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Original Research Article

FREQUENCY OF THYROID DYSFUNCTION IN PATIENTS WITH TYPE 2 DIABETES MELLITUS PRESENTING TO SAIDU GROUP OF TEACHING HOSPITAL, SWAT

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ABSTRACT

Background: *Thyroid dysfunction is frequently associated with type 2 diabetes mellitus (T2DM) due to shared pathophysiological mechanisms, including insulin resistance and autoimmune processes. Identifying its prevalence in diabetic populations is essential for early diagnosis and management.* ***Objective:*** *To determine the frequency of thyroid dysfunction in patients with T2DM presenting to Saidu Group of Teaching Hospital, Swat.* ***Study Design:*** *Cross-sectional study.* ***Setting:*** *Department of Medicine, Saidu Group of Teaching Hospital, Swat.* ***Duration of Study:*** *11 July 2024 to 11 January 2025.* ***Methods:*** *A total of 185 patients aged 27–75 years with confirmed T2DM (defined as fasting plasma glucose ≥126 mg/dL, HbA1c ≥6.5%, or documented antidiabetic medication use for ≥3 years) were included. Thyroid dysfunction was defined as hypothyroidism (TSH <0.5 mIU/L in males, <0.4 mIU/L in females) or hyperthyroidism (TSH >4.15 mIU/L in males, >4.5 mIU/L in females). Data were analyzed using descriptive statistics, and stratification was performed by gender and family history.* ***Results:*** *The mean age of participants was 51.50 ± 14.31 years. The mean TSH level was 2.69 ± 1.47 mIU/L. Males constituted 103 (55.7%) and females 82 (44.3%) of the study population. Overall, thyroid dysfunction was observed in 46 (24.9%) patients, with higher frequency among females and those with a family history of thyroid disease.* ***Conclusion:*** *Thyroid dysfunction was present in approximately one-quarter of T2DM patients. Screening for thyroid disorders, particularly in females and individuals with a positive family history, may improve patient outcomes through earlier detection and management.*

Keywords: Type 2 Diabetes Mellitus, Thyroid Dysfunction, Hypothyroidism, Hyperthyroidism

INTRODUCTION

One of the most prevalent metabolic diseases in the world, type 2 diabetes mellitus (T2DM) is primarily brought on by a combination of two primary variables: the pancreatic β-cells' diminished capacity to secrete insulin, as well as tissues' inability to react to insulin (1, 2). As illness worsens, insulin secretion is inadequate for maintaining glucose levels stable, leading to hyperglycemia. The primary trait of patients with T2DM is obesity or a greater proportion of body fat, which tends to accumulate in the abdomen (3, 4). Adipose tissue in this scenario stimulates IR by several physiological processes, such as dysregulation of adipokines as well as increased release of free fatty acids. Sedentary lifestyles, population aging, and a global increase in obesity are primary causes of the T2DM epidemic. The liver, kidneys, brain, adipose tissue as well as pancreas are among the organs implicated in development of T2DM (5, 6).

Endocrine conditions are widespread, especially thyroid-related ones. Hormones secreted by the pituitary gland regulates the vast majority of endocrine glands; nevertheless, others react directly to metabolic glands (7-9). TSH, T3, and T4 have been linked in the pathogenesis of numerous thyroid disorders. TSH is the most significant chemical that indicates thyroid function. A low TSH profile indicates hyperthyroidism, whereas a high number suggests hypothyroidism (10). One of the main characteristics of hypothyroidism is decreased or impaired 18-hydroxylase activity. Because livers create more glucose to compensate for insulin resistance in peripheral tissues, hypothyroid diabetics need less insulin to maintain glycemic control. According to a study, 28.33% of people with T2DM have thyroid dysfunction (11, 12).

Clinical implications of thyroid dysfunction in T2DM necessitate a holistic approach to patient care, including routine screening for thyroid disorders in individuals with T2DM. Due to the scarcity of literature on this topic at our regional level, this study aims to determine the frequency of thyroid dysfunction in patients with type 2 diabetes mellitus presenting to Saidu Group of Teaching Hospitals, Swat. The results of this study will help our medical professionals to explore the valuable insights into the complexities of managing thyroid dysfunction in the context of T2DM, paving the way for enhanced patient care and improved clinical outcomes.

