



Frequency of Hypothyroidism in Diabetes Mellitus Patients

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ABSTRACT

Introduction: There is evidence to support the long-standing association between thyroid problems and diabetes mellitus. Thyroid problems are more common in women and people with diabetes than in people without the disease, and they have been shown to occur more frequently as people age. **Study type:** Descriptive, cross sectional study. **Study place:** Department of Medicine, Shahida Islam Teaching Hospital, Lodhran. **Study duration:** 23rd December 2024 to 22nd April 2025. **Materials and Methods:** Total 215 patients with diabetes mellitus between the ages of 20 and 70 years of either gender were included. Patients with a history of thyroid gland surgery, those taking dopamine antagonists, antiepileptics, oral contraceptives, lithium, or glucocorticoids, and those with chronic liver disease (s/bilirubin >1.0 mg/dl) or renal failure (s/creatinine >1.5 mg/dl) were not included. The institutional pathology laboratory next analyzed the blood sample for thyroid function assays and found hypothyroidism (TSH >5.2 mIU/L, FT3 <1.5 pg/ml, and FT4 <0.8 pg/ml). **Results:** Mean age was 53.13 ± 2.26 years. The male to female ratio of the 215 patients was 1.2:1, with 113 (52.56%) being men and 102 (47.34%) being women. DM lasted 10.36 ± 3.49 years on average. The mean body mass index was 30.35 ± 2.48 kg/m². The mean FT3 (pg/ml) and FT4 (pg/ml) values were 2.35 ± 1.87 and 1.38 ± 0.76, respectively, whereas the mean TSH (mIU/L) was 4.36 ± 1.42. This study shows that 51 (23.72%) of the patients with diabetes mellitus had hypothyroidism. **Conclusion:** According to the study's findings, patients with diabetes mellitus had a relatively high incidence of hypothyroidism.

INTRODUCTION

Diabetes mellitus (DM) is a crippling condition brought on by the dynamic interplay of genes, environment, and other lifestyle variables like obesity and sedentary behavior.¹ Type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM), which affects the metabolism of carbohydrates, fats, and proteins, are characterized by elevated blood glucose levels brought on by either suboptimal or complete insulin secretion by the pancreas or poor insulin utilization by body cells.² The International Diabetes Federation (IDF) reported that there were 537 million diabetics globally in 2021; by 2030, that number is expected to increase to 643 million, and by 2045, it will reach 783 million.³

There is evidence to support the long-standing association between thyroid problems and diabetes mellitus. Thyroid problems are more common in women and people with diabetes than in people without the disease, and they have been shown to occur more frequently as people age.⁴ Thyroid disease should be checked every year to identify asymptomatic thyroid malfunction in diabetics.⁵ In patients with thyroid dysfunction, the possibility of

abnormal glucose metabolism may also need to be examined since thyroid hormone levels may increase insulin resistance, intestinal glucose absorption, and hepatic glucose production.⁶ Geographical differences in diabetes manifestations also result from genetic and environmental factors that influence the incidence of diabetes and the impact of potential risks (such as thyroid impairment) on the mechanisms of complications associated with diabetes.⁶ 6.5% of diabetes individuals have hypothyroidism, according to a local study.⁷ Another study discovered that 14% of diabetes patients had hypothyroidism.⁸ According to research by Alsamghan AS et al.⁹ and Talwalkar P et al.¹⁰, the prevalence of hypothyroidism in diabetes patients was 18.75% and 24.8%, respectively.

I designed this study to highlight the importance of routinely monitoring thyroid function tests in patients with diabetes mellitus, as the prevalence of this condition is steadily rising in our society and thyroid function tests are not consistently conducted in these specific patients. According to the aforementioned research, the prevalence of hypothyroidism in CKD patients varies by ethnic group;

therefore, a study that identifies the local scope of the issue is required in our region. My research will assist physicians in creating an appropriate treatment plan for these specific patients, hence lowering the morbidity rate in our community.

