% ( $\pm 0.07$ ). No statistical significance was seen ( $p=0.05$ ) (table-2).

#### DISCUSSION

In our study 100 patients of Type 2 DM were studied for evaluation of thyroid dysfunction. The patients were thoroughly investigated. The results were then analyzed and compared with other similar studies.

#### Prevalence of thyroid dysfunction

In our study 100 diabetic patients were evaluated in which the prevalence of thyroid dysfunction was 24% (16% had subclinical hypothyroidism, 6% of patients had overt hypothyroidism and only 2% of patients had overt hyperthyroidism). Results are similar to study done by Singh P et al<sup>7</sup> in which 100 diabetic patients studied, 29 patients (29%) showed abnormal thyroid hormone levels (24% hypothyroidism and 5% hyperthyroidism), prevalence of thyroid dysfunction was 29%. In study by Celani MF et al<sup>8</sup> in which 290 diabetic patients studied Abnormal TSH concentrations were detected in 91 patients (31.4%) {Subclinical hypothyroidism (48.3%), followed by subclinical hyperthyroidism (low TSH, nor (24.2%) and hypothyroidism (23.1%), hyperthyroidism (4.4%)}, prevalence of thyroid dysfunction was 31.4%. Udiong C.E.J et al<sup>3</sup> in their study found high incidence of abnormal thyroid hormone levels in 161 diabetic patients, prevalence of thyroid dysfunction in diabetic patients was 46.5%.

In present study 76% of patients were euthyroid. Which is similar to study by Singh P et al,<sup>8</sup> in which 71% of patients were euthyroid. In our study the type 2 diabetic patients with thyroid dysfunction 16% had subclinical hypothyroidism. Our study findings are similar to study done by Singh et al,<sup>9</sup> 80 type 2 diabetic subjects were investigated for total triiodothyronine (T3), total thyroxine (T4), free triiodothyronine (FT3), free thyroxine (FT4) and thyroid stimulating hormone (TSH) in which he found hypothyroidism in 23.75% (15% subclinical hypothyroidism and 8.75% Primary hypothyroidism) and hyperthyroidism in 6.25% (all primary

hyperthyroidism) of diabetic patients.

In this study 6% of patients had overt hypothyroidism and 2% of patients had overt hyperthyroidism which is similar to study by Saha et al,<sup>10</sup> 60 diabetic patients were studied in which only 6.6% of patients had overt hypothyroidism and 1.6% of patients had overt hyperthyroidism.

None of the patient had subclinical hyperthyroidism. Mean distribution of HbA1C in our study in with thyroid dysfunction was 8.3% (+/-1.2). In a study by Nandyala V et al,<sup>11</sup> mean distribution of HbA1C was in 8.2% in diabetic subjects, which is close to the results in our study. In a study by Pasupathi P et al<sup>12</sup> mean HbA1c was 11.3% in diabetic patients.

## CONCLUSION

The prevalence of thyroid dysfunction in our study was 24% SCH was seen in 16% of patients, 6% had overt hypothyroidism and 2% had overt hyperthyroidism. None of patient had subclinical hyperthyroidism.

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