

## The profile of thyroid disorders in patients with type 2 diabetes mellitus patients above age of 40 years

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### Abstract

Type 2 DM hyperthyroidism is reported to be more common as compared to normal people. In many patients, uncontrolled hyperthyroidism may be the reason for poor glycemic control and recurrent diabetic ketoacidosis. In response to hyperthyroidism gut absorption of glucose is increased along with endogenous glucose production. Randomly selected 100 patients, both male and female with type 2 diabetes mellitus above age of 40 years including newly diagnosed diabetics attending hospital were included in this study. Among the study group of 100 patients 2 patients had high T4 value, 8 patients had high TSH values and 4 patients were low TSH values.

**Keywords:** Thyroid disorders, diabetes mellitus, TSH

### Introduction

The most common endocrine disorders encountered in present clinical practice are Diabetes Mellitus and Thyroid dysfunction. Thyroid disorders are common in the general population, and the prevalence increases with age. Thyroid disease is a pathological state that can adversely affect glycemic control in diabetics and has the potential to affect the health. Thyroid disease is commonly associated type 2 diabetes mellitus with advanced age and in type 1 diabetes mellitus. Thyroid hormones and insulin are involved in cellular metabolism, deficit or excess of either of these hormones result in the functional dysregulation of the other [1].

Hypothyroidism is by far the most common thyroid disorder in the adult population and is more common in women. It is usually autoimmune in origin, presenting as either primary atrophic hypothyroidism or Hashimoto's thyroiditis. Also, in Type 2 DM hyperthyroidism is reported to be more common as compared to normal people. In many patients, uncontrolled hyperthyroidism may be the reason for poor glycemic control and recurrent diabetic ketoacidosis. In response to hyperthyroidism gut absorption of glucose is increased along with endogenous glucose production [2].

Diabetes mellitus is a metabolic disease resulting due to defects in insulin action, secretion or both. The patients with one organ-specific autoimmune disease are at risk of developing other autoimmune disorders. Diabetes and thyroid disorders have been shown to mutually influence each other and an association between both these conditions has been reported in various

studies. The incidence of thyroid dysfunction in Diabetes mellitus has been estimated as 10.8% with majority of hypothyroidism and subclinical hypothyroidism. Many case reports have been reported that incidence of thyroid dysfunction being most common in diabetes mellitus, common disorder associated found to be hypothyroidism.

On one hand, thyroid hormones contribute to the regulation of carbohydrate and other metabolic functions and on the other hand, diabetes affects thyroid function to variable extents. A disturbance in thyroid hormone levels may also exaggerate chances of cardiovascular disease in patient with diabetes by interrelationships with insulin resistance, dyslipidemia and endothelial dysfunction. Inability to diagnose abnormal thyroid hormone levels in patients with diabetes is often a reason for poor diabetic management. If a patient is showing unexplained alteration in metabolic control, thyroid function tests should be performed. There is a continuing interest in the association between thyroid disorders in type 2 diabetes mellitus <sup>[3]</sup>.

Thyroid dysfunction and type 2 diabetes mellitus have been correlated with underlying pathology. Probable mechanism of type 2 diabetes mellitus in thyroid dysfunction could be due to expression of constellation of genes, impaired glucose production and utilization in diabetes mellitus leading to insulin resistance. Thyroid function associated with insulin resistance. Cases reports shown that Hypo-and hyperthyroidism associated with insulin resistance due to impaired glucose metabolism in type 2 diabetes mellitus <sup>[4]</sup>.

## Methodology

Randomly selected 100 patients, both male and female with type 2 diabetes mellitus above age of 40 years including newly diagnosed diabetics attending hospital were included in this study.

- Informed consent was taken as per attached annexure.
- 100 type 2 diabetic patients, newly diagnosed was selected, as per inclusion and exclusion criteria.
- It is a cross sectional study.
- Detailed history was taken and examination performed as per attached annexure.
- Blood and other appropriate investigations were done as per attached annexure.
- Data compared and analysed as per chi-square test and student t test.