METHODOLOGY

From 23rd December 2024 to 22nd April 2025, the Department of Medicine at Shahida Islam Teaching Hospital in Lodhran conducted this descriptive cross-sectional study. 215 patients who satisfied the inclusion criteria were selected via non-probability sequential sampling after institutional ethical review committee permission. Using the WHO sample size calculator, 215 individuals with a 95% confidence level, a 3.3% margin of error, and a frequency of hypothyroidism in diabetes patients of 6.5%⁷ were found. Every patient with diabetes mellitus between the ages of 20 and 70 years of either gender who has had the disease for more than a year and is using insulin or oral hypoglycemic medication. Patients with a history of thyroid gland surgery, those taking dopamine antagonists, antiepileptics, oral contraceptives, lithium, or glucocorticoids, and those with chronic liver disease (s/bilirubin >1.0 mg/dl) or renal failure (s/creatinine >1.5 mg/dl) were not included.

Age, gender, length of DM, height, weight, BMI, residence (rural/urban), and family history of hypothyroidism were recorded following informed permission. The institutional pathology laboratory next analyzed the blood sample for thyroid function assays and found hypothyroidism (TSH >5.2 mIU/L, FT3 <1.5 pg/ml, and FT4 <0.8 pg/ml). The pre-made proforma was used to record all of the patient data.

SPSS version 25.0 was used to enter and analyze the data. The data's normality was examined using the Shapiro-Wilk test. Age, length of DM, height, weight, BMI, and TSH levels were all calculated as mean \pm SD. Gender, domicile (rural/urban), family history of hypothyroidism, presence or absence of hypothyroidism, and hypertension (yes/no) were all represented by frequency and percentage. Age, gender, length of diabetes mellitus, BMI, hypertension, domicile (rural versus urban), and family history of hypothyroidism were all stratified. The chi square test was then used, and a p-value of less than 0.05 was deemed significant.

RESULTS

The study participants ranged in age from 20 to 70 years, with an average age of 53.13 ± 2.26 years. The male to female ratio of the 215 patients was 1.2:1, with 113 (52.56%) being men and 102 (47.34%) being women. DM lasted 10.36 ± 3.49 years on average. The mean body mass index was 30.35 ± 2.48 kg/m². Table 1 displays the patient distribution based on confounding variables. The mean FT3 (pg/ml) and FT4 (pg/ml) values were 2.35 ± 1.87 and 1.38 ± 0.76 , respectively, whereas the mean TSH (mIU/L) was 4.36 ± 1.42 .

Table 2 of this study shows that 51 (23.72%) of the patients with diabetes mellitus had hypothyroidism. Table 3 displays the stratification of hypothyroidism according to covariates.

Table 1

Distribution of Different Variables (n=215)

Confounding variables		Frequency	%age
Age (years)	20-45	24	11.16
	46-70	191	88.84
Gender	Male	113	52.56
	Female	102	47.44
Duration (years)	≤10	129	60.0
	>10	86	40.0
BMI (kg/m ²)	≤30	102	47.44
	>30	113	52.56
HTN	Yes	74	34.42
	No	141	65.58
Family History of hypothyroidism	Yes	80	37.21
	No	135	62.79
Residence	Rural	116	53.95
	Urban	99	46.05

Table 2

Descriptive statistics.

Variables	Mean \pm SD
Age (years)	53.13 \pm 2.26
Duration of DM (years)	10.36 \pm 3.49
Height (cm)	159.53 \pm 14.32
Weight (kg)	78.43 \pm 8.72
BMI (kg/m ²)	30.35 \pm 2.48
TSH (mIU/L)	4.36 \pm 1.42
FT3 (pg/ml)	2.35 \pm 1.87
FT4 (pg/ml)	1.38 \pm 0.76

Figure 1

Frequency of hypothyroidism in diabetes mellitus patients (n=215).

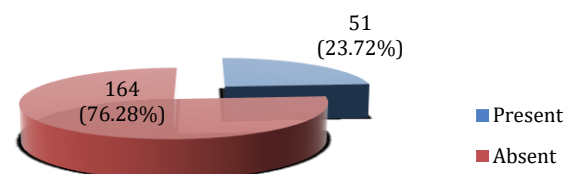


Table 3

Stratification of Hypothyroidism with Respect to Confounders.