METHODOLOGY

This cross-sectional study was conducted in the Department of Medicine at Saidu Group of Teaching Hospital, Swat, from 11/July/2024 to 11/January/ 2025. Ethical certificate was obtained from the institute. We had 185 participants in the study, with the sample size calculated using the WHO sample size calculator. The calculation was based on an anticipated frequency of thyroid dysfunction of 28.33%[12] in T2DM patients, a 95% confidence level, and an absolute precision of 6.5%. Non-probability consecutive sampling was adapted.

Patients aged between 27 and 75 years diagnosed with T2DM according to standard criteria, which was either through fasting plasma glucose (FPG) ≥126 mg/dL (7.0 mmol/L), glycated hemoglobin (HbA1c) ≥6.5% (48 mmol/mol) or documented use of antidiabetic medications for at least three years were selected for the study. Patients with autoimmune disorders, congenital diseases, or pregnancy were excluded. Written consent was obtained from all participants. Demographic details such as age, gender, education, occupation, socioeconomic status, BMI, and residential address were recorded along with clinical parameters including family history and hypertension.

Thyroid function was assessed by measuring thyroid-stimulating hormone (TSH) levels. Hypothyroidism was defined as TSH levels <0.5 mIU/L for males and <0.4 mIU/L for females, while hyperthyroidism was defined as TSH levels >4.15 mIU/L for males

and >4.5 mIU/L for females. Laboratory confirmation of thyroid dysfunction was performed at the hospital's diagnostic facility under the supervision of a consultant with at least five years of post-fellowship experience. All the data was documented on a pre-defined proforma.

Data were analyzed with the help of SPSS 21. Age, height, weight, BMI, and TSH levels were assessed as mean and standard deviation. For demographic details, thyroid dysfunction, hypertension, and family history, we used frequency and percentages. Thyroid dysfunction was stratified with gender, BMI, age, residence, occupation, education, and socioeconomic status, along with family history and hypertension, using the Chi-Square test, with a p-value of ≤0.05 considered statistically significant.

RESULTS

The study included 185 participants with a mean age of 51.50 ± 14.31 years. The average thyroid-stimulating hormone (TSH) level was 2.69 ± 1.47 mIU/L, while the mean body mass index (BMI) was 25.03 ± 1.52. Among the participants, 103 (55.7%) were male and 82 (44.3%) were female. Clinical history indicated that hypertension was present in 72 (38.9%) individuals and absent in 113 (61.1%). 43 (23.2%) participants reported a family history of thyroid dysfunction, whereas 142 (76.8%) had no such history (Table 1). Thyroid dysfunction was identified in 46 (24.9%) of the participants, while the majority, 139 (75.1%), showed no evidence of the condition (Figure 1). Stratification of thyroid dysfunction with demographic and clinical history can be seen in Table 2.

Table 1: Demographics and clinical history

Demographics and clinical history		Frequency	%
Gender	Male	103	55.7%
	Female	82	44.3%
Education	Educated	86	46.5%
	Uneducated	99	53.5%
Occupation status	Employed	98	53.0%
	Unemployed	87	47.0%
Residence	Urban	90	48.6%
	Rural	95	51.4%
Socioeconomic status	Lower class	45	24.3%
	Middle class	121	65.4%
	Upper class	19	10.3%
Hypertension	Yes	72	38.9%
	No	113	61.1%
Family history	Yes	43	23.2%
	No	142	76.8%

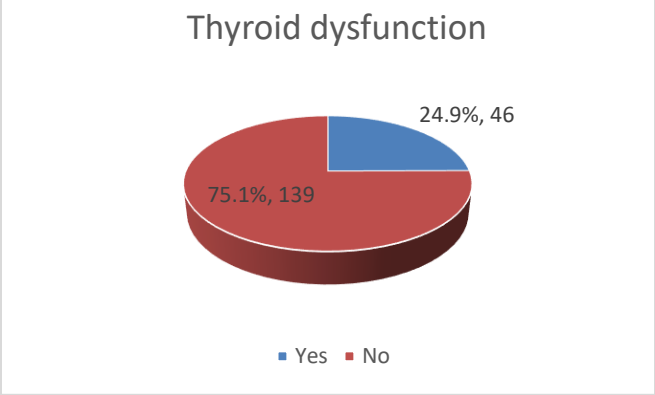

Figure 1: Frequency of thyroid dysfunction

Table 2: Stratification of thyroid dysfunction with demographics and clinical profile

