

PREVALENCE OF DIABETES MELLITUS IN PATIENTS WITH HYPOTHYROIDISM ATTENDING A TERTIARY CARE HOSPITAL

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Abstract

To determine the prevalence of diabetes mellitus (DM) among patients with hypothyroidism. A cross-sectional study was conducted at Bolan Medical Complex Hospital, Quetta, from 24 August 2024 to 23 February 2025. A total of 91 patients with a primary diagnosis of hypothyroidism were enrolled. All participants underwent HbA1c testing, and those with HbA1c >6.5% or already receiving anti-diabetic therapy were classified as diabetic. The mean age of participants was 54.7 ± 6.1 years, with an average hypothyroidism duration of 4.5 ± 3.6 years and a mean BMI of $25.3 \pm 2.7 \text{ kg/m}^2$. The study population included 34 males (37.4%) and 57 females (62.6%). Diabetes mellitus was identified in 31 patients (34.0%). Diabetes mellitus frequently coexists with hypothyroidism. Routine screening for DM in patients with thyroid disorders, and vice versa, is essential for early detection, optimal management, and prevention of complications associated with these comorbid conditions.

INTRODUCTION

Thyroid dysfunction represents one of the most common endocrine disorders observed globally. This condition is defined by either an excessive or insufficient production of thyroid hormones (TH), which are crucial for regulating various bodily functions (Chaker et al., 2016). Hypothyroidism specifically arises when the thyroid gland does not produce enough hormones or when there is inadequate signalling from the hypothalamus or pituitary gland. The underlying causes of hypothyroidism can range from the primary failure of the thyroid gland to factors such as iatrogenic effects, which are induced by medical treatment, or transient issues that may resolve over time. Furthermore, central causes can also contribute (Chiovato et al., 2019). According to studies, clinical

hypothyroidism affects approximately 0.3% of the general population in the United States (Chen et al., 2018). This condition is notably more prevalent among individuals over the age of 65, with the incidence rate being approximately seven times higher in females compared to males, where the figures are about 40 cases per 10,000 women versus just six per 10,000 men (Diez & Iglesias, 2023).

Diabetes Mellitus (DM) is a long-term metabolic condition marked by persistently high blood sugar levels, primarily caused by insulin resistance. In addition to this, thyroid hormones are crucial in managing glucose levels in the body.⁶ They have the potential to influence blood sugar readings through multiple pathways, one of which involves the reduction of insulin production by the pancreas.

Furthermore, thyroid hormones are not only essential for the metabolism of carbohydrates but also for maintaining proper pancreatic function.^{7, 8} Conversely, the presence of DM can adversely affect both the functionality and efficiency of the thyroid gland, leading to a complex interplay between these two endocrine systems(*Eom et al., 2022*).

The aim of the present study was to determine the frequency of DM in patients of hypothyroidism.

METHODS:

In this cross-sectional study, we included 91 patients with a primary diagnosis of hypothyroidism who presented in Bolan Medical Complex Hospital, Quetta, from 24 August 2024 to 23 February 2025. Post-menopausal women and those with comorbidities such as cardiac abnormalities or endocrine-related disorders other than thyroid were excluded.

In all patients, HbA1c test was performed; patients with HbA1c levels $>6.5\%$ or those already taking anti-diabetic treatment were labelled as having diabetes. Frequency of T2D was determined.

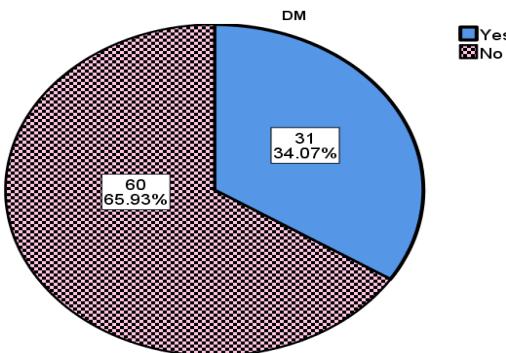
RESULTS:

The baseline characteristics of the study participants are summarized as follows: the average age was 54.7 years (± 6.1), the duration of hypothyroidism averaged 4.5 years (± 3.6), and the mean Body Mass Index (BMI) was 25.3 kg/m^2 (± 2.7). In terms of gender distribution, there were 34 males (37.4%) and 57 females (62.6%). Regarding hypertension, 47 participants (51.6%) had hypertension, while 44 participants (48.4%) did not. In terms of smoking history, 29 participants (31.9%) were current smokers, 5 participants (5.5%) were former smokers, and 57 participants (62.6%) had never smoked (Table 1).