		Present (n=51)	Absent (n=164)	P-value
Age (years)	20-45	09 (37.50%)	15 (62.50%)	0.092
	46-70	42 (21.99%)	149 (78.01%)	
Gender	Male	27 (23.89%)	86 (76.11%)	0.950
	Female	24 (23.53%)	78 (76.47%)	
Duration (months)	≤10	28 (21.71%)	101 (78.29%)	0.395
	>10	23 (26.74%)	63 (73.26%)	
BMI (kg/m ²)	≤30	34 (33.33%)	68 (66.67%)	0.002
	>30	17 (15.04%)	96 (84.96%)	
HTN	Yes	17 (22.97%)	57 (77.03%)	0.852
	No	34 (24.11%)	107 (75.89%)	
Family History of hypothyroidism	Yes	09 (11.25%)	71 (88.75%)	0.009
	No	42 (36.52%)	93 (63.48%)	
Residence	Rural	25 (21.55%)	91 (78.45%)	0.418
	Urban	26 (26.26%)	73 (73.74%)	

DISCUSSION

A serious public health issue that impacts people with diabetes is thyroid dysfunction. Thyroid problems and diabetes have a complicated interaction that affects a number of variables. According to Sam et al., excessive insulin levels may change thyroid tissue, and insulin resistance may be the cause of diabetes mellitus and thyroid dysfunction.¹¹ Furthermore, there is a reciprocal association between the two disorders, with thyroid abnormalities adversely influencing glycemic management and uncontrolled diabetes exacerbating thyroid dysfunction. In type 1 diabetes, where autoimmunity-induced thyroid dysfunction is a prevalent comorbidity, autoimmune mechanisms are also important.¹²

The male to female ratio in this study is 1.2:1, with 113 (52.56%) of the 215 patients being men and 102 (47.34%) being women. On the other hand, comparable patterns of male preponderance were also documented by Fakhroo et al.¹³ and others.^{14,15} In contrast to our study, Ogbonna and Ezeani's study contained 43.5% male participants and 56.5% female participants.¹⁶

Participants in our study were 53.13 ± 2.26 years old on average. In contrast to our work, Fakhroo A et al.¹³ and others¹⁷⁻¹⁹ showed a somewhat higher mean age (over 50). The average age was 51.2 ± 6.18 years in the Khan et al.²⁰ study, 49.8 ± 11.4 years in the Shahbazian et al. study²¹, 60.14 ± 12.21 years in the Khassawneh et al.²² study, and 57.5 ± 9.3 years in the Ogbonna et al. study.¹⁶ These age discrepancies between the studies may be explained by variations in study techniques, sample populations, and regional factors. Therefore, early therapies can be carried out and the suspicion of hypothyroidism in T2DM should be raised considerably earlier. These results suggest that diabetes patients in their fourth and fifth decades of life are more likely to develop hypothyroidism. The study by Javeedh S et al.¹⁸ and others²³ also showed a correlation between hypothyroidism and growing older in diabetic patients, indicating that age may play a part in the development of this illness.

The mean BMI for the 215 cases in the T2DM group of the current study was 30.35 ± 2.48 kg/m². According to Asuti S et al.¹⁷ and others^{20,21}, the population's BMI was comparable. These results highlight the necessity of focused metabolic and cardiovascular risk assessment and treatment techniques in this population by indicating a robust correlation between excess body weight and the prevalence of diabetes. Thyroid function, blood pressure, and BMI must all be regularly monitored in order to maximize long-term health in this population. This study was similar to one conducted by Wang X et al.²⁴, while there were still notable statistical variations ($P < 0.05$) in the prevalence of diabetes, BMI, and waist circumference.

In present study, 51 (23.72%) of the individuals with diabetes mellitus had hypothyroidism. According to a local study, 6.5% of diabetic individuals have hypothyroidism.⁷ According to a different study, 14% of diabetes patients had hypothyroidism.⁸ According to research by Alsamghan AS et al.⁹ and Talwalkar P et al.¹⁰, the prevalence of hypothyroidism in diabetes patients is 18.75% and 24.8%, respectively.