## Inclusion criteria

Known type 2 diabetes mellitus and newly detected type 2 diabetes mellitus.

## Exclusion criteria

Those who are not willing for the study

- Patient with known thyroid disease.
- Patient with chronic renal failure and diabetic nephropathy.
- Patient with acute illness like sepsis, acute MI, severe heart failure.
- Patient with hepatic dysfunction.
- Pregnancy.
- Patient on drugs like amiodarone, propranolol, corticosteroids and OCP.
- History of thyroidectomy.
- History of radioactive Iodine.

## Thyroid profile

**Reference values:** Done in fasting serum sample.

**FT3:** 4-8.3pmol/L (ELFA method) (enzyme-linked immunosorbent assay).

**FT4:** 9-24pmol/L (ELFA method).

**TSH:** 0.25-5 micro IU/ml (ELFA method).

Subclinical Hypothyroidism is defined as TSH >5microIU/ml with normal FT3 and FT4 levels.

Overt Hypothyroidism is defined as TSH >5microIU/ml with FT4 <9pmol/L.

Subclinical Hyperthyroidism is defined as TSH <5microIU/ml with normal FT3 and FT4 level Overt Hyperthyroidism is defined as TSH <5microIU/ml with FT4 >24pmol/L.

## Results

**Table 1:** Thyroid Status of the Study Population

S. No.	Thyroid Status	No. of Patients	Percentage
1.	Normal thyroid profile	88	88%
2.	Abnormal thyroid profile	12	12%
	Total	100	100%

Table 1 Shows, among the study group of 100 patients 88% had normal thyroid profile and 12% had abnormal thyroid profile.

**Table 2:** Distribution of Abnormal Thyroid Profile

S. No.	Abnormal thyroid profile	No. of Patients	Percentage
1.	Overt Hypothyroidism	0	0%
2.	Subclinical Hypothyroidism	8	66.6%
3.	Overt Hyperthyroidism	2	16.66%
4.	Subclinical Hyperthyroidism	2	16.66%

Table 2 Shows, among the study group of 100 patients none had overt hypothyroidism, 8% were subclinical hypothyroidism, 2% were overt hyperthyroidism and 2% were subclinical hyperthyroidism.

**Table 3:** Thyroid Profile in the Study Population

S. No.	Thyroid Profile	Normal Values	No. of Euthyroid Patients	No. of Patients with high Values	No. of Patients with Less Than Normal Values
1	Free T3	4-8.3 pmol/L	100	0	0
2	Free T4	9-24 pmol/ L	98	2	0
3	TSH	0.25-5 $\mu$ IU/ml	88	8	4

Table 3 Shows, among the study group of 100 patients 2 patients had high T4 value, 8 patients had high TSH values and 4 patients were low TSH values.

**Table 4:** Comparison of Thyroid Hormones in Patients with Normal and Abnormal Thyroid Profile

S. No.	Variable	Subjects with Normal Thyroid Profile (n=88)	Subjects with Abnormal Thyroid Profile (n=12)	P Value
1.	T3 (pmol/L)	5.77 $\pm$ 1.05	6.15 $\pm$ 1.06	0.2429
2.	T4 (pmol/L)	14.07 $\pm$ 3.00	18.70 $\pm$ 7.72	0.0002*
3.	TSH ( $\mu$ IU/ml)	2.35 $\pm$ 1.12	4.93 $\pm$ 3.68	<0.0001*

Comparing mean T3 of patients with abnormal thyroid profile with that of patients with normal thyroid profile shows had no statistical significance with P value= 0.2429.

Comparing mean T4 of patients with abnormal thyroid profile with that of patients with normal thyroid profile shows it is statistically significant with P value =0.0002.

Comparing mean TSH of patients with abnormal thyroid profile with that of patients with normal thyroid profile shows it is statistically significant with P value =<0.0001.

