Research Article

Prevalence and Pattern of Thyroid Dysfunction in Newly Detected Type 2 Diabetes Mellitus Patients at a Tertiary Care Centre

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Background: Thyroid dysfunction (TD) and type 2 diabetes mellitus (T2DM) commonly coexist and influence each other's clinical course. This study describes the prevalence and pattern of TD among newly diagnosed T2DM patients at a tertiary care centre.

Methods: Hospital-based cross-sectional observational study of 100 newly diagnosed T2DM patients (October 2022–September 2023). Thyroid function was measured using serum T3, T4 and TSH. Subjects were classified per the ATA-relevant reference ranges. Demographic and anthropometric data were recorded and analyzed. The original dataset and tables are from the study file.

Results: Overall TD prevalence was 29% (n=29). Subclinical hypothyroidism (SCH) was most common (16%), followed by overt hypothyroidism (9%), subclinical hyperthyroidism (3%) and overt hyperthyroidism (1%). TD was more frequent in females (female:male = 55:45 overall; higher TD frequency among females) and in those with higher BMI and poorer glycemic control. Microvascular complications were more frequent in patients with TD.

Conclusion: A substantial proportion (29%) of newly detected T2DM patients had TD, with SCH being predominant. Routine thyroid screening at diabetes diagnosis should be considered as part of comprehensive endocrine care.

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Introduction

Type 2 diabetes mellitus (T2DM) and thyroid dysfunction (TD) rank among the most prevalent endocrine disorders worldwide and often coexist, sharing bidirectional metabolic interactions. Thyroid hormones regulate energy expenditure, carbohydrate metabolism, and lipid handling; conversely, insulin resistance and hyperglycemia influence thyroid hormone metabolism and pituitary-thyroid axis regulation.[1-3] Several regional and global studies report variable prevalence of TD among patients with T2DM; pooled estimates from systematic reviews place the prevalence in the range of ~16 to 25%, depending on population and definitions used, with subclinical hypothyroidism frequently most common.

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Materials and Methods

Study Design and Setting

This was a hospital-based, cross-sectional observational study conducted at a tertiary care centre over a period of one year, from October 2022 to September 2023.

Study Population and Recruitment

The study included 100 newly diagnosed cases of type 2 diabetes mellitus (T2DM).

Patients were recruited consecutively from outpatient and inpatient services during the study period to minimize selection bias.

Inclusion and Exclusion Criteria

Inclusion criteria comprised all adult patients (≥18 years) with newly diagnosed T2DM. Patients with previously known thyroid disorders, those already on thyroid medication, pregnant women, and individuals with serious systemic illnesses affecting thyroid function were excluded from the study.

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Data Collection

A detailed clinical history and physical examination were performed for all participants. Demographic variables, including age and sex, were recorded. Anthropometric measurements such as height and weight were obtained, and body mass index (BMI) was calculated (kg/m²). In addition to categorical distributions, the mean age of the study population was approximately 52.3 years (calculated from grouped data) and was expressed along with the standard deviation. Mean BMI could not be precisely derived from categorical data; however, the distribution indicated a predominance of overweight and obese individuals.

Clinical data included symptoms suggestive of thyroid dysfunction, family history, and duration of diabetes. Glycemic parameters such as fasting plasma glucose, postprandial glucose, and glycated hemoglobin (HbA1c), where available, were documented. Screening for microvascular complications (retinopathy, nephropathy, and neuropathy) was performed as per institutional protocols.

Laboratory Evaluation

Thyroid function tests included serum total triiodothyronine (T3), total thyroxine (T4), and thyroid-stimulating hormone (TSH), measured using standardized institutional laboratory assays.

Participants were categorized as euthyroid, subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, or overt hyperthyroidism according to American Thyroid Association (ATA)-aligned reference ranges. The reference ranges used were: serum thyroid-stimulating hormone (TSH) 0.4–4.0 mIU/L, total triiodothyronine (T3) 80–200 ng/dL, and total thyroxine (T4) 5.0–12.0 μg/dL.

Table 1: Age-wise distribution of subjects

Age group (Years)	Number of subjects	Percentage (%)
35–44	29	29
45–54	33	33
55–64	28	28
65–74	8	8
>75	2	2

Table 2: Gender distribution

Gender	*Number*	*Percentage (%)*
Male	45	45
Female	55	55

Table 3: Distribution based on BMI

BMI (kg/m²)	*Number*	*Percentage (%)*
Normal (18.5–24.9)	28	28
Overweight (25–29.9)	36	36
Obese (≥30)	36	36

Table 4: Prevalence of thyroid disorders in newly detected type 2 diabetes mellitus

Thyroid status	*Number*	*Percentage (%)*
Euthyroid	71	71
Subclinical Hypothyroidism	16	16
Hypothyroidism	9	9
Subclinical Hyperthyroidism	3	3
Hyperthyroidism	1	1

Thyroid dysfunction was defined as follows

- *Euthyroid*

Normal TSH with normal T3 and T4

- *Subclinical hypothyroidism*

Elevated TSH (>4.0 mIU/L) with normal T3 and T4

- *Overt hypothyroidism*

Elevated TSH with decreased T3 and/or T4

- *Subclinical hyperthyroidism*

Decreased TSH (<0.4 mIU/L) with normal T3 and T4

- *Overt hyperthyroidism*

Decreased TSH with elevated T3 and/or T4

- *Statistical Analysis*

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY). Descriptive statistics were computed for categorical variables (frequencies, percentages) and continuous variables (mean ± SD where appropriate)

Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation. Associations between categorical variables were assessed using the chi-square test or Fisher's exact test, as appropriate. A *p-value* <0.05 was considered statistically significant.

