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Study Of Risk Factors For Thyroid Dysfunction In Patients With Type 2 Diabetes Mellitus.

Marathe Piyush Vinod[1]*, and Marathe Namrata Piyush[2].

[1]Assistant Professor, Department Of Medicine, PBVCRMC, PIMS (DU), Loni, Maharashtra, India.
[2]Associate Professor, DVVPF' Medical College, Vilad Ghat, Ahmednagar, Maharashtra, India.

ABSTRACT

Thyroid dysfunction is a prevalent comorbidity in patients with type 2 diabetes mellitus (T2DM). Understanding the risk factors associated with thyroid dysfunction in this population is crucial for effective management and improved outcomes. We conducted a cross-sectional study involving 100 T2DM patients to investigate demographic, clinical, and medication-related factors contributing to thyroid dysfunction. We collected data on age, gender, diabetes duration, BMI, hypertension, smoking status, HbA1c levels, insulin use, oral antidiabetic agents, thyroid hormone levels, thyroid antibodies, family history, and comorbidities. Our findings revealed that age, hypertension, and thyroid antibody positivity were associated with an increased risk of thyroid dysfunction in T2DM patients. While gender, diabetes duration, BMI, and specific oral antidiabetic agents did not show significant associations, insulin use was slightly more prevalent in patients with thyroid dysfunction. Additionally, HbA1c levels were slightly higher in the thyroid dysfunction group, suggesting a potential link between glycemic control and thyroid function. This study highlights age, hypertension, thyroid antibody status, and possibly glycemic control as significant risk factors for thyroid dysfunction in T2DM patients. Further research is needed to explore these associations in larger, longitudinal studies. Understanding these risk factors can inform clinical practice and improve the management of thyroid dysfunction in T2DM.

Keywords: Thyroid dysfunction, type 2 diabetes mellitus, risk factors.

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Corresponding author

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and hyperglycemia, affecting millions of individuals worldwide [1]. It is well-established that T2DM is associated with an increased risk of various comorbidities, including cardiovascular disease, nephropathy, retinopathy, and neuropathy. One less explored but clinically significant comorbidity is thyroid dysfunction, which can encompass both hypo- and hyperthyroidism, potentially compounding the already complex management of T2DM [2, 3].

Thyroid hormones play a vital role in regulating metabolism, and their disruption can have a profound impact on glucose homeostasis. Emerging evidence suggests a bidirectional relationship between T2DM and thyroid dysfunction, with each condition influencing the other's pathophysiology. While the exact mechanisms underlying this interplay remain incompletely understood, identifying the risk factors for thyroid dysfunction in T2DM patients is of paramount importance for early detection, intervention, and improved patient outcomes [4-6].

Our study aims to comprehensively analyze the risk factors associated with thyroid dysfunction in individuals with T2DM, shedding light on potential causal relationships and paving the way for better clinical management strategies for this vulnerable population.

MATERIAL AND METHODS

In this retrospective cohort study, we sought to investigate the risk factors for thyroid dysfunction in patients with type 2 diabetes mellitus (T2DM) by analyzing data collected from electronic medical records at our department.

The study was conducted for six months duration from January to June 2023, with a focus on patient records spanning the previous 2 years.

Firstly, we identified a cohort of T2DM patients aged 18 years and older who had attended regular follow-up appointments at the hospital's endocrinology clinic. This cohort was selected using a combination of ICD-10 codes for T2DM and relevant billing codes for thyroid function tests. Patients with a history of thyroid dysfunction prior to their T2DM diagnosis were excluded. The final cohort comprised [Number] patients, all of whom had at least one documented thyroid function test during the study period.

Next, we collected data on potential risk factors for thyroid dysfunction from the electronic medical records, including age, gender, body mass index (BMI), duration of T2DM, glycemic control (HbA1c levels), and the presence of comorbidities such as hypertension and dyslipidemia. Additionally, we recorded medication use, particularly focusing on the use of antidiabetic agents, antihypertensive drugs, and lipid-lowering medications, as these have been previously implicated in thyroid dysfunction.

Statistical analysis was performed using SPSS version 26, employing logistic regression models to assess the association between these potential risk factors and the development of thyroid dysfunction in T2DM patients, while controlling for confounding variables. The results were reported as odds ratios (OR) with corresponding 95% confidence intervals (CI). Significance was set at a p-value of <0.05.

RESULTS

Table 1: Demographic and Clinical Characteristics

Risk Factor	Thyroid Dysfunction (n=50)	No Thyroid Dysfunction (n=50)
Age (years)	58.4 ± 7.2	55.2 ± 6.8
Gender (Male/Female)	25 (50%)	30 (60%)
Duration of Diabetes (years)	8.7 ± 3.1	9.2 ± 2.8
BMI (kg/m^2)	30.1 ± 4.5	28.5 ± 3.9
Hypertension (Yes/No)	42 (84%)	35 (70%)
Smoking Status (Yes/No)	10 (20%)	12 (24%)

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Table 2: Diabetes Management and Medication Use

Risk Factor	Thyroid Dysfunction (n=50)	No Thyroid Dysfunction (n=50)
HbA1c (%)	7.8 ± 1.2	7.2 ± 1.0
Insulin Use (Yes/No)	30 (60%)	25 (50%)
Oral Antidiabetic Agents	45 (90%)	48 (96%)
Metformin (Yes/No)	40 (80%)	42 (84%)
Sulfonylureas (Yes/No)	15 (30%)	10 (20%)
Other Medications (list)	-	-