Demographics and clinical profile		Thyroid dysfunction				P value
		Yes		No		
		n	%	n	%	
Age distribution (Years)	27 to 45	15	32.6%	56	40.3%	P > 0.05
	46 to 60	16	34.8%	37	26.6%	
	61 to 75	15	32.6%	46	33.1%	
BMI (Kg/m2)	18 to 24.9	21	45.7%	61	43.9%	P > 0.05
	> 24.9	25	54.3%	78	56.1%	
Gender	Male	21	45.7%	82	59.0%	P > 0.05
	Female	25	54.3%	57	41.0%	
Education	Educated	26	56.5%	60	43.2%	P > 0.05
	Uneducated	20	43.5%	79	56.8%	
Occupation status	Employed	20	43.5%	78	56.1%	P > 0.05
	Unemployed	26	56.5%	61	43.9%	
Residence	Urban	20	43.5%	70	50.4%	P > 0.05
	Rural	26	56.5%	69	49.6%	
Socioeconomic status	Lower class	10	21.7%	35	25.2%	P > 0.05
	Middle class	30	65.2%	91	65.5%	
	Upper class	6	13.0%	13	9.4%	
Hypertension	Yes	20	43.5%	52	37.4%	P > 0.05
	No	26	56.5%	87	62.6%	
Family history	Yes	17	37.0%	26	18.7%	P < 0.05
	No	29	63.0%	113	81.3%	

DISCUSSION

In our cohort of 185 diabetic patients, we observed that around 24.9% patients had developed thyroid dysfunction. In the study by K et al., which examined 91 diabetic patients, thyroid dysfunction was identified in 23.1% of participants, with hypothyroidism being the most common form. This finding is particularly noteworthy as it suggests that nearly one in four diabetic patients may have concurrent

thyroid dysfunction potentially exacerbating their metabolic control. The study also found that female patients and those with longer diabetes duration (>5 years) were more likely to develop thyroid abnormalities, highlighting essential risk factors that clinicians should consider when screening patients (13).

Similarly, Khan et al. documented a slightly lower overall prevalence of thyroid dysfunction, 19.7% in their study of 288 diabetic patients, but with a different pattern of thyroid disorders. In their population, hyperthyroidism was more common (13.19%) than hypothyroidism (6.59%). This discrepancy in findings between studies may reflect differences in study populations diagnostic criteria or regional variations in thyroid disorder prevalence. Interestingly, the mean TSH level in their research was 2.280±1.42 mU/L, which falls within the normal range, suggesting that many cases might have been subclinical presentations that could be missed without comprehensive thyroid function testing (14).

The study by Awan et al. provided additional insights by examining 150 diabetic patients and finding a 24.66% prevalence of thyroid dysfunction. The pattern of disorders in this study was somewhat different, with subclinical hyperthyroidism being the most common (13.3%), followed by hyperthyroidism (5.3%), subclinical hypothyroidism (2.7%), and hypothyroidism (3.3%). This distribution suggests that milder forms of thyroid dysfunction may be particularly prevalent in diabetic populations. The study also reported that 31.32% of female diabetic patients had thyroid dysfunction compared to only 16.41% of male patients, further supporting the notion that female gender is a potential risk factor for developing thyroid abnormalities in the context of diabetes (15).

Bukhari et al. conducted one of the larger studies with 317 diabetic patients and found an even higher prevalence of thyroid dysfunction at 37%. In their population, subclinical hypothyroidism was the most common disorder (17.4%), followed by hypothyroidism (8.5%), hyperthyroidism (6.0%), and subclinical hyperthyroidism (5.0%). The study made several important observations about risk factors, noting that thyroid dysfunction was notably associated with older age (56-65 years), female gender, and family history of thyroid disorders (16). These findings are similar to our findings, as we found that family history was notably associated with thyroid dysfunction. We also noted that female gender had a higher rate of the condition.

The pathophysiology underlying the association between diabetes and thyroid dysfunction is complex and likely multifactorial. Insulin resistance, a hallmark of type 2 diabetes, has been implicated in thyroid dysfunction through several mechanisms. Some studies suggest that hyperinsulinemia may directly affect thyroid tissue, potentially leading to structural and functional changes (14).

CONCLUSION

In conclusion, our study found that the frequency of thyroid dysfunction in type 2 diabetes mellitus patients was 24.9%. The condition was more common in females and those with a family history of thyroid dysfunction.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

YASIR ABBAS (Post Graduate Resident)

Conception of Study, Data Collection, Development of Research Methodology Design, Study Design, Review of Manuscript, Manuscript drafting, and Manuscript revisions.

WASIL KHAN (Professor)

Study Design,Critical Input, Conception of Study, and Final approval of manuscript.

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