



## TO STUDY THE SOCIODEMOGRAPHIC PROFILE OF THYROID DYSFUNCTION IN PATIENTS OF DIABETES MELLITUS TYPE -2 IN WESTERN RAJASTHAN

### General Medicine

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### ABSTRACT

DM is a universal endocrine disorder that possesses the inherent capability to affect virtually every organ of the body. Thyroid dysfunctions are much more prevalent in DM patients. Both type 1 and type 2 DM affect thyroid function. The effects are many fold hypothyroidism as well as hyperthyroidism, clinical as well as subclinical and both males and females are affected

### KEYWORDS

Diabetes Mellitus, Thyroid dysfunction.

### INTRODUCTION-

The world-wide prevalence of DM has increased dramatically over the past two decades from an estimated 30 million cases in 1985 to 382 million in 2013. Based on current trends the International Diabetes Federation (IDF) project that 592 million individuals will have diabetes by the year 2035<sup>1</sup>.

This increased prevalence of DM causes increased complications due to micro and macrovascular diseases which lead to increase morbidity and mortality.

DM is a universal endocrine disorder that possesses the inherent capability to affect virtually every organ of the body. The past decade has witnessed an explosive rate of growth of research in this area. Most of this research has a direct and/or indirect clinical implication.

Thyroid dysfunction is the second most common endocrine disorder. It is a matter of clinical interest to know whether there is any correlation between both endocrinopathies, and if there is a correlation, what type of relation is it? It may be just a coincidence that both disorders occur simultaneously like type II Polyendocrine syndrome or it may be a part of nature's compensatory adjustment e.g. hypoinsulinemia in diabetes study about the simultaneous existence of both disorders.

The role of thyroid hormone in the regulation of carbohydrate metabolism is evident from the alteration of the latter, which follows changes in thyroid function. Increased rate of absorption of ingested sugar, hyperglycemia and glycosuria occur in thyrotoxicosis whereas the decreased rate of absorption of sugar occurs in hypothyroidism. These alterations of carbohydrate metabolism associated with changes in thyroid function are rarely of any clinical significance in the non-diabetic individual. However, changes in thyroid function produce marked alteration in the impaired carbohydrate metabolism of the patients with DM. The severity of DM is increased in the presence of the thyrotoxicosis and often ameliorated by hypothyroidism<sup>2</sup>.

Thyroid dysfunctions are much more prevalent in DM patients. Both type 1 and type 2 DM affect thyroid function. The effects are many fold hypothyroidism as well as hyperthyroidism, clinical as well as subclinical and both males and females are affected<sup>3</sup>.

Autoimmunity may play a role to have thyroid dysfunction in patients of DM 1 which we can witness in Schmidt's syndrome. However, in type 2 DM thyroid abnormality may coexist due to altered thyroid hormone metabolism and is probably unrelated to the autoimmune process. It appears to influence thyroid function at several sites from hypothalamic control of TSH to the action of T3 and T4 in the target tissues<sup>4</sup>.

So far studies have been done to correlate thyroid dysfunction and DM in various part of the world but the majority of studies were done with patients of DM 1. However, so far, no studies have been done in

Rajasthan to correlate thyroid dysfunction and DM 2. Hence, it is planned to study their interrelationship in Western Rajasthan people.

**MATERIAL AND METHODS-** This was a case-control cross-sectional study which includes randomly selected 50 patients of diabetes mellitus (DM) type 2 and an equal number of controls in a one-year duration. The patients were selected from the medical outpatient diabetes clinic and indoor of M.D.M. Hospital, Dr S.N. Medical College, Jodhpur. This hospital caters to all section of societies of Western Rajasthan and thus the sample drawn from this hospital is a true representation of Western Rajasthan.

### Inclusion Criteria

1. All patients with Type 2 diabetes aged more than 30 years.
2. All diabetics were irrespective of glucose control.
3. All diabetics were irrespective of treatment (OHA/insulin).

### Exclusions criteria

1. Type 1 DM
2. Patients with:
  - a. Gestational diabetes mellitus.
  - b. Fibro calculous pancreatitis.
  - c. Pancreatitis.
  - d. Steroid-induced Diabetes would be excluded.
3. All those who had proven thyroid disorder and treatment.
4. Patient on drug affecting thyroid profile (cough syrup, lithium, amiodarone, statins, occupation etc.)
5. Patients with chronic renal disorder.
6. Patients with liver disorder.