Additionally, the higher rates reported in earlier studies are consistent with the prevalence of thyroid dysfunction in this diabetic population. With pooled prevalence rates of 15–36% and subclinical hypothyroidism as the most common anomaly, numerous investigations have demonstrated that thyroid dysfunction is considerably more common in T2DM patients than in the general population.^{17,18} Similar to these pooled estimates and corresponding regional data from South Asia and the Middle East, the current study discovered hypothyroidism and subclinical hypothyroidism in 23.8% and 14.9% of patients, respectively.^{25,26} Interestingly, overt hyperthyroidism is still less common (4.5%), which is in line with the fact that it is not as well-represented in the majority of international research.^{27,28} The evidence supporting routine thyroid screening in T2DM patients is strengthened by our findings, particularly for individuals with prolonged disease duration or other risk factors.

Thyroid dysfunction was observed in 24.6% of diabetic patients in a recent study from Pakistan; the frequency was higher in females (31.32%) than in males (16.41%), indicating the necessity for routine screening in diabetic patients.⁶ Thyroid dysfunction is 3.8 times more common in females with type 2 diabetes than in males, according to Ogbonna et al.¹⁶ This is probably because estrogen affects thyroid follicular cells and thyroxine binding globulin (TBG).

According to a similar study conducted in Kerala by Thankappan PK, thyroid dysfunction affected 26.7% of the population.²⁹ Additionally, 23.6% of patients with type 2 diabetes had thyroid problems, according to research done at a tertiary care hospital by Asuti S. et al.¹⁷ A study by Khassawneh AH et al. revealed similar results, indicating that thyroid abnormalities were present in 26.7% of diabetic patients.³⁰ Thyroid dysfunction was found in 20.1% of patients with diabetes, according to a research by Yadav et al.³¹ The most prevalent condition in each of these investigations was hypothyroidism, which was followed by subclinical hypothyroidism and hyperthyroidism.

Because early diagnosis may help improve glycemic control and lower complications, this study emphasizes the clinical significance of routine thyroid screening in older, overweight, female, or poorly managed diabetes patients. A sizable sample size, comprehensive clinical and biochemical profiling, and the application of established diagnostic criteria are some of its main advantages. There was no longitudinal follow-up or intervention in this single-center, cross-sectional investigation, which limited generalizability and made it impossible to draw conclusions about the causal relationship between thyroid dysfunction and related clinical or metabolic indicators. To enhance long-term care, future studies should investigate longitudinal outcomes and encourage coordinated therapy of thyroid and diabetes conditions.

CONCLUSION

This study showed that people with type 2 diabetes frequently have hypothyroidism. It was discovered that a family history of hypothyroidism, an elevated BMI, and advanced age were statistically linked to hypothyroidism. These correlations imply that regular evaluation of thyroid function may be advantageous in diabetic populations,

especially in individuals who exhibit high-risk clinical profiles. However, no causal links can be concluded because of the cross-sectional and observational methodology. To investigate the possible influence of

managing thyroid dysfunction on diabetes outcomes, further prospective and interventional research is required.

