



## Original Research Article

## EVALUATION OF THYROID DYSFUNCTION IN PATIENTS SUFFERING FROM DIABETES MELLITUS IN A TERTIARY CARE HOSPITAL

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**Abstract:** Diabetes mellitus is an endocrine disorder so it is prone to affect other endocrine functions, one of which is thyroid function. The present study was conducted to estimate thyroid hormone levels in diabetes mellitus (Both type 1, type 2) and to compare these levels with normal population (control). Fasting blood samples from 50 diabetic subjects (7 type 1 and 43 type 2) and 50 non diabetic control were analysed. Out of the 50 diabetic patients for the study, 21 are males (3 in type 1 and 18 in type 2) and 29 are females (4 in type 1 and 25 in type 2). Of these 31 (62%) are euthyroid, 7 (14.0%) had primary hypothyroidism (6 females and 1 male), 1 (2.0%) had primary hyperthyroidism (only 1 male), 9 (18%) had subclinical hypothyroidism (1 male and 8 females), 2 (4.0%) had subclinical hyperthyroidism (1 male and 1 female). Maximum cases were of hypothyroidism (subclinical and clinical) seen in the study group. There were only 2 subjects in control groups having thyroid disorders. So thyroid disorders in study group is highly significant as compared to control group. As the level of Glycosylated Hb (HbA1c) increases the chances of thyroid disorders also increases. There is high prevalence of thyroid disorders in diabetes. Thyroid disorders are more common in females and most common thyroid disorder is hypothyroidism. The association of thyroid disorders are more frequent in diabetics who have deranged metabolic control.

**Key Words:** Thyroid hormones, Type 1 DM, Type 2 Diabetes Mellitus, Glycosylated Hb.

## INTRODUCTION

Diabetes mellitus is a syndrome of disordered metabolism with inappropriate hyperglycemia due either to an absolute deficiency of insulin secretion or a reduction in the biological effectiveness of insulin or both<sup>1</sup>. Most cases of diabetes mellitus can be separated in to two groups, Type 1 (formerly called insulin dependent diabetes mellitus and Type 2 (formerly called noninsulin-dependent diabetes mellitus)<sup>2</sup>. Diabetes Mellitus, the most common endocrine disease, is characterized by metabolic abnormalities and by long term complications involving the eyes, kidneys, nerves and blood vessels<sup>3</sup>. Glycosylated hemoglobin (HbA1c) is normally used for assessment of diabetic control, and the American Diabetes Association recently recommended its use for diagnosing diabetes and pre-diabetes<sup>4</sup>. Thyroid dysfunction is other most common endocrinopathy seen in the adult population. Both insulin and thyroid hormones are intimately involved in cellular metabolism and thus excess or deficit of either of these hormones could result in the functional derangement of the other. 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<sup>5,6,7</sup>. Many studies had been conducted to know relation between diabetes mellitus and thyroid dysfunction. There are many reports of complex interdependent interaction of these hormones; diagnosis of which is very important for proper therapy of the patients and to prevent long term complications.

The present study was therefore undertaken to see prevalence of thyroid dysfunction in diabetics and to see the correlation between thyroid profile and diabetes mellitus.

## MATERIAL AND METHOD

The prospective study was undertaken in clinical laboratory of our institute. A total of hundred patients (in patients and outpatients) of our tertiary care institute were included in our study, that consist of 50 patients suffering from diabetes mellitus (Type 1, Type 2) which served as test group and another 50 non diabetic control (age and sex matched from the same population with normal blood sugar).

### Exclusion criteria

Patients with the following history were excluded from the study. Total/Subtotal thyroidectomy, Patients on I<sup>131</sup> treatment, lithium, antithyroid drugs, Graves disease, toxic multi nodular goiter, toxic adenoma and carcinoma patients, Radiation exposure, Gestational hyperthyroidism

### Collection and processing of blood sample

7ml of fasting venous blood sample was drawn from each subject under aseptic conditions. 2 ml of the Sample was dispensed in to fluoride oxalate bottles for plasma glucose estimation. 1ml of the sample was dispensed in to EDTA vial for estimation of glycosylated hemoglobin. The rest of the sample was discharged into a plain vial and allowed to clot. The serum was separated and used for various investigations.