### TOOLS OF THE STUDY

1. Socio-demographic profile
2. Clinical Performa
3. Clinical examination / Vitals / Systemic examination
4. Investigations
  - a. Blood sugar levels (Blood sugar level done by glucose oxidase method) like Fasting blood sugars & Post Prandial blood sugars
  - b. Glycosylated haemoglobin
  - c. Renal function tests like Blood Urea & Serum Creatinine
  - a. Thyroid functions test

By the aseptic precautions, 7 ml of blood was collected from the antecubital vein after 8-12 hours of fasting. Blood was collected in EDTA vacutainer (2ml) and plain vacutainer (5ml). Blood collected in plain vacutainer was processed to obtain serum. Serum T3 Serum T4, Serum TSH was measured by a chemiluminescent method in immulite 1000 autoanalyzer. Serum creatinine was measured by modified Jaffe's method in semi-autoanalyzer using a commercially available kit.

Blood collected in EDTA tube was used for estimation of glycated haemoglobin measured by ion-exchange resin method using a commercially available kit.

**Guidelines for detection of thyroid dysfunction:**

- Normal – when T3, T4 and TSH are in the normal range.
- Primary Hypothyroidism – when TSH more than 5.5mIU/ml and T3, T4 less than normal.
- Subclinical Hypothyroidism – when TSH is more than 5.5 mIU/ml and T3, T4 is within the normal range.
- Primary Hyperthyroidism – when TSH is less than 0.3mIU/ml and T3, T4 more than normal.
- Subclinical Hyperthyroidism – when TSH is less than 0.3 mIU/ml and T3, T4 is within the normal range.

**Diagnostic criteria of diabetes mellitus**

Criteria for the diagnosis of DM include one of the following:

- Fasting plasma glucose  $\geq 7.0$ mmol/L ( $\geq 126$ mg/dl)
- Symptoms of diabetes plus a random blood glucose concentration  $\geq 11.1$ mmol/L ( $\geq 200$ mg/dl)
- 2-h plasma glucose  $\geq 11.1$  mmol/L ( $\geq 200$ mg/dl) during a 75g oral glucose tolerance test.
- Haemoglobin A<sub>1c</sub>  $\geq 6.5\%$

These criteria should be confirmed by repeat testing on a different day unless unequivocal hyperglycaemia is present.

Statistical analysis-The data was analysed using SPSS Statistical software version 20.0. The categorical data were expressed in items of rates, ration and percentage and comparison was done using the chi-square test. The continuous data were expressed as mean  $\pm$  standard deviation and comparison was done using independent 't' test a probability value (p-value) of less than or equal to 0.05 was considered as statically significant.

**OBSERVATIONS AND RESULTS-**

**TABLE 1: Distribution of patients by age groups**

Age (yrs)	Case		Control	
	N	%	N	%
31-45	13	13.00	28	28.00
46-60	40	40.00	35	35.00
61-75	34	34.00	27	27.00
76-90	13	13.00	10	10.00
Mean $\pm$ SD	60.791 $\pm$ 2.23		56.94 $\pm$ 14.05	

In our study mean age of the patients 60.79 years and the maximum no of patients were in the age group of 46-60 of age group (40%) followed by 61-75 years of age group (34%).

**TABLE 2: Sex distribution in the study**

Sex	Case		Control	
	N	%	N	%
Male	50	50.00	48	48.00
Female	50	50.00	52	52.00
Total	100	100.00	100	100.00

We studied 100 patients of which majority of patients in the study were Males (50%) compared to Females (50%). The Male to Female ratio was 1:1.

**TABLE 3: Distribution of patients based on the duration of Diabetes**

Duration of DM (yrs)	No. of patients	Percentage
$\leq 5$	47	47.00
6-10	44	44.00
11-15	9	9.00
Total	100	100.00

Most of the patients in our study fell in the group of  $\leq 5$  years of duration of Diabetes (47%) followed by 6-10 years (44%).

**TABLE 4: Association between age groups and Thyroid Function**

Thyroid function	Age (yrs)				Total
	31-45	46-60	61-75	76-90	
Euthyroid	8	25	25	9	67
Subclinical hypothyroidism	4	5	6	2	17
Subclinical hyperthyroidism	0	0	0	0	0
Hypothyroidism	0	9	3	2	14
Hyperthyroidism	1	1	0	0	2

P value 0.349

In the age group of 31-45 years, 13 patients were there, of whom 5 patients had Thyroid Disorder. Out of 40 patients in the age group of 46-60 years, 15 patients had Thyroid Disorder. Out of 34 patients in the age group of 61-75 years, 9 patients had Thyroid Disorder. 4 out of 13 patients in the age group of 76-90 years had Thyroid Disorder. But there was no statistical significance (p=0.349).

