

## Original Research Article

# Thyroid dysfunction in patients with diabetes mellitus at Puducherry, India: a retrospective study

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## ABSTRACT

**Background:** There is a complex interrelationship in the co-existence of thyroid dysfunction among diabetic patients and may be related to the development of cardiovascular diseases and other complications of long term metabolic derangements. The prevalence of thyroid dysfunction varies from 10 to 24% among diabetic patients. The objective of the present study was to determine the prevalence of thyroid dysfunction among the patients with diabetes mellitus in a tertiary care hospital at Puducherry, India.

**Methods:** This retrospective study was conducted during June 2018 analysing the records of diabetes patients attending to the diabetes OPD, Department of General Medicine in the past one year and their association with thyroid dysfunction was studied.

**Results:** Among the study participants (n=200), 14.5% (n=29) were Type I diabetics and 85.5% (n=171) were type II Diabetes patients. The prevalence of Thyroid Dysfunction (TD) among the study participants was 28.5% (n=57). The proportion of TD was higher among type 1 DM compared to type 2 (p<0.001). The prevalence of subclinical hypothyroidism was more (n=7, 24.1%) among type 1DM compared to type II DM patients (p=0.05).

**Conclusions:** There was a higher prevalence of TD among the diabetics. TD was more frequent among type 1 DM compared to Type 2 DM patients and the most frequent TD associated with diabetes was subclinical hypothyroidism.

**Keywords:** Diabetes mellitus, Prevalence, Thyroid dysfunction

## INTRODUCTION

Metabolic disorders are more rampant in present scenario as we can witness an epidemiological transition from infectious to non-communicable diseases.

Diabetes is the most common among the metabolic disorders and next in the order would be thyroid dysfunction.<sup>1</sup> There is great variability in the prevalence of Thyroid Dysfunction in general population, ranging from 6.6% to 13.4%.<sup>2,3</sup> In diabetic patients, the prevalence still varies more ranging from 10 to 24%.<sup>3,4</sup>

These differences in magnitude can be attributed to the different methods and criteria for diagnosing TD, the

prevalence of iodine deficiency, instrumental variations while assaying TSH and ethnic diversity.<sup>5</sup> There exists a complex interrelationship in the co-existence of thyroid dysfunction among diabetic patients and may be related to the development of cardiovascular diseases and other complications of long term metabolic derangements.<sup>3</sup>

The study was designed to reveal the magnitude of diabetes-thyroid dysfunction co-existence and help in bringing out the differences in the two metabolic disorders manifesting separately and together as a unit.

The present study aimed at determining the prevalence of thyroid dysfunction among the patients with diabetes mellitus in a tertiary care hospital at Puducherry.

## METHODS

This retrospective study was conducted during June 2018 at Diabetes OPD, Department of General Medicine, Sri Venkateshwarra Medical College Hospital and Research Centre, Ariyur, Puducherry.

Accordingly, diabetic patients satisfying the inclusion criteria viz: either type 1 or type 2 diabetic patients with duration of diabetes for at least 6 months, who had undergone thyroid blood investigations and with residence in South India, attending to the diabetology OPD, Department of General medicine during the time July 2017 to June 2018 (One year) were included in the study.

The patient anonymity was maintained by masking the names and identification features. Those patients with previously known thyroid abnormalities like thyroid cancers, patients who underwent thyroidectomy and those not willing for thyroid examination or blood investigations were excluded from the study.

A total of 200 diabetic subjects were included in the study on par with a calculated sample size of 200 as estimated using the prevalence of thyroid diabetes co-existence of 14.7% reported in a study by Palma et al.<sup>6</sup>

Patient information was obtained from the patient records available in the diabetology clinic pertaining to socio-demographic details, thyroid profile, HbA1c levels and blood sugar levels and were recorded in a proforma.

### Statistical analysis

The collected data was entered and analyzed by using SPSS (Statistical Package for Social Sciences) version 19.0 for windows. The findings are expressed in terms of proportions or percentages. Chi-square test was used to check significant associations between categorical

variables. A p value <0.05 was considered as statistically significant.

## RESULTS

Among the study participants (n=200), 14.5% (n=29) were Type I diabetics and 85.5% (n=171) were type II Diabetes patients. The clinical and socio-demographic characteristics of the study participants are mentioned in Table 1.

The prevalence of Thyroid Dysfunction (TD) among the study participants was 28.5% (n=57). The proportion of TD was higher among type 1 DM compared to type 2 (p<0.001).

