

## Original Research

### Relationship between thyroid dysfunction and Diabetes mellitus

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#### ABSTRACT:

**Introduction:** Diabetes mellitus is a common metabolic disease and the prevalence is increasing rapidly. Thyroid disorders including subclinical hypothyroidism are frequently observed in diabetic patients. We conducted a study to explore Present study was conducted to know the spectrum of thyroid dysfunction in diabetes mellitus. **Material and methods:** A total of 60 candidates were enrolled in this study. 30 patients with a history of diabetes for less than 5 years were taken as cases and rest 30 patients were normal healthy candidates taken as control. Venous blood was withdrawn from antecubital vein and various parameters like TSH, T3, T3, FBS, PPBS etc were estimated. **Results:** Thyroid disorders were present in 43.33%. Hypothyroidism was present in 1, hyperthyroidism in 5 and subclinical hypothyroidism in 7 cases. There was significant difference between levels of TSH and T3. **Conclusion:** Prevalence of thyroid disorders in Diabetics was 43.33%. Hence regular screening of diabetic patients should be done.

**Key words:** thyroid dysfunction, type 2 diabetes mellitus, hyperthyroidism, hypothyroidism

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#### INTRODUCTION:

Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice. Diabetes and thyroid disorders have been shown to mutually influence each other and associations between both conditions have long been reported. On one hand, thyroid hormones contribute to the regulation of carbohydrate metabolism and pancreatic function, and on the other hand, diabetes affects thyroid function tests to variable extents.<sup>1</sup> Thyroid dysfunction is a spectrum of disorders of the thyroid gland which manifests either as hyperthyroidism or hypothyroidism and is reflected in the circulating levels of thyroid stimulating hormone (TSH).<sup>2,3</sup> Patients with DM are at increased risk of thyroid disease, especially those with poor glycaemic control.<sup>4</sup> Many times thyroid disorders go undiagnosed owing to the common signs and symptoms. Unmanaged type I and type II diabetes result in a low T3 state which is characterised by low serum levels of total and free T3, increase in reverse T3 but serum T4 and TSH levels remain the same.<sup>5</sup> Present study was conducted to know the spectrum of thyroid dysfunction in diabetes mellitus.

#### MATERIALS AND METHODS:

A hospital based age matched comparative study was done in Department of Medicine, Hind Institute of Medical Sciences Ataria Sitapur U.P. A total of 60 candidates were enrolled in this study. 30 patients with a history of diabetes for less than 5 years were taken as cases and rest 30 patients were normal healthy individuals were taken as control. Ethical committee clearance was obtained from the institute and all the candidates were informed about the study, a written informed consent was obtained from all. Most of the patients were aged between 40-70 years. Patients below 40 years and above 70 years were not included in the study.

**PROCEDURE:** Venous blood from the antecubital vein was drawn after a period of overnight fasting. Total 4 ml of blood was withdrawn, 2 ml for fasting blood sugar estimation and 2 ml for thyroid hormone estimation. Blood was centrifuged at 4000 rpm for serum separation and serum creatinine was measured by enzymatic method. After that patient was asked to have normal breakfast and after 2 hours of that

another 2 ml of blood was withdrawn for estimating postprandial blood sugar estimation. By electrochemiluminescence method TSH, T3 and T4 were estimated. High performance liquid chromatography (HPLC) method was used for Hb1Ac estimation. Cholesterol oxidase method was used for total cholesterol estimation and LDL was measured by direct measurement.

**STATISTICAL ANALYSIS:** The results were organised in tabulated form and expressed as mean +/- Standard deviation. SPSS software was used for analysis and unpaired t test was applied as a test of significance. P value of < 0.05 was defined as statistically significant.

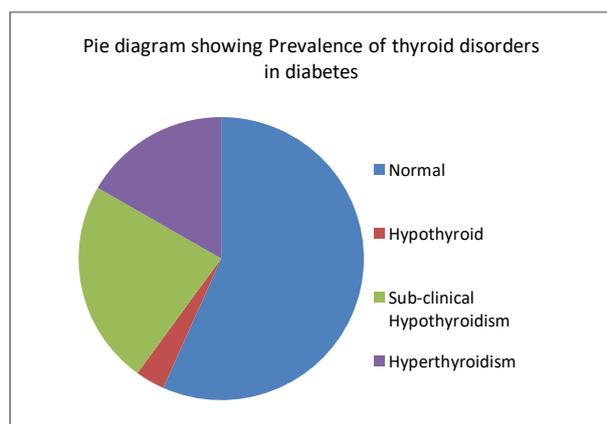
**RESULTS:**

Table 1: Comparisons of clinical characteristics between patients and controls

Parameter	Diabetic patient	Controls	P value
Age	59.24±6.75	54.44± 7.12	0.001
Gender (M/F)	13/17	20/10	-
TSH ( mIU/ dl)	7.12±4.33	1.9±1.89	0.01
T3 (microgm/dl)	0.24±0.4	0.97±0.3	0.012
T4 (microgm/dl)	5.46±1.9	5.88±2.14	0.11

Table 2: Prevalence of thyroid disorders in diabetes

Thyroid disorder	Number of patients
Normal	17
Hypothyroid	1
Sub-clinical Hypothyroidism	7
Hyperthyroidism	5



**DISCUSSION:**

Both thyroid diseases and diabetes mellitus (DM) are commonly encountered in clinical practice. They can influence each other and the associations between these two conditions have been reported by earlier studies. An in-depth underlying relation between DM and thyroid dysfunction exists. A growing body of

evidence pointed towards an array of complex interlinking biochemical, genetic, and hormonal malfunctions reflecting this pathophysiological association.<sup>6</sup>

The mean age of diabetic patients in our study was 59.24 years. This may be due to the fact that the prevalence of type 2 DM increases with age.<sup>7</sup> This reflects the pattern observed by Chinenye S et al<sup>8</sup> who in a multi-center study involving DM patients reported mean age of 57.1 years. Ofoegbu EN et al<sup>9</sup> conducted a study that evaluated the body composition of Nigerians with DM reported a mean age of 59.2 years.