**Table 5:** Relationship of Thyroid Profile with Age of the Patients

S. No.	Age Distribution	Subjects with Normal Thyroid Profile (n=88)	Subjects with Abnormal Thyroid Profile (n=12)	Chi-square Value	Degree of Freedom	P Value
1	41-45 Years	8	6	5.39	1	0.020*
2	46-50 Years	9	0			
3	51-55 Years	15	2			
4	56-60 Years	18	3			
5	61-65 Years	18	1			
6	66-70 Years	7	0			
7	71-75 Years	12	0			
8	76-80 Years	1	0			

- Categorized as age less than and more than 60 years

Table 5 Shows, among the study group of 100 patients age between 41 to 60 years 11 patients had abnormal thyroid profile and above age of 60 years 1 patient had abnormal thyroid profile. It is statistically significant with P value of 0.020.

## Discussion

In this study among 100 patients 12% patients had abnormal thyroid profile.

Study conducted by Hussain *et al.* <sup>[5]</sup> observed that out of 700 patients 21% patients were having abnormal thyroid profile.

Study conducted by Madavaram Sreelatha *et al.* <sup>[6]</sup> shows that out of 108 patients 13% patients were having abnormal thyroid profile.

Study conducted by Kaeley N *et al.* <sup>[7]</sup> observed that out of 100 patients 24% were having abnormal thyroid profile.

Study conducted by Ravishankar S N *et al.* <sup>[8]</sup> shows that out of 100 patients 29% were having abnormal thyroid profile.

In this study among 100 patients 8% had subclinical hypothyroidism, 2% had overt hyperthyroidism, 2% had subclinical hyperthyroidism.

Study conducted by Keley N *et al.* <sup>[7]</sup> observed among 100 patients 24% patients were observed to have thyroid dysfunction. Hypothyroidism was found to be the most common thyroid disorder (19%). 11% of them had overt hypothyroidism and 8% had subclinical hypothyroidism.

Study conducted by Pramanik S *et al.* <sup>[9]</sup> observed among 100 patients the prevalence of subclinical hypothyroidism and overt hypothyroidism was 23% and 3%, respectively.

Study conducted by Shekar H S *et al.* <sup>[10]</sup> observed among 100 patients that the prevalence of diabetes mellitus among the hypothyroidism patients was found to be 10% (9 patients) and whereas in hyperthyroid patients found to be 50%.

Study conducted by Ravishankar S N *et al.* <sup>[8]</sup> observed among 100 patients thyroid disorders were present in 29%. Hypothyroidism in 1, hyperthyroid in 13 and subclinical hypothyroidism in 15 cases. Females (36%) had high incidence of thyroid disorders than males (22%). Subclinical hypothyroidism was more common among the elderly (31.25%).

Study conducted by Demitrost L *et al.* <sup>[11]</sup> observed among 202 patients that 139 (68.8%) are euthyroid, 33 (16.3%) have subclinical hypothyroidism (10 males and 23 females), 23 (11.4%) have hypothyroidism (6 males and 17 females), 4 (2%) have subclinical hyperthyroidism and 3 (1.5%) are hyperthyroidism cases.

Study conducted by Deuri A *et al.* <sup>[12]</sup> observed among 120 patients 27 (22.5%) had thyroid dysfunction and remaining 93 patients had normal thyroid function. Out of 27 thyroid dysfunction patients, 8 (6.6%) had clinical hypothyroidism, 17 (14.1%) had subclinical hypothyroidism and 2 (1.6%) diabetics had hyperthyroidism.

Among the study group of 100 patients 2 patients had high T4 value, 8 patients had high TSH values and 4 patients were low TSH value.

## Conclusion

- In our study 12% patients (n = 12) were having abnormal thyroid profile and rest 88% (n=88) patients were having normal thyroid profile.
- Among 12% patients with abnormal thyroid profile 8% were subclinical hypothyroidism, 2% were overt hyperthyroidism, 2% were subclinical hyperthyroidism.

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