Out of 91 patients, DM was diagnosed in 31 (34.01%) patients (Figure 1).

Table 1. Baseline Characteristics.

Age (Y)	54.7 \pm 6.1
Duration of Hypothyroidism	4.5 \pm 3.6
BMI (Kg/m ²)	25.3 \pm 2.7
Gender (%)	
Male	34 (37.4%)
Female	57 (62.6%)
Hypertension (%)	
Yes	47 (51.6%)
No	44 (48.4%)
Smoking History (%)	
Smoker	29 (31.9%)
Former Smoker	05 (5.5%)
Never Smoker	57 (62.6%)


Figure 1. Frequency of DM.

DISCUSSION:

Diabetes mellitus (DM) is a chronic and serious condition that arises from complex interactions between genetic predispositions, environmental influences, and various lifestyle choices, including obesity and physical inactivity.^{9, 10} The connection between thyroid disorders and diabetes mellitus has been recognized for decades, with studies tracing this association back to 1979. Research indicates that individuals diagnosed with type 2 diabetes mellitus tend to experience a notably higher occurrence of thyroid disorders compared to those without diabetes(Garber et al., 2012).

Numerous studies have explored the link between diabetes and thyroid disorders, particularly highlighting that hypothyroidism frequently occurs in individuals with diabetes, with prevalence rates varying between 4.8% and 31.4%(Kalra et al., 2021). Notably, thyroid disorders are more common among female patients with diabetes. Furthermore, diabetic individuals who have long-term conditions such as high lipid levels, obesity, and anemia are more susceptible to developing underlying hypothyroidism (McDermott, 2020). The connection between these two widespread endocrine disorders is significant, as hypothyroidism can exacerbate diabetic complications, underscoring the need for comprehensive management of both conditions.

A study conducted on patients with hypothyroidism revealed interesting findings regarding the prevalence of coexisting conditions. Out of the participants, 43 individuals (28.66%) were found to have both type 2 diabetes mellitus and hypertension. Meanwhile, 57 patients (38%) were diagnosed with diabetes alone, and 50 patients (33.33%) had neither condition (Walia & Bala, 2022).

In 2016, a significant population-based prospective cohort study was carried out by Chaker et al. in Rotterdam, involving a total of 8,452 participants. The research investigated the relationship between thyroid hormones and diabetes risk. The findings revealed that individuals with lower levels of free thyroxine 4 (FT4) exhibited a higher risk of developing diabetes and transitioning from prediabetes to diabetes. More specifically, the study reported a hazard ratio of 0.91, indicating a reduced likelihood of diabetes with higher FT4 levels, along with a 95% confidence interval ranging from 0.86 to 0.97. Conversely, the data also highlighted that elevated thyroid-stimulating hormone (TSH) levels were linked to an increased risk of diabetes, with a hazard ratio of 1.32, although the confidence interval was not provided in the original text(Laulund et al., 2014). In 2022, Walia and colleagues conducted a comprehensive meta-analysis that encompassed data from 36,500 individuals diagnosed with type 2 diabetes mellitus (T2DM). The findings of their study highlighted a significant association between T2DM and an elevated risk of developing subclinical hypothyroidism. Specifically, the calculated odds ratio (OR) was found to be 1.88 with a 95% confidence interval, indicating a notable increase in the likelihood of this condition among T2DM patients (Menon et al., 2019). In a departure from the findings of previous research, Menon et al. executed an expansive cohort study involving 1,180 participants, which comprised both individuals with diabetes and those without. The study was structured into two distinct groups: a community cohort of 986 patients and a hospital-based cohort of 194 patients. Each participant underwent comprehensive evaluations, including thyroid function assessments

and tests for thyroid autoantibodies. The researchers reached a significant conclusion, indicating that the occurrence of thyroid disorders did not differ between the diabetic and nondiabetic groups, suggesting an equal prevalence across both populations(Młynarska et al., 2025).

These results underline the significant overlap of metabolic disorders in patients suffering from hypothyroidism, emphasizing the need for comprehensive management strategies to address all comorbidities effectively.

CONCLUSION:

Diabetes mellitus often coexists with hypothyroidism. As a result, it is important to conduct routine diabetes assessments for individuals with thyroid disorders and to evaluate thyroid function in those diagnosed with diabetes. This proactive approach helps prevent complications and ensures better management of both conditions.

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