



## PREVALENCE OF THYROID DYSFUNCTION AMONG DIABETIC PATIENTS IN NORTH INDIAN REGION

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### KEYWORDS :

#### Introduction

Diabetes mellitus is clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. It is defined as fasting blood sugar  $\geq 126$  mg% or postprandial blood sugar  $\geq 200$  mg% or either of the two.<sup>1</sup>

#### Prevalence

Diabetes is an iceberg disease. Although the increase in both the prevalence and incidence of type-2 diabetes have occurred globally, they have an especially dramatic role in the societies in economic transition, in newly developing countries. Currently, the mortality estimated around the world is 150 million. This no. is predicted to be doubled by 2025, with the greatest no. of cases being expected in China and India.<sup>2</sup>

It is estimated that 20% of the current global diabetic population resides in the South-East Asia region. The no. of diabetic persons in the countries of the region is likely to triple by the year 2015.

In a systematic review of the prevalence of disease in India in adult was found to be 2-4 percent in rural and 4-11.6 percent in urban dwellers. High frequencies of impaired glucose tolerance shown by those studies ranging from 3.6-9.1 percent indicate the potential for a further rise in the prevalence of diabetic Mellitus in the coming decades.<sup>3</sup>

The burden of thyroid disease in the general population is enormous. Thyroid disorders are the most common among all the endocrine disease in India. Endemic goiter and related problems of human health and development caused by nutritional iodine deficiency. In a multicentric study done by ICMR showed the countrywide prevalence of endemic goiter. In various study to estimate the prevalence of thyroid disease in diabetic patients reported its occurrence varies from 2.2 to 17%. Another study reported a high prevalence of abnormal TSH concentration in 31% of patients with type 2 diabetes.<sup>4</sup>

Disturbed thyroid level and its impact on diabetes mellitus were studied and found that iodothyronine is an insulin antagonist with the high level being diabetogenic while the absence of the hormone inhibits the development of diabetes.

This study was planned to classify the type of thyroid dysfunction in type-2 diabetes Mellitus and identify the association of thyroid function test is included in the investigation protocol of type-2 Diabetes mellitus.<sup>5</sup>

#### Material and Method:

##### Subject selection:

Patients were randomly selected from both the genders of the age not below than 40 years, presented to the outpatient department of Santosh Hospital. The patients included for the study were properly informed and a written consent form was taken.

The inclusion and exclusion criteria were laid down as:

##### Inclusion Criteria

- The patients diagnosed with T2DM, based on the guidelines laid down by the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. All the subjects were on diet, oral hypoglycemic agents, insulin and combined were included.
- The criteria for blood sugar were

- Fasting Blood Sugar:  $\geq 126$  mg/dl
- Postprandial blood sugar:  $\geq 140$ mg/dl
- Random blood sugar:  $\geq 200$ mg/dl
- Patients with only primary thyroid dysfunction with DM.

##### Exclusion Criteria

- Other endocrine and exocrine disorder.
- Gestational diabetes mellitus
- Stress diabetes mellitus.
- Steroid-induced DM
- Secondary thyroid disease
- Recent onset of DM
- Freshly detected DM

##### Thyroid Profile:

All the selected patients were monitored and thyroid profiling was done through standard thyroid function test describe by Chleminusence method.

The thyroid profile were considered normal if:

- TSH Normal levels: 0.3-5.5 mcgIU/ml
- T3 normal levels: 60-200 ng/dl
- T4 normal levels: 4.5-12 mcg/dl
- Patients were considered hyperthyroid if TSH, T3 and T4 are  $< 0.3$  mcgIU/ml,  $> 200$  ng/dl and  $> 12$  mcg/dl respectively.
- Patients were considered hypothyroid if TSH, T3 and T4 are  $> 5.56$  mcgIU/ml,  $< 60$  ng/dl and  $< 4.5$ mcg/dl respectively.
- Patients with TSH  $> 5.1$  mcgIU/ml with normal T3 and T4 levels were considered as subclinical hypothyroidism.<sup>6</sup>

##### Blood glucose level:

The blood sugar level was estimated by glucose uptake oxidase-peroxidase method.

##### Statistical Analysis:

Procurement of data was done in replicates and arithmetic mean was calculated to get the central value. Chi-square test, student 't' test was used to analyze the data and p-value was calculated.  $P < 0.05$  were taken as significant.

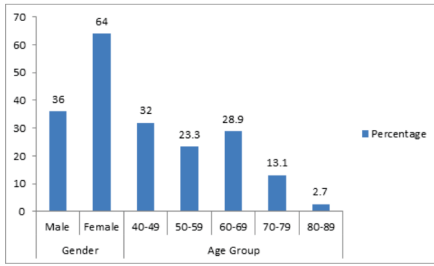
##### Result and discussion:

##### Selection of patients:

The patients appeared at the outpatient department with thyroid dysfunction and type-2 diabetes mellitus were monitored. A total of 1000 patients laid in the inclusion criteria were selected, for the study, among which 360 male and 640 female patients were present. The demographic distribution is represented in Table 1.