Amongst 30 diabetic patients 17 were Females. Female predominance was also seen in studies conducted by Chinenye S et al<sup>7</sup> and Ogbonna SU and Ezeani IU.<sup>4</sup>

Prevalence of thyroid disorders in Diabetics in this study was 43.33%. Hypothyroidism was present in 1, hyperthyroidism in 5 and subclinical hypothyroidism in 7 cases. Pasupathi P et al<sup>10</sup> in their study found that prevalence of thyroid disorder was 45% among type 2 diabetics. Hypothyroidism was present in 28% and 17% had hyperthyroidism. Kalra S<sup>11</sup> and Distiller LA<sup>12</sup> in their studies reported higher prevalence rates of thyroid disorders in diabetic patients compared with nondiabetic individuals, and overt hypothyroidism was frequently observed in type 2 diabetes mellitus (T2DM).

In our study, there was significant difference between levels of TSH and T3 between healthy controls and diabetic group. The following mechanisms are thought to be responsible. In cases of hypothyroidism there is decrease in glucose absorption from gastrointestinal tract along with increased glucose accumulation and decreased disposal of glucose.<sup>13</sup> In patients with DM, the nocturnal TSH peak is blunted or abolished; and the TSH response to TRH, from the hypothalamus, is impaired thus leading to hypothyroidism. Low T3 levels have been observed in uncontrolled DM. This has been ascribed to the impairment in peripheral conversion of T4 to T3 which normalizes with improvement in glycaemic control. This is as a result of the hyperglycaemia-induced reversible reduction of the activities and hepatic concentration of thyroxine 5'-deiodinase (8). Higher levels of circulating insulin associated with insulin resistance have been shown to have a proliferative effect on thyroid tissue resulting in larger thyroid size with increased formation of nodules. This may lead to thyroid dysfunction (hyperthyroidism) in patients with type 2 DM.<sup>4</sup>

Failure to recognize the presence of abnormal thyroid hormone levels in diabetes may be a primary cause of poor management often encountered in some treated diabetics. There is therefore need for the routine assay of thyroid hormones in diabetics, particularly in those patients whose conditions are difficult to manage.<sup>10</sup>

This study has shown a high incidence of abnormal thyroid hormone levels among diabetic patients. In conclusion, our findings demonstrate that detection of

abnormal thyroid hormone levels in addition to other biochemical variables in the early stage of diabetes will help patients improve their health and reduce their morbidity rate.

#### CONCLUSION:

Prevalence of thyroid disorders in Diabetics was 43.33%. Hence regular screening of diabetic patients should be done.

#### REFERENCES

1. Hage M, Zantout MS, and Azar ST. Thyroid Disorders and Diabetes Mellitus. SAGE-Hindawi Access to Research Journal of Thyroid Research Volume 2011, Article ID 439463, 7 pages doi:10.4061/2011/439463.
2. Tunbridge WMG, Evered DC, Hall R, Appleton D, Brewis M, Clark F, et al. The spectrum of thyroid disease in a community: the Wickham survey. Clin Endocrinol. 1977;7:481–93.
3. Ghazali SM, Abbiyesuku FM. Thyroid dysfunction in type 2 diabetics seen at the University College Hospital, Ibadan, Nigeria. Niger J Physiol Sci. 2010;25:173–9.
4. Ogbonna SU and Ezeani IU. Risk Factors of Thyroid Dysfunction in Patients With Type 2 Diabetes Mellitus. Front Endocrinol (Lausanne). 2019;10:440.
5. Kadiyala R, Peter R and Okosieme OE. Thyroid dysfunction in patients with diabetes: clinical implications and screening strategies. International Journal of Clinical Practice. 2010;64:1130–39.
6. Ray S, Ghosh S. Thyroid Disorders and Diabetes Mellitus: Double Trouble J Dia Res Ther. 2016;2(1):1-7
7. Turner HE, Wass TAH. Diabetes. In: Turner HE, Wass TAH, editors. Oxford Handbook of Endocrinology and Diabetes. New York, NY: Oxford University Press; 2010.p. 724–822.
8. Chinenye S, Uloko AE, Ogbera AO, Ofoegbu EN, Fasanmade OA, Fasanmade AA, et al. Profile of Nigerians with diabetes mellitus—Diabcare Nigeria study group (2008): results of a multi-centre study. Indian J Endocrinol Metab. 2012;16:558–64.
9. Ofoegbu EN, Oli JM, Igwe JC. Body composition of Nigerian diabetics using Bioimpedance analysis (BIA). Niger Health Biomed Sci. 2004;3:37–9.
10. Pasupathi P, Bakthavathsalam G, Ganesan Saravanan G, Sundaramoorth R. Screening for Thyroid Dysfunction in the Diabetic/Non-Diabetic Population. Thyroid Science. 2008 3(8):CLS1-6.
11. Kalra S. Thyroid disorders and diabetes,” Journal of the Pakistan Medical Association. 2014;64(8):966–8.
12. Distiller LA, Polakow ES, and Jofe BI. “Type 2 diabetes mellitus and hypothyroidism: Te possible influence of metformin therapy,” Diabetic Medicine. 2014;31(2):172–5.
13. Althausen TL and Stockholm M. The influence of the thyroid gland on absorption in the digestive tract. The American Journal of Physiology. 1938;123:577–88.