REFERENCES

- Galicia-Garcia U, Benito-Vicente A, Jebari S, Larrea-Sebal A, Siddiqi H, Uribe KB, et al. Pathophysiology of type 2 diabetes mellitus. *Int J Mol Sci.* 2020;21(17):62-75
<https://doi.org/10.3390/ijms21176275>
- Berbudi A, Rahmadika N, Tjahjadi AI, Ruslami R. Type 2 diabetes and its impact on the immune system. *Curr Diabetes Rev.* 2020;16:442-9.
<https://doi.org/10.2174/1573399815666191024085838>
- IDF Diabetes Atlas: Diabetes around the world in 2021. (2023).
<https://diabetesatlas.org>.
- Vemula S, Aramadaka S, Mannam R, Narayanan RS, Bansal A. The impact of hypothyroidism on diabetes mellitus and its complications: a comprehensive review. *Cureus.* 2023;15(6):e40447.
<https://doi.org/10.7759/cureus.40447>
- Bai K, Abbassi A, Suthar RK, Qasmi R, Bhatti U, Rani K. Assessment of thyroid profile in diabetes mellitus type 2 patients at LUMHS, Jamshoro/Hyderabad. *J Liaquat Uni Med Health Sci.* 2021;20(02):109-12.
<https://doi.org/10.22442/ijlumhs.2021.00721>
- Awan H, Ali A, Qureshi N, Shah H, Ali R, Malik S, et al. Frequency of thyroid dysfunction in diabetic patients: thyroid dysfunction in diabetic patients. *Pak J Health Sci.* 2023;4(04):110-4.
<https://doi.org/10.54393/pjhs.v4i04.642>
- Singh D, Rajar I, Rajkumar, Ahmed A, Maheshwari PK, Memon M. Frequency of thyroid function abnormalities among patients of type ii diabetes mellitus. *Pak J Med Health Sci.* 2022;16(07):563-4.
<https://doi.org/10.53350/pjmhs22167563>
- Chauhan DS, Kushwaha JS, Giri R, Kushwaha P. Prevalence of hypothyroidism in type 2 diabetic adult Indian females and its correlation with age, HbA1c, BMI and duration of diabetes. *Int J Res Med Sci.* 2023;11:1623-7.
<https://doi.org/10.18203/2320-6012.ijrms20231326>
- Alsamghan AS. Prevalence of thyroid disorder in diabetic patients. *Bahrain Med Bull* 2020;42(4):266-9.
- Talwalkar P, Deshmukh V, Bhole M. Prevalence of hypothyroidism in patients with type 2 diabetes mellitus and hypertension in India: a cross-sectional observational study. *Diabetes Metab Syndr Obes.* 2019;12:369-76.
<https://doi.org/10.2147/dms0.s181470>
- Sam S, Stephen S. The incidence of thyroid dysfunction in diabetic patients: a study at a tertiary care center in South India. *Indian J Anat Surg Head Neck Brain.* 2022;7:107-110.
<https://doi.org/10.18231/ijashnb.2021.028>
- KVB, Cm P, V KV, Ss Y. Prevalence and Association of Thyroid Dysfunction with Diabetes Mellitus in a Tertiary Care Hospital: A Retrospective Study. *Cureus.* 2025 Feb 28;17(2):e79855.
<https://doi.org/10.7759/cureus.79855>.
- Fakhroo A, Elhadary MR, Elsayed B, Al-Kuwari A, Aly R, Mesilhy R, Bakalaf A, Al-Maadhadi M, Al Dehaimi AA, Chivese T, Rathnaiah Babu G. Association of subclinical hypothyroidism with type 2 diabetes mellitus in Qatar: a cross sectional study. *Diabetes Metab Syndr Obes.* 2023 Oct 28;16:3373-9.
<https://doi.org/10.2147/dms0.s428987>
- Veltri F, Rocha FO, Willems D, Praet JP, Grabczan L, Kleynen P, et al. Prevalence of thyroid dysfunction and autoimmunity in the older population and implications of age-specific reference ranges. *Clin Chim Acta.* 2017;465:34-9.
<https://doi.org/10.1016/j.cca.2016.12.008>
- Mariscal Hidalgo AI, Lozano Alonso JE, Vega Alonso T; Grupo de Investigación del HipotiroidismoSubclínicoen Castilla y León. Prevalence and clinical characteristics of subclinical hypothyroidism in an opportunistic sample in the population of Castile-León (Spain). *Gac Sanit.* 2015;29:105-11.
<https://doi.org/10.1016/j.gaceta.2014.10.007>
