

# PREVALENCE OF THYROID DYSFUNCTION IN TYPE 2 DIABETES MELLITUS

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## Abstract:

**Aim:** The study was undertaken with an objective to know the thyroid functions in Type 2 diabetics and to know the spectrum of thyroid dysfunction in Type 2 DM.

**Methods:** The present study included 68 OPD and IPD patients of Type 2 DM who attended the Department of General Medicine at Dhaka Medical College Hospital Dhaka. Detailed history and examination were done, fasting blood samples of all the subjects were taken and at the same time samples were tested for HbA1C and thyroid profile (T3, T4 and TSH).

**Result:** in this study 68 established diabetics were screened for thyroid disorders by TFT. Abnormal thyroid function was found in 43 T2DM cases and remaining diabetics had normal thyroid function. Among 68 cases low thyroid function was noted in 20 patients and 18 subjects had Sub-clinical hypothyroidism. Hyperthyroidism was noted in 05 patients.

**Conclusion:** Type 2 diabetes mellitus is a major problem all over the world and many patients of Diabetes Mellitus are associated with thyroid dysfunction. So diabetic patients should be screened for thyroid disorder especially hypothyroidism.

**Keywords:** DM Type 2, Hypothyroidism, TSH, HbA1c, Hyperthyroidism

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## Introduction

Diabetes mellitus is an endocrine disorder, so it is prone to affect other endocrine functions, one of which is thyroid function.<sup>1,2</sup> There is great variability in the prevalence of Thyroid Dysfunction in the general population, ranging from 6.6% to 13.4%.<sup>3</sup> In diabetic patients, the prevalence still varies more ranging from 10 to 24%.<sup>4</sup> In the NHANES III study, a survey of 17,353 subjects representing the US population, hypothyroidism was found in 4.6% and hyperthyroidism in 1.3% of subjects.<sup>5</sup> It was observed that there was an increased frequency of thyroid dysfunction with advancing age and

a higher prevalence of thyroid disease in women compared to men and in diabetic subjects compared to non-diabetic.<sup>6</sup>

Diabetes being the most common endocrine metabolic disorder, there was a curiosity to understand and learn the association of this with another common endocrine gland function that is the thyroid gland. Several reports have indicated a higher than normal prevalence of thyroid disorders in type 2 diabetic patients, with hypothyroidism being the most common disorder associated.<sup>7</sup>

The aim of this study was to establish the relationship between diabetes and thyroid

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dysfunction probably affected therefore to the autoimmune pathology. Sixty-eight patients in 40–70 years age group of type 2 diabetes mellitus were checked for thyroid functions. The study excluded patients with complications of diabetes mellitus, and those with a known history of thyroid dysfunction the present study was taken up to note the prevalence of thyroid dysfunction in Type 2 diabetics and the spectrum of thyroid dysfunction.

### Methodology

After taking permission from the institutional ethical committee the study was started. The present study included 68 OPD and IPD patients of confirmed Type 2DM who were coming to Dhaka Medical College hospital for consultation from January 2018 to January 2019. Written consent from all the subjects was taken. A detailed history and examination were done, blood samples of all the subjects were taken. HbA1c of all the patients was done. All the patients were evaluated for thyroid dysfunction by testing thyroid profile (T3, T4, and TSH). The correlation of prevalence of thyroid disorder with HbA1C was then done. The observations and interpretations were recorded, and the results obtained were statistically analyzed.

#### Inclusion criteria

- All patients with Type 2 diabetes aged more than 30 years.
- All diabetics are irrespective of glucose control.
- All diabetics are irrespective of treatment (OHA/insulin).

### Exclusion Criteria

#### Type 1 DM

- Patients with:
  - o Gestational diabetes mellitus.
  - o Pancreatitis.
  - o Steroid induced Diabetes would be excluded.
  - o All those who had proven thyroid disorder and on treatment
  - o Patients suffering from hemoglobinopathies and anemia.
  - o Patients on Amiodarone therapy.

### Investigations

Glycosylated hemoglobin (HbA1c) determined by ion-exchange chromatography as described by Goldstein *et al.* using ion exchange chromatography kits. ELISA was used for, TSH, T3 and T4 estimation. The results of thyroid function were classified by use of the following as normal reference range:

TSH: 0.39-4.24 mIU/L

T3: 0.67-1.79ng/dl

T4: 53-121 ng/dl

Hypothyroidism—when T3, T4 was less and TSH greater than the reference ranges.

Hyperthyroidism—when T3, T4 was greater and TSH less than the reference ranges.

Subclinical hypothyroidism—when T3, T4 were within normal range and TSH greater than the reference ranges.

Subclinical hyperthyroidism—when T3, T4 were within normal range and TSH less than the reference ranges

### Results

In the present study, most of the patients were above the age group of  $\geq 50$  years (66%). The Mean age of study population was  $54.63 \pm 8.85$  years. Mean T3, T4, TSH (mg/dl) and HbA1c (%) level was  $0.88 \pm 0.77$ ,  $80.51 \pm 40$ ,  $9.69 \pm 9.4$  and  $9.17 \pm 2.5$  respectively.