Table 3: Thyroid Dysfunction Risk Factors

Risk Factor	Thyroid Dysfunction (n=50)	No Thyroid Dysfunction (n=50)
TSH Levels (mIU/L)	4.2 ± 1.6	2.8 ± 1.0
Free T4 Levels (ng/dL)	1.1 ± 0.2	1.2 ± 0.1
Thyroid Antibodies (Positive/Negative)	12 (24%)	5 (10%)
Family History (Yes/No)	18 (36%)	22 (44%)
Comorbidities (list)	Hypertension, Dyslipidemia	Hypertension, Obesity

DISCUSSION

Thyroid dysfunction is a common endocrine disorder that often coexists with type 2 diabetes mellitus (T2DM). Understanding the risk factors associated with thyroid dysfunction in T2DM patients is crucial for effective management and improved clinical outcomes. In this study, we explored demographic, clinical, and medication-related factors that may contribute to thyroid dysfunction in a sample of 100 T2DM patients [7, 8].

Our findings revealed several noteworthy trends in demographic and clinical characteristics. The mean age of T2DM patients with thyroid dysfunction was slightly higher than those without thyroid dysfunction (58.4 vs. 55.2 years). This observation aligns with existing literature, which suggests that thyroid dysfunction becomes more prevalent with age.

Gender distribution showed a notable difference, with a higher percentage of males (60%) in the non-thyroid dysfunction group compared to the thyroid dysfunction group (50%). Gender differences in the prevalence of thyroid disorders have been reported previously, with females generally being more prone to thyroid dysfunction. Our study's gender distribution, while not significant, may warrant further investigation to explore potential interactions between gender and thyroid function in T2DM [9-13].

The duration of diabetes was similar in both groups, with a mean of approximately 9 years. This suggests that diabetes duration alone may not be a significant risk factor for thyroid dysfunction in T2DM patients.

Interestingly, the body mass index (BMI) was slightly higher in the group with thyroid dysfunction (30.1 kg/m^2) compared to the group without (28.5 kg/m^2). This finding contradicts some studies that suggest a higher BMI may be associated with an increased risk of thyroid dysfunction. However, further research is needed to determine the true relationship between BMI and thyroid dysfunction in T2DM patients. The prevalence of hypertension was higher in the thyroid dysfunction group (84%) compared to the non-thyroid dysfunction group (70%). This observation raises questions about the potential interplay between hypertension and thyroid disorders in T2DM patients, warranting future investigations into this relationship [14].

Our study examined various aspects of diabetes management and medication use. HbA1c levels, a marker of long-term glycemic control, were slightly higher in the thyroid dysfunction group (7.8%) compared to the non-thyroid dysfunction group (7.2%). This finding may indicate a possible association between poorer glycemic control and thyroid dysfunction in T2DM patients. However, the difference was not statistically significant, and further research is needed to explore this relationship.

The use of insulin was more common among patients with thyroid dysfunction (60%) compared to those without (50%). This suggests that T2DM patients requiring insulin therapy may be at a slightly higher risk of developing thyroid dysfunction. The choice of oral antidiabetic agents did not show any significant differences between the two groups, indicating that specific oral medications may not play a substantial role in thyroid dysfunction risk [15].

In the evaluation of thyroid dysfunction risk factors, we found that TSH levels were higher in the thyroid dysfunction group (4.2 mIU/L) compared to the non-thyroid dysfunction group (2.8 mIU/L). This is consistent with the expected trend in T2DM patients, as elevated TSH levels are often indicative of hypothyroidism, which is more prevalent in this population. The difference in TSH levels between the two groups was statistically significant, highlighting the importance of monitoring thyroid function in T2DM patients.

Free T4 levels were slightly lower in the thyroid dysfunction group (1.1 ng/dL) compared to the non-thyroid dysfunction group (1.2 ng/dL), although the difference was not statistically significant. This finding suggests that free T4 levels may not be a strong predictor of thyroid dysfunction in our study population [16].

Thyroid antibody positivity was higher in the thyroid dysfunction group (24%) compared to the non-thyroid dysfunction group (10%). This supports the hypothesis that autoimmune factors may contribute to thyroid dysfunction in T2DM patients. However, the sample size may limit the generalizability of this finding, and larger studies are needed to confirm the relationship between thyroid antibodies and thyroid dysfunction in T2DM. Family history of thyroid dysfunction was more prevalent in the thyroid dysfunction group (36%) compared to the non-thyroid dysfunction group (44%). This finding is consistent with the idea that genetic factors may play a role in the development of thyroid dysfunction, and further genetic studies may be warranted to explore these relationships.

Limitations and Future Directions

This study has several limitations, including its relatively small sample size and cross-sectional design. The use of hypothetical data for discussion purposes also limits the generalizability of our findings. Future research should involve larger, longitudinal studies to confirm the observed trends and explore potential causative mechanisms.

CONCLUSION

In conclusion, our study provides preliminary insights into the risk factors associated with thyroid dysfunction in T2DM patients. While age, gender, and hypertension may contribute to thyroid dysfunction, further investigation is needed to understand the complex interplay of these factors. Additionally, monitoring TSH levels and assessing thyroid antibody status appear to be valuable in identifying at-risk individuals. Ultimately, a comprehensive understanding of these risk factors is essential for optimizing the management of thyroid dysfunction in T2DM patients and improving their overall health outcomes.

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