**Table 1: Demographic distribution of patients with Type 2 Diabetes Mellitus**

Parameters	No. of patients	Percentage
<b>Gender</b>		
Male	360	36
Female	640	64
<b>Age</b>		
40-49	320	32
50-59	233	23.3
60-69	289	28.9
70-79	131	13.1
80-89	27	2.7

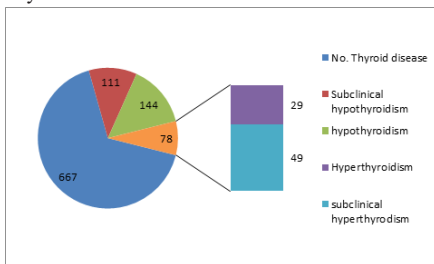


**Fig 1: Demographic distribution of patients in percentage**

As per the data maximum no. of patients, 32% were of age group 40-49 years followed by 28.9% in the age group 60-69 years. Age group 80-89 years contains least no. 2.7% of the patients.

**Distribution of thyroid disorder:**

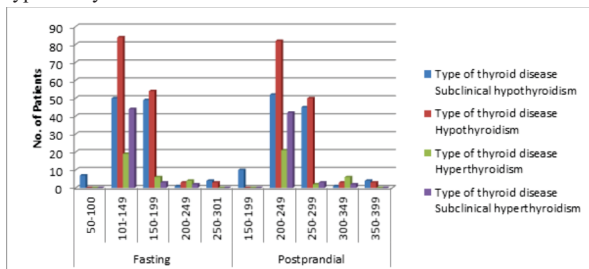
Among the selected patients with type-2 diabetes mellitus, total of 333 patients were found with thyroid dysfunction and showed different clinical manifestation. 14.4% and 11.1% of patients were diagnosed with hypothyroidism and subclinical hypothyroidism. Whereas 4.9% and 2.9% of patients were diagnosed with subclinical hyperthyroidism and hyperthyroidism.



**Table 3: Prevalence of diabetes patients with various thyroid disorder**

Type of Blood sugar test	Blood Sugar Level (mg%)	Type of thyroid disease				Total
		Subclinical hypothyroidism	Hypo-thyroidism	Hyperthyroidism	Subclinical hyperthyroidism	
Fasting	50-100	7	0	0	0	7
	101-149	50	84	19	44	197
	150-199	49	54	6	3	112
	200-249	1	3	4	2	10
	250-301	4	3	0	0	7
Postprandial	150-199	10	0	0	0	10
	200-249	52	82	21	42	197
	250-299	45	50	2	3	100
	300-349	1	3	6	2	12
	350-399	4	3	0	0	7

To estimate the relationship between the blood sugar level and thyroid disorder, chi-square test, followed by ANOVA was performed and found to be highly significant (p<0.001). There is a significant difference found between the fasting blood sugar level and various types of thyroid disorders.



Through the chi-square test, it was evident that thyroid disorders are associated with postprandial blood sugar level. There is a significant difference between the levels of postprandial blood sugar and types of thyroid disorder.

A logistic regression was performed in order to estimate the impact of variables like gender and duration of type 2 DM. The results showed that:

- For being a male the odds in favor of thyroid decreases by 34.9%.
- For a unit increase in the duration of type 2 DM, the odds in favor of thyroid increases by 4.5%

**Fig 2: Prevalence of thyroid disorder among the selected patients with DM.**

Distribution of thyroid dysfunction among both the gender was 1.04:2.29. Among 640 patients, 229 female and among 360 male, 104 patients were diagnosed with a thyroid disorder.

Patients with different age groups were also monitored for the observation of thyroid disorder.

**Table 2: Distribution of various thyroid disorder among different age groups**

Age groups (years)	Type of thyroid disease				Total
	Subclinical hypothyroidism	Hypothyroidism	Hyperthyroidism	Subclinical hyperthyroidism	
40-49	47	23	2	17	89
50-59	26	45	8	12	91
60-69	32	47	13	14	106
70-79	6	29	0	6	41
80-89	0	0	6	6	12

From the observation, it was found that age group 60-69 years were having maximum no. 106, of patients affected by total thyroid disease. Followed by this, the age group 50-59 years and 40-49 years were having 91 and 89 patients respectively.

Association of blood sugar level with various thyroid disorders.

Patients were observed with their blood sugar level and associated thyroid disorder. The data is represented in the table with two blood sugar tests i.e. fasting and postprandial.

**Discussion:**

The prevalence of thyroid disease in the present study is 33.3%, which is found higher with the study done by Smithson and Ridgway, who showed only 5% incidences of thyroid disease. The higher prevalence in this study could be due to the inclusion of subclinical hypothyroid and subclinical hyperthyroid group which was responsible for 11.1% and 4.9% respectively.<sup>7</sup>

The most common type of thyroid dysfunction was hypothyroidism which accounts for 14.4% prevalence in diabetic patients. The finding in accordance with the study of Ridgway et al. who reported hypothyroid prevalence 9.5% in American diabetics. They reported a female preponderance, which is similar to the finding of the present study (male: female, 1:2).<sup>8</sup>

**Conclusion**

From the findings reported in the present study, it is evident that the prevalence of thyroid dysfunction in Type-2 DM is higher 33.3%. Also, the female preponderance was reported in the distribution of the total thyroid disorder among the patients with type-2 DM. Among the thyroid disease maximum, no of patients were suffering from hypothyroidism followed by subclinical hypothyroidism. The age group 40-49 years was accounted for maximum no. of patients. There is association found between the blood sugar levels in both the tests. From the study, it can be recommended that the assessment of thyroid profile of patient having type-2 Diabetes Mellitus provides an important clinical tool for the observation of the progression of both the diseases.

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