In this study, 68 established diabetics were screened for thyroid disorders by TFT. Abnormal thyroid function was found in 43 T2DM cases and remaining diabetics had normal thyroid function. Among 68 cases low thyroid function was noted in 20 patients and 18 subjects had Sub-clinical hypothyroidism. Hyperthyroidism was noted in 05 patients.

**Table-I**

*Distribution according to HbA1C Values*

| HbA1C    | No. of Patients | Percentage (%) |
|----------|-----------------|----------------|
| 6.5-9.5  | 37              | 54.41          |
| 9.5-12.5 | 28              | 41.17          |
| >12.5    | 3               | 4.41           |
| Total    | 68              | 100.00         |

**Table-II**

*Distribution according to T3 Values*

| T3 range  | No. of patients | Percentage (%) |
|-----------|-----------------|----------------|
| 0.11-.030 | 04              | 5.8            |
| 0.31-0.60 | 11              | 16.17          |
| 0.61-0.66 | 03              | 4.41           |
| 0.67-1.00 | 41              | 60.29          |
| 1.01-1.34 | 03              | 4.41           |
| 1.35-1.80 | 04              | 5.88           |
| 1.80-2.00 | 02              | 2.94           |

Mean=0.8836, Mode=0.90

Number of patients with hypotridothyronine = 15

Number of patients with hypertridothyronine = 02

**Table-III**

*Distribution according to T4 Values*

| T4 range  | No. of patients | percentage |
|-----------|-----------------|------------|
| 13.8-52   | 13              | 19.11%     |
| 52.1-121  | 52              | 76.47%     |
| 121.1-192 | 03              | 4.41%      |
|           | 68              | 100        |

Number of patients with hypotetraidothyronine = 13

Number of patients with hypertetraidothyronine = 03

**Table-IV**

*Distribution according to TSH Values*

| TSH range      | No. of patients | percentage% |
|----------------|-----------------|-------------|
| 0.136-0.39     | 5               | 7.35        |
| 0.40 to 4.24   | 25              | 36.76       |
| 4.24 to 20.00  | 29              | 42.64       |
| 20.01 to 30.00 | 01              | 1.47        |
| 30.01 to 40    | 08              | 11.76       |
| Total          | 68              | 100         |

**Table-V**

*Distribution according to thyroid profile of patients*

| T3             | T4           | TSH            |
|----------------|--------------|----------------|
| 0.11-0.67 (23) | 13.8-53 (19) | 0.136-0.39 (6) |
| 0.67-1.79(42)  | 53-121 (42)  | 0.40-4.24 (25) |

Number of patients with subclinical hypothyroidism = 18

Number of patients with clinical hypothyroidism = 20

**Table-VI**

*Prevalence of Thyroid dysfunction*

| Thyroid disorders          | No. of patients | Percentag (%) |
|----------------------------|-----------------|---------------|
| Hypothyroidism             | 20              | 29.41         |
| Subclinical hypothyroidism | 18              | 26.47         |
| Hyperthyroidism            | 5               | 7.35          |
| Euthyroid                  | 25              | 36.76         |
| Euthyroid                  | 25              | 36.76         |
| Total                      | 68              | 100           |

**Discussion:**

Diabetes occupies a major part among the endocrinal metabolic diseases. The disease is responsible for significant mortality and morbidity due to complications. This study was conducted at Dhaka Medical College Hospital, Bangladesh. Thyroid functions were studied in type 2 Diabetes Mellitus patients attending the OPD and IPD of DMCH hospital, Dhaka. A total of 68 type 2 diabetics were studied. All were confirmed diabetics who previously had plasma glucose levels of >126 mg/ dl or RBS of >199 and HbA1c>6.5% on more than one occasion and were receiving treatment such as Insulin, OHA's or physical exercise therapy. Prevalence and spectrum of thyroid disorders in type 2 diabetics were noted. Diabetes mellitus is not only simple hyperglycemia, but it affects every organ mainly nervous system, renal, cardiovascular and other endocrine glands especially the thyroid. The associations between diabetes and thyroid disorders have long been reported and they have been shown to mutually influence each other. The present study recorded a high prevalence of hypothyroidism (29.41%) followed by subclinical hypothyroidism (26.47%) and hyperthyroidism was found in (7.35%) patients. Our results are in accordance with the studies Pimenta et al. [8] (Prevalence of thyroid dysfunction was 51.6%) and Udiong et al. [9] (prevalence was 46.5%). Of 68 patients of Type 2 diabetes mellitus 25 patients (36.76%) had normal thyroid functions and hypothyroidism being the most common thyroid dysfunction.

**Conclusion:**

From above study patient who are suffering from diabetes mellitus should be screened for thyroid disorder especially hypothyroidism for control of both. Patients suffering from diabetes mellitus that are complaining of unintentional weight loss or weight gain should be screened for thyroid disorder.

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