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Following investigations were carried out in all the patients:

- I. Fasting blood glucose: glucose oxidase method<sup>8</sup>.
- II. Serum T<sub>3</sub> estimation: Immunoenzymometric assay (ELISA Thyro kit made by RFCL limited)
- III. Serum T<sub>4</sub> estimation: Immunoenzymometric assay. (ELISA Thyrokit made by RFCL limited)
- IV. Serum TSH estimation: Immunoenzymometric assay (ELISA Thyrokit made by RFCL limited)
- V. Glycosylated Haemoglobin estimation: Ion Exchange Resin method<sup>9</sup>.
- VI. The result obtained from the above investigations will be analyzed. The results would be expressed as mean±SD of each variable. The comparison will be done by student 't' test on the number of variables of each parameter

### RESULT

The present study was undertaken in clinical laboratory of our institute. 50 patients suffering from diabetes mellitus (Type1, Type2) comprised study group. 50 adults of same age group and normal blood sugar level acted as controls. In the study group there were 21 males and 29 females, whereas in the control group there were 19 males and 31 females. Table 1 shows the comparison of thyroid hormones levels, fasting blood sugar levels and glycosylated Hb levels between study and control group. The comparison of levels of thyroid hormones between patients suffering from type 1 and type 2 diabetes mellitus have been shown in table 2. The statistical correlation of thyroid hormone levels, fasting sugar levels and glycosylated Hb levels between diabetic patients having normal thyroid profile and diabetic patients having abnormal thyroid profile has been depicting in table 3. Table 4 and 5 shows the number of subjects diagnosed with thyroid disease and their gender distribution. Different types of thyroid disorders according to their gender, in diabetic patients has been depicting in figure 1.

**Table 1:** Comparison of Thyroid Hormones (T<sub>3</sub>, T<sub>4</sub>, TSH), HbA<sub>1c</sub> and FBS levels in study and control groups

Investigation	Study group (50 patients)		Control group (50 patients)		P value	Significance
	Mean	±SD	Mean	±SD		
SerumT <sub>3</sub> (ng/ml)	0.814	0.40	1.22	0.38	<.0001	HS
SerumT <sub>4</sub> (µg/dl)	6.30	1.95	7.85	2.09	<.05	S
Serum TSH (µIU/ml)	6.40	5.96	3.35	2.26	<.05	S
FBS (mg%)	159.1	16.17	85.4	11.0	<.0001	HS
HbA <sub>1c</sub> (%)	7.30	0.65	5.24	0.53	<.0001	HS

**Table 2:** Comparison of Thyroid Hormones (T<sub>3</sub>, T<sub>4</sub>, TSH) level between Type 1, Type 2 diabetic mellitus patients

Investigation	Types of diabetes mellitus				P value	Significance
	Type 1		Type 2			
	Mean	±SD	Mean	±SD		
SerumT <sub>3</sub> (ng/ml)	0.68	0.52	0.83	0.38	>.05	NS
SerumT <sub>4</sub> (µg/dl)	5.52	3.0	6.43	1.74	>.05	NS
SerumTSH (µIU/ml)	10.76	9.93	5.69	4.86	<.05	S

**Table 3:** Comparison of Thyroid Hormones (T<sub>3</sub>, T<sub>4</sub>, TSH), HbA<sub>1c</sub> and FBS levels in patients of diabetes mellitus having Normal and Abnormal Thyroid profile

