Original Research Article

Thyroid dysfunction among patients with type-2 diabetes mellitus

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Abstract

Background: About 422 million people worldwide have diabetes, 1.6 million deaths occur due to diabetes each year. Thyroid dysfunction is common and the prevalence increases with age. **Aim and Objectives:** To study the prevalence and determine the spectrum of thyroid dysfunction in type-2 DM. **Material and Methods:** A hospital-based, analytical cross-sectional study was conducted in the Department of General Medicine, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore. Patients ≥30 years of age with type-2 DM were included. Study period was 6 months from 1st August 2019 to 31st January 2020. IEC approval and written consent were obtained. A detailed history was taken and examination done. Thyroid assessment, FNAC and biopsy were done if required. Data was analyzed in SPSS version-22 trial. **Results:** Prevalence of thyroid dysfunction among the type-2 DM cases was 30 p.c of which 16 p.c had hypothyroidism and 14 p.c had hyperthyroidism. **Conclusion:** Prevalence of thyroid dysfunction was high among diabetics.
Key Words: Diabetes, type-2 DM, thyroid dysfunction.

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Email: kirankumar17121986@gmail.com
Received Date: 20/11/2019 Revised Date: 19/12/2019 Accepted Date: 11/01/2020
DOI: https://doi.org/10.26611/10211429

Access this article online

Quick Response Code:

Website: www.medpulse.in

Accessed Date: 19 May 2020

INTRODUCTION

Diabetes is a chronic, endocrine metabolic disease which is characterized by elevated levels of blood glucose, which leads to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common in diabetes is type 2 diabetes occurs when the body becomes resistant to insulin or doesn't make enough insulin, it is usually observed in adults.[1] About 422 million people worldwide have diabetes, particularly in low-and middle-income countries and 1.6 million deaths are directly attributed to diabetes each year.[1] Global target is to halt the rise in diabetes and obesity by 2025.[1] Both T2DM and thyroid dysfunction are chronic diseases that require lifelong treatment and have a long-lasting effect on cardiovascular health.[2] Thyroid disease is common in the general population, and the prevalence increases with age.[3] Diabetic patients have a higher prevalence of thyroid disorders compared with the normal population.[3] Patients with one organ-specific autoimmune disease are at risk of developing other autoimmune disorders and thyroid disorders are more common among females.[3] Insulin and thyroid hormone are involved in cellular metabolism which lead to excess or deficit of these hormones and result in functional derangement.[4] Prevalence of thyroid diseases among diabetic patients is 2-3 times higher than in nondiabetic subjects and it raises with age and is strongly influenced by female gender and autoimmune diabetes.[5] Criteria for the diagnosis of diabetes as per ADA, FPG ≥126 mg/dL (7.0 mmol/L) or 2-h PG ≥200 mg/dL (11.1 mmol/L) during OGTT or A1C ≥6.5% (48 mmol/mol) or in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).[6] The normal readings for laboratory thyroid evaluation are T3 (0.7- 2.0 ng/ml), T4 (4.5- 11.0 microg/dl) and TSH (0.4- 5.0 microIU/ml.) Thyroid gland disease manifests symptoms due to either excess or

insufficient production of thyroid hormone.[7] Thyroid disease is established on clinical grounds and functional disturbance based on metabolic state assessment.[7] Thyroid function test can be classified as follows Direct test of thyroid function, tests related to the concentration of thyroid hormones in the blood, tests related to binding of thyroid hormones in the blood, tests that asses the mechanism for regulating thyroid function, tests that assess the metabolic impact of the thyroid hormone and miscellaneous- TPO- Ab, FNAC, thyroid USG.[7] Perros *et al