- Ogbonna SU and Ezeani IU. Risk Factors of Thyroid Dysfunction in Patients with Type 2 Diabetes Mellitus. *Frontier of Endocrinology.* 2019 Jul; 10: 440.
<https://doi.org/10.3389/fendo.2019.00440>.
- Asuti S, Purad S, Hosamani P. Pattern of thyroid dysfunction in type II diabetes mellitus patients in a tertiary care center: a cross-sectional study. *J Med Sci Health.* 2023;9(2):204-10.
<https://doi.org/10.46347/jmsh.v9i2.23.125>
- Javeedh S, Vidya TA. Study of subclinical thyroid disorders in type 2 diabetes mellitus. *J Evid Based Med Healthc.* 2021;8(02):103-7.
<https://doi.org/10.18410/jebmh/2021/20>
- Sharma P, Sinha R, Prasad A, Mitra JK. Lack of association between poor glycemic control in T2DM and subclinical hypothyroidism. *J Thyroid Res.* 2020 Sep 8;2020:8121395.
<https://doi.org/10.1155/2020/8121395>
- Khan MU, Kumar D, Ahmed K. Frequency thyroid dysfunction in patients with type 2 diabetes seen at Dow University Hospital, Karachi, Pakistan. *Rawal Medical Journal.* 2017 Jan; 42(1): 52-5.
- Shahbazian H, Behbahani AM, Mohtashami AZ. Prevalence of thyroid dysfunction and thyroid auto antibodies in type 2 diabetic patients. *Pakistan Journal of Medical Sciences.* 2011 Oct; 27 (5): 1169-72.
- Witting V, Bergis D, Sadet D, Badenhoop K. Thyroid disease in insulin-treated patients with type 2 diabetes: a retrospective study. *Thyroid Research.* 2014 Dec; 7(1): 1-6.
<https://doi.org/10.1186/1756-6614-7-2>.
- Stott DJ, Rodondi N, Kearney PM, Ford I, Westendorp RGJ, Mooijaart SP, et al. Thyroid hormone therapy for older adults with subclinical hypothyroidism. *N Engl J Med.* 2017;376:2534-44.
- Wang X, Wang H, Yan L, Yang L, Xue Y, Yang J, et al. The positive association between subclinical hypothyroidism and newly diagnosed hypertension is more explicit in female individuals younger than 65. *Endocrinol Metab (Seoul).* 2021 Aug;36(4):778-89.
<https://doi.org/10.3803/enm.2021.1101>
- Kandel L, Shakya YL, Yadav M, Shah NA, Gupta S: Prevalence of thyroid dysfunction among patients with type II diabetes mellitus in tertiary care center: a cross-sectional descriptive study. *JNMA J Nepal Med Assoc.* 2024, 62:691-6.
<https://doi.org/10.31729/jnma.8787>
- Islam MR, Sultana N: Prevalence of thyroid dysfunction in type 2 diabetes mellitus. *Mymensingh Med J.* 2024, 33:341-9.
- Patel PR, Maitra A, Ashok A, Jose J, Ragav Y, Novalene Paul N: Evaluation of thyroid dysfunction in type 2 diabetes mellitus patients and its association with diabetic complications: a cross-sectional study. *Cureus.* 2025, 17:e78871.
<https://doi.org/10.7759/cureus.78871>.

28. Hussain S, Khan W, Jabbar A, Ahad A, Ziaullah, Ali I, Shafiq M: Frequency of thyroid dysfunction among type 2 diabetes mellitus patients presenting to Saidu group of teaching hospital. *Pak J Intensive Care Med.* 2025, 5:70. <https://doi.org/10.54112/pjicm.v5i01.70>.
29. Thankappan PK. A study on prevalence of thyroid dysfunction and dyslipidaemia in type 2 diabetes mellitus in a tertiary care hospital - Kottayam, Kerala. *J Evid Based Med Healthc.* 2021;8:3477–3482. <https://doi.org/10.18410/jebmh/2021/630>
30. Khassawneh AH, Al-Mistarehi AH, Zein Alaabdin AM. Prevalence and predictors of thyroid dysfunction among type 2 diabetic patients: a case-control study. *Int J Gen Med.* 2020;13:803–816. <https://doi.org/10.2147/IJGM.S273900>.
31. Yadav A, Yadav GA, Narsingrao KK, Nanda Kumar LG, Yadav GS. Prevalence of thyroid disorders among patients with diabetes in rural South India. *Diabetes Metab Syndr.* 2021;15:885–889. <https://doi.org/10.1016/j.dsx.2021.04.012>.