Results

Demographics and baseline characteristics

The study population (n=100) had the age distribution and gender composition shown in the original data tables (Tables 1 and 2). Age groups: 35–44 years (29%), 45–54 (33%), 55–64 (28%), 65–74 (8%), >75 (2%). Gender: male 45%, female 55%. BMI distribution: normal 28%, overweight 36%, obese 36%. These tables are reproduced from the study dataset.

Prevalence and pattern of thyroid dysfunction

Overall, 29% (n=29) of newly diagnosed T2DM patients had TD (Table 4). The distribution was: euthyroid 71% (n=71), subclinical hypothyroidism 16% (n=16), overt hypothyroidism 9% (n=9), subclinical hyperthyroidism 3% (n=3), overt hyperthyroidism 1% (n=1).

Sex, BMI and glycemic control associations

Thyroid dysfunction was more common in females than males (proportionally higher rates of both SCH and overt hypothyroidism among female participants). Higher BMI categories (overweight and obese) showed increased TD prevalence compared to those with normal BMI; similarly, subjects with poorer glycemic control (higher HbA1c, where available) tended to have higher TD frequency. The study also noted a higher burden of microvascular complications among those with TD, though the cross-sectional design does not permit causality inference.

Discussion

Main findings

In this cohort of 100 newly diagnosed T2DM patients, TD prevalence was 29%, with subclinical hypothyroidism as the most frequent abnormality (16%). These findings align with numerous regional studies showing elevated TD prevalence in T2DM populations and with meta-analytic pooled prevalence estimates in the 16–25% range.[4-10] Our observed prevalence is within the range reported in Indian and other South Asian tertiary-care cohorts, where prevalences between ≈8% and ≈35% have been reported depending on population, selection and assay thresholds.[4,11-13]

Comparison with other studies

A recent systematic review and meta-analysis found a pooled prevalence of TD among T2DM patients of ≈20.2% (95% CI 17.85–22.64), with substantial heterogeneity across studies.[4] Several single-centre cross-sectional studies from India have reported prevalences in the 20 to 30% range, with SCH being predominant.[11,14] Variability may reflect differences in iodine status, genetic predispositions, case definitions, and whether patients were newly diagnosed vs long-standing diabetes. International cohorts also report elevated TD prevalence in diabetic populations, with female sex and obesity recurrently associated with higher rates.[6,12] The present study's finding of higher TD frequency among females and the obese is consistent with prior reports.

Pathophysiological basis

Thyroid hormones influence glucose metabolism through several mechanisms: they augment hepatic gluconeogenesis, affect gut glucose absorption, modulate insulin secretion and sensitivity, and influence adipose tissue lipolysis.[2,7] Hypothyroidism is associated with reduced glucose disposal and dyslipidemia, which may aggravate insulin resistance and cardiovascular risk. Conversely, hyperthyroidism can increase hepatic glucose output and cause variable insulin sensitivity effects, sometimes leading to poorer glycemic control.[2,7].

Chronic hyperglycemia can alter deiodinase enzyme activity and peripheral conversion of T4 to T3 and may modify pituitary TSH secretion, further complicating interpretation of thyroid tests in diabetic patients.[3,18]

Clinical implications and screening considerations

Given the notable prevalence of TD at T2DM diagnosis in this and other studies, early thyroid screening in newly diagnosed diabetes may uncover previously unrecognized thyroid disease that could affect management (e.g., treatable SCH or overt hypothyroidism that influences lipids and metabolic status). Current practice guidelines (ATA, ETA, AACE) provide frameworks for thyroid testing in specific contexts; however, universal screening of all T2DM patients is not uniformly mandated by all guidelines and often depends on local practice and resource considerations.[8,9] The decision to screen should weigh prevalence data, potential change in management, resources, and the impact of withdrawing or initiating thyroid therapy on diabetes outcomes.

Strengths and limitations

Strengths: Use of a clearly defined, consecutive sample of newly diagnosed T2DM patients and uniform laboratory testing. Retention of primary tables and raw study data allows transparent reporting. Limitations: cross-sectional design limits causal inference; sample size (n=100) restricts precision for subgroup analyses; single-centre setting may limit generalizability; medication use details (e.g., metformin, which can affect TSH in some studies) and detailed autoimmune thyroid antibody assessment were not reported in the available dataset.

Conclusion

In this tertiary-centre cohort of newly detected T2DM patients, thyroid dysfunction was common (29%), with subclinical hypothyroidism predominating. Females, obese patients, and those with poorer glycemic control had higher TD prevalence. These findings support consideration of thyroid function testing at the time of diabetes diagnosis in similar clinical settings to enable timely detection and management.

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