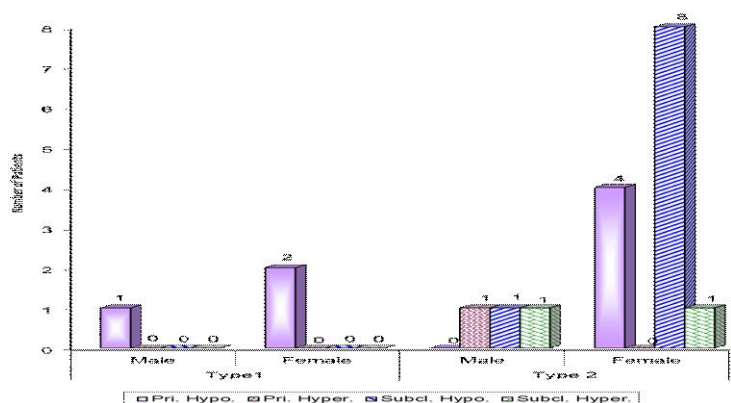
Investigation	Diabetic patients having normal Thyroid profile		Diabetic patients having abnormal Thyroid profile		P value	Significance
	Mean ±SD		Mean ±SD			
	Mean	±SD	Mean	±SD		
SerumT <sub>3</sub> (ng/ml)	0.91	0.28	0.65	0.50	<.05	S
SerumT <sub>4</sub> (µg/dl)	6.69	1.13	5.64	2.75	>.05	NS
Serum TSH (µIU/ml)	3.20	1.59	11.64	6.67	<.0001	HS
FBS (mg%)	150.7	13.8	172.0	8.0	<.0001	HS
HbA <sub>1c</sub> (%)	6.97	0.54	7.9	0.26	<.0001	HS

**Table 4:** Number of subjects diagnosed with Thyroid disease

Group	Number of subjects	Subjects diagnosed with thyroid disease	Percentage
Study group	50	19	38
Control group	50	2	4

**Table 5:** Distribution of Thyroid disorders according to gender in diabetes mellitus (Type1, Type2)

Gender	Number of patients having Thyroid disorders in Type1 diabetes mellitus	Number of patients having Thyroid disorders in Type2 diabetes mellitus
Male	1	3
Female	2	13



**Figure 1:** Types of thyroid disorders according to gender in diabetic patients (Type 1, Type 2)

## DISCUSSION

In our study 38 % i.e 19 out of 50 patients suffering from diabetes mellitus had abnormal thyroid profile as compared to 4% i.e 2 out of 50 among the control group. A comparison of thyroid hormone levels among the study and control group showed statistically derangement of hormone levels in diabetics ( $p < 0.05$ ). This corroborates the findings of various other authors who have also reported the co-occurrence of thyroid dysfunction to be more prevalent in diabetes as compared to the non diabetics<sup>10,11</sup>. Thyroid dysfunction was found to be more prevalent in females than the male diabetics i.e 15 out of 19 as compared to 4 out of 19 which correlates with other studies in different parts of the world<sup>12</sup>. Another finding was slightly higher prevalence of thyroid disorders in type 1 diabetic patients as compared to type 2 diabetic patients. Many studies<sup>13,14</sup> conducted have reported the thyroid disorders to be more prevalent in type 2 diabetics. Our result may be because of very small number of subjects having type 1 diabetes i.e 7 in comparison to type 2 diabetes i.e 43 of the total 50 patients. Hypothyroidism was found to be more common thyroid dysfunction as compared to hyperthyroidism in our study. Our results are in agreement with other studies<sup>15,16,17</sup> that have reported hypothyroidism to be more prevalent than hyperthyroidism in case of diabetic patients.

## CONCLUSIONS

There is high prevalence of thyroid disorders in diabetes mellitus. The thyroid disorders are more common in females. The most common thyroid disorder is hypothyroidism. In Type 1 diabetes mellitus there are chances of Primary hypothyroidism in females as well as in males. In Type 2 diabetes mellitus there are chances of Subclinical hypothyroidism in females and hyperthyroidism in males. The association of thyroid disorders is more frequent in diabetics who have deranged metabolic control. TSH is more sensitive marker when we compared the thyroid hormones level between Type 1 and Type 2 diabetic patients. Thus biochemical screening for thyroid disease is justified in patients of diabetes mellitus.

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