**TABLE 5: Association between gender and Thyroid Function**

Thyroid function	Male		Female		Total
	N	%	N	%	
Euthyroid	35	52.24	32	47.76	67
Subclinical hypothyroidism	6	35.29	11	64.71	17
Subclinical hyperthyroidism	0	0.00	0	0.00	0
Hypothyroidism	8	57.14	6	42.86	14
Hyperthyroidism	1	50.00	1	50.00	2

P value 0.595

Out of 50 male patients, 15 of the males had Thyroid Disorder. In Out of 55 male patients, 22 of the males had Thyroid Disorder. In that 35.29% of the males had Subclinical Hypothyroidism. Out of 50 female patients, 18 of the females had Thyroid Disorder, in that 64.71% of the females had Subclinical Hypothyroidism. But there was statistical, not significance (p= 0.595).

**DISCUSSION-**

Type 2 diabetes mellitus and Thyroid diseases are the most common endocrine disorders among the global health challenges encountered in physicians practice. It has been shown to have the mutual influence of Diabetes and thyroid disorders on each other and association between both the conditions has long been reported.<sup>5</sup>

In the present study, out of 100 diabetic patients, 33% of patients had a thyroid disorder and 67% of patients were found to be Euthyroid. The findings of our study are consistent with studies of Vikhe *et al.*<sup>6</sup> (overall prevalence of thyroid disorder was 30%), Demitrost *et al.*<sup>7</sup> (overall prevalence of thyroid disorder was 31.2%), Diez *et al.*<sup>8</sup> (overall prevalence of thyroid disorder was 32.4%) and Celani MF *et al.*<sup>9</sup> (overall prevalence of thyroid disorder was 31.4%). Subclinical hypothyroidism was the most prevalent disorder in diabetic patients in our study, occurring in 17%, followed by primary hypothyroidism in 14% of the total 100 diabetic patients. Thus, among thyroid disorders, the maximum prevalence was found to be of subclinical hypothyroidism. Our results are in concordance with the results of Vikhe *et al.*<sup>9</sup> in which Hypothyroidism was present in 22 % (14% subclinical hypothyroidism and 8 %primary hypothyroidism) and hyperthyroidism is present in 8 % (all Primary hyperthyroid subjects) of diabetic subjects.

Similarly, another study was conducted by Laloo Demitrost *et al.*<sup>9</sup> they observed 33 (16.3%) had subclinical hypothyroidism (10 males and 23 females), 23 (11.4%) had hypothyroidism (6 males and 17 females), 4 (2%) had subclinical hyperthyroidism, 3 (1.5%) were hyperthyroidism cases and in this study majority of the patients were in the age group of 46-60 years (40%) and the mean age was 54.82 years with a standard deviation of 4.62.

In this study, out of 55 male patients, 15 of the males had Thyroid Disorder. In that 40% of the males had Subclinical Hypothyroidism. Out of 50 female patients, 18 of the females had Thyroid Disorder, in that 61.1% of the females had Subclinical Hypothyroidism. But there was no statistical significance.

Yang GR *et al.*,<sup>10</sup> studied 371 diabetics, in which 83 subjects (22.4%) were diagnosed as SCH of whom 12.1% were males and 29.9% were females.<sup>11</sup> In many of the studies it shows that thyroid disorders are more common in females with Type 2 Diabetes – Babu K *et al.*,<sup>12</sup> Celani MF *et al.*<sup>8</sup> etc.

Association of the duration of diabetes and thyroid disorder did not correlate each other.

**CONCLUSION-**

- The mean age of the study group was 60.79 years.
- Males equal numbered females in the study.
- The prevalence of Thyroid disorder in our study was 33% of which Subclinical hypothyroidism was 17%, followed by 14% primary hypothyroidism and primary hyperthyroidism in 2% of the total diabetics.

- The prevalence of subclinical hypothyroidism was highest in the Thyroid disorders in our study (17%).
- The prevalence of Thyroid disorder was more in Females as compared to in our study.

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