**Table 1: Clinical and socio-demographic variables of study participants (n=200).**

Variables	Type I diabetics (n=29)	Type II diabetics (n=171)
Age (Mean $\pm$ SD)	31 $\pm$ 3.2	43 $\pm$ 5.6
<b>Gender</b>		
Male	20 (69)	90 (52.6)
Female	9 (31)	81 (47.4)
Hypertension (yes)	12 (41.4)	101 (59.1)
Dyslipidemia (yes)	15 (51.7)	128 (74.9)
Previous thyroid dysfunction (yes)	12 (41.4)	45 (26.3)
BMI (Kg/m <sup>2</sup> )	23.2 $\pm$ 4.5	31.4 $\pm$ 7.2
HbA1c levels (%)	12.3 $\pm$ 3.1	9.2 $\pm$ 4.1
TSH levels ( $\mu$ UI/mL)	2.7 $\pm$ 1.2	2.4 $\pm$ 0.8
FT4 ( $\mu$ UI/mL)	1.25 $\pm$ 0.2	1.3 $\pm$ 0.3

The prevalence of subclinical hypothyroidism was more (n=7, 24.1%) among type 1DM compared to type II DM patients (p=0.05) (Table 2).

**Table 2: Distribution of types of TD among the Diabetic patients (n=200).**

*Type of thyroid dysfunction	Type I diabetics (N=29)	Type II diabetics (N=171)	**p-value	Overall diabetics (n=200)
SC-Hypo	7 (24.1)	21 (12.3)	0.05	28 (14)
C-Hypo	2 (6.9)	16 (9.4)	0.67	18 (9)
SC-Hyper	2 (6.9)	5 (2.9)	0.28	7 (3.5)
C-Hyper	1 (3.4)	3 (1.8)	0.55	4 (2)
TD	12 (41.4)	45 (26.3)	<0.001	57 (28.5)

\*\*Chi-square test; SC-Hypo -Subclinical hypothyroidism; C-hypo- Clinical Hypothyroidism; SC-Hyper-Subclinical hyperthyroidism; C-Hyper- Clinical Hyperthyroidism; TD-Total thyroid dysfunction.

Hypothyroidism (n=46, 23%) was more common than hyperthyroidism (n=11, 5.5%) among the diabetics.

The proportion of hyperthyroidism did not significantly vary between the type 1 and type 2 DM patients involved in the study.

## DISCUSSION

Diabetes is a metabolic derangement caused by lack of insulin or its action whereas thyroid dysfunction does the same due to imbalance in thyroxin levels. The metabolic disturbances caused may be more problematic if the two disorders co-exist in the same individual. In the present study the prevalence of Thyroid Dysfunction (TD) among the study participants was 28.5% (n=57). This was higher when compared to the prevalence of 14.7% in a previous study by Palma et al.<sup>6</sup> who included a larger sample size of 386 diabetics among which 21% were type 1 DM patients. In present study, 14.5% (n=29) were Type I diabetics and 85.5% (N=171) were type II Diabetes patients which was lesser compared to the previous study. In the present study, the proportion of TD was higher among type 1 DM compared to type 2 (p<0.001) which was similar to the previous study.

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The most common TD reported was sub-clinical hypothyroidism (14%, n=28) which was more (n=7, 24.1%) among type 1DM compared to type II DM patients (p=0.05). The reason for such concurrence would be the presence of autoimmune factors common to both the disorders yet it might require autoimmune antibodies assay to prove which is beyond the scope of this study. In the study by Ramos et al they considered measurement of anti-TPO antibodies and was proved that 18.2% of the subjects with TD had autoimmune antibodies positivity.<sup>7</sup> Palma et al anti-TPO was positive in 12 (14.6%) patients with T1DM and in 30 (9.9%) in T2DM patients which again reinforces the ideology behind considering an autoimmune background for the co-existence of T1DM and SC-Hypo.<sup>6</sup> In the study by Souza et al, evaluating 101 patients with T1DM, the prevalence of Sub-Clinical Hypothyroidism was 6.5% and the prevalence of 30.7% of at least one antibody was found positive in the same study, where 3 antibodies were assayed: anti-thyroglobulin, anti-microsomal, and anti-TPO.<sup>8</sup> Thus hypothyroidism has to be screened in all the patients with diabetes and preferably an antibody assay would add more meaning to the diagnosis and management.

The study had some limitations like a convenient sampling technique adopted to select the participants and being a record-based study. The thyroid antibody assays were not part of the study if added would have given

more details regarding the autoimmune etiology of Diabetes TD co-existence.

## CONCLUSION

The study showed a higher prevalence of TD among the Diabetics. TD was more frequent among type 1 DM compared to Type 2 DM patients and the most frequent TD associated with diabetes was subclinical hypothyroidism. Further prospective studies are indicated to establish the sequelae towards complications like cardiovascular diseases among the patients with such co-existing TD and DM.

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