Scholars Journal of Applied Medical Sciences (SJAMS)
Abbreviated Key Title: Sch. J. App. Med. Sci.
ISSN 2320-6691 (Online)
ISSN 2347-954X (Print)

A Unit of Scholars Academic and Scientific Society, India
www.saspublishers.com

General Medicine

Prevalence of Thyroid Dysfunction in Type 2 Diabetes Mellitus

Dr. Pankaj Kumar[1], Dr. Bushra Khanam[2*], Dr. Ankit Rana[3], Dr. Sparsh Gupta[4]
[1]Assistant Professor, Department of General Medicine, Index Medical College, Hospital and Research Centre, Indore, India
[2]Associate Professor, Department of General Medicine, Index Medical College, Hospital and Research Centre, Indore, India
[3]PG Resident, Department of General Medicine, Index Medical College, Hospital and Research Centre, Indore, India
[4]PG Resident, Department of General Medicine, Index Medical College, Hospital and Research Centre, Indore, India

Original Research Article

***Corresponding author**
Bushra Khanam

Article History
Received: 09.11.2018
Accepted: 18.11.2018
Published: 30.11.2018

DOI:
10.36347/sjams.2018.v06i11.027

Abstract: Type 2 diabetes mellitus (DM) is a growing problem all over the world and we have observed that many patients of Diabetes Mellitus are associated with thyroid dysfunction. Various studies have found that diabetes and thyroid disorders mutually influence each other and both disorders tend to coexist**.** The study was undertaken with an objective to know the thyroid functions in Type 2 diabetics and to know the spectrum of thyroid dysfunction in Type 2 DM. The present study included 135 OPD and IPD patients of Type 2 DM who attended Department of General Medicine at Index Medical College Hospital and Research Centre, Indore (M.P.). Detailed history and examination was done, Fasting blood samples of all the subjects were taken and at the same time samples were tested for HbA1C and thyroid profile (T3, T4 and TSH). The results of both were analyzed for correlation**.**
Keywords: DM Type 2, Hypothyroidism, TSH, HbA1c, Hyperthyroidism.

INTRODUCTION

Thyroid dysfunction and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice [1]. 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 found commonly in diabetes and is associated with advanced age, particularly in type 2diabetes and underlying autoimmune disease in type 1 diabetes [2]. Insulin and thyroid hormones are intimately involved in cellular metabolism and thus excess or deficit of either of these hormones result in the functional derangement of the other.

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 [3]. 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.

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both [4]. 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 [5]. The prevalence of thyroid dysfunction in DM has been estimated as 10.8% with majority of hypothyroidism (around 30%) and subclinical hypothyroidism (around 50%) [6]. A number of reports have also indicated a higher than normal prevalence of thyroid disorders in type 2 diabetic patients, with hypothyroidism being the most common disorder associated[7].

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 [8]. 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 diabetes mellitus type 2. Furthermore on extensive search of literature we found no major studies have been conducted to compare and correlate serum insulin levels and total tri-iodothyronine (T3), thyroxine (T4), thyroid stimulating hormone (TSH) levels in type 2 diabetes mellitus patients. Data on comparison and correlation of the glycosylated hemoglobin (HbA1c) levels and total T3, T4, TSH levels in type 2 diabetes mellitus patients is also scanty.

Our study demonstrates the importance of recognition of this interdependent relationship between thyroid disease and diabetes which in turn will help guide clinicians on the optimal screening and management of these conditions. The aim of this study was to establish the relationship between the diabetes and thyroid dysfunction probably affected as a consequence to the auto immune pathology. One thirty five patients in 40–70 years age group of type 2 diabetes mellitus were checked for thyroid functions. The study excluded patients with complications of diabetes mellitus, and those with known history of thyroid dysfunction The present study was taken up to note the prevalence of thyroid dysfunction in Type 2 diabetics and spectrum of thyroid dysfunction.

METHODOLOGY

After taking permission from institutional ethical committee the study was started. The present study included 135 OPD and IPD patients of confirmed Type 2DM who were coming to Index Medical college hospital for consultation. Written consent from all the subjects was taken. A detailed history and examination was done, blood samples of all the subjects were taken.HbA1c of was all the patients was done. All the patients were evaluated for thyroid dysfunction by testing thyroid profile (T3, T4 and TSH). The correlation of prevalence of thyroid disorder with HbA1C was then done. The observations and interpretations were recorded and results obtained were statistically analyzed**.**

Inclusion criteria

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

Exclusion criteria

- Type 1 DM
- Patients with:
    - Gestational diabetes mellitus.
    - Pancreatitis.
    - Steroid induced Diabetes would be excluded.
- All those who had proven thyroid disorder and on treatment
- Patients suffering from hemoglobinopathies and anemia.
- Patients on Amiodarone therapy.

Investigations

Glycosylated hemoglobin (HbA1c) determined by ion-exchange chromatography as described by Goldstein *et al*. using ion exchange chromatography kits. ELISA were used for, TSH, T3 and T4 estimation. The results of thyroid function were classified by use of the following as normal reference range:

TSH: 0.39-4.24 mIU/L
T3: 0.67-1.79ng/dl
T4: 53-121 ng/dl

Hypothyroidism—when T3, T4 were less and TSH greater than the reference ranges.
Hyperthyroidism—when T3, T4 were greater and TSH less than the reference ranges.
Subclinical hypothyroidism—when T3, T4 were within normal range and TSH greater than the reference ranges.

Subclinical hyperthyroidism—when T3, T4 were within normal range and TSH less than the reference ranges

RESULTS

In present study, most of the patients were above the age group of ≥50 years (66%). Mean age of study population was 54.63±8.85 years. Mean T3, T4, TSH (mg/dl) and HbA1c (%) level was 0.88±0.77, 80.51±40, 9.69±9.4 and 9.17±2.5 respectively. In this study, 135 established diabetics were screened for thyroid disorders by TFT. Abnormal thyroid function was found in 85 T2DM cases and remaining diabetics had normal thyroid function. Among 135 cases low thyroid function was noted in 38 patients and 36 subjects had Sub-clinical hypothyroidism. Hyperthyroidism was noted in 11 patients.

Table-1: Distribution according to HbA1C Values

HbA1C	No. of Patients	Percentage (%)
6.5 – 9.5	74	54.81
9.5-12.5	56	41.48

>12.5	05	3.70
Total	135	100.00

Mean= 9.177 Mode=9.1

Table-2: Distribution according to T3 Values

T3 Range	No. of Patients	Percentage (%)
0.11 to 0.30	08	5.93
0.31 to 0.60	21	15.55
0.61 to 0.66	06	4.44
0.67 to 1.00	81	60.00
01.01 to 1.34	07	5.19
1.35 to 1.80	07	5.19
1.80 to 2.00	05	3.70

Mean=0.8836, Mode=0.90

Number of patients with hypotridothyronine = 28

Number of patients with hypertridothyronine = 05

Table-3: Distribution according to T4 Values

T4 Range	Number of Patients	Percentage (%)
13.8 to 52.00	26	19.23
53.1 to 121	102	75.55
121.1 to 192	07	5.19
Total	135	100.00

Mean=80.51 Mode=86.00

Number of patients with hypotetraidothyronine = 26

Number of patients with hypertetraidothyronine= 07

Table-4: Distribution according to TSH Values

TSH Range	No of Patients	Percentage (%)
0.136-0.39	11	8.14
0.40 to 4.24	50	37.03
4.24 to 20.00	57	42.2
20.01 to 30.00	01	0.70
30.01 to 40	16	11.85
Total	135	100.00

Table-5: Distribution according to thyroid profile of patients

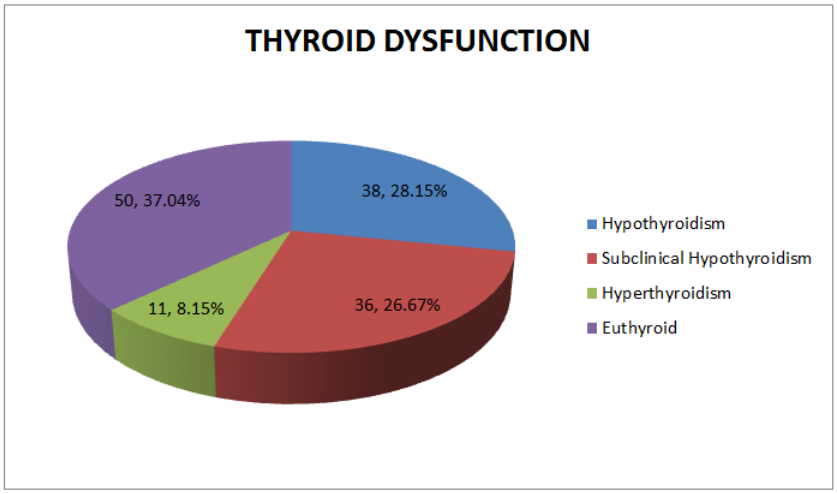
T3 (No. of Patients)	T4 (No. of Patients)	TSH (No. of Patients)
0.11-0.67 (46)	13.8-53 (38)	0.136-0.39 (11)
0.67-1.79(84)	53-121 (102)	0.40-4.24 (50)
1.8-2.00(05)	121-192 (07)	4.24-40 (74)

Number of patients with subclinical hypothyroidism = 36

Number of patients with clinical hypothyroidism = 38

Table-6: Prevalence of Thyroid dysfunction

Thyroid Disorder	No. of Patients	Percentage (%)
Hypothyroidism	38	28.15
Subclinical Hypothyroidism	36	26.67
Hyperthyroidism	11	8.15
Euthyroid	50	37.04
Total	135	100.00



DISCUSSION

Among the endocrinal metabolic diseases diabetes occupies the major share. India has the dubious distinction of being home to the largest number of people suffering from diabetes in any country. The disease is responsible for significant mortality and morbidity due to the complications. This study was conducted at Index Medical College Hospital & Research Centre, Indore. Thyroid functions where studied in type 2 Diabetes Mellitus patients attending the OPD and IPD of IMCH&RC hospital, Indore (M.P). A total of 135 type 2 diabetics were studied. All were confirmed diabetics who previously had plasma glucose levels of ≥126 mg/ dl or RBS of >199 and HbA1c >6.5% on more than one occasion and were receiving treatment such as Insulin, OHA's or physical exercise therapy. Prevalence and spectrum of thyroid disorders in type 2 diabetics was noted. Diabetes mellitus is not only simple hyperglycemia but it affects every organ mainly nervous system, renal, cardiovascular and other endocrine glands especially thyroid. The associations between diabetes and thyroid disorders have long been reported and they have been shown to mutually influence each other. In present study, the mean age of patients was 54.63±8.85 years. The present study recorded a high prevalence of hypothyroidism (28.1%) followed by subclinical hypothyroidism (26.6%) and hyperthyroidism was found in (8%) patients. Our results are in accordance with the studies Pimenta *et al.* [9] (Prevalence of thyroid dysfunction was 51.6%) and Udiong *et al.* [10] (prevalence was 46.5%).Of 135 patients of Type 2 diabetes mellitus 50 patients (37.03%) had normal thyroid functions and hypothyroidism being the most common thyroid dysfunction.

CONCLUSION

From above study it is clear that patient who are suffering from diabetes mellitus should be screened for thyroid disorder also especially hypothyroidism for control of both. Patients suffering from diabetes mellitus that are complaining of unintentional weight loss or weight gain should be screened for thyroid disorder.

LIMITATIONS: Small number of study subjects.

REFERENCES

1. Nathan DM. Long-term complications of Diabetes mellitus. N Engl J Med 1993; 328:1676-85.
2. Wu P. Thyroid disease and diabetes. Clinical Diabetes. 2000; 18(1):38-9.
3. Trinder P. Blood sugar estimation by GODPOD method. Ann Clin Biochem 1969; 6:24-7.
4. Trivelli LIA. Glycosylated Hemoglobin estimation by Ion Exchange Resin Method. New Eng J Med. 1971; 284:353.
5. Allain CC, Poon LS, Chan CS, Richmond W, Fu PC. Enzymatic determination of total serum cholesterol. Clin Chem. 1974 Apr; 20(4):470-5.
6. Geofrey B, Simon W, Peter R, Peter A. Lecture notes. Clin Biochem. 2006; 7:152.
7. Udiong CEJ, Udoh AE, Etukudoh ME. Evaluation of Thyroid functions in Diabetes mellitus. Indian J Clin Biochem. 2007 Sep; 22(2):74–8.
8. Yang GR, Yang JK, Zhang L, AN YH, LU JK. Association between subclinical hypothyroidism and proliferative diabetic retinopathy in type 2 diabetic patients: a case-control study. Tohoku J Exp Med. 2010 Dec; 222 (4):303-10.
9. Pimenta WP, Mazeto GM, Callegaro CF, Shibata SA, Marins LV, Yamashita S. Thyroid disorders in diabetic patients. Arq Bras Endocrinol Metabol. 2005; 49:234–40.
10. Udiong CEJ, Udoh AE, Etukudoh ME. Evaluation of thyroid function in diabetes mellitus in Calabar, Nigeria. Indian J Clin Biochem. 2007 Sep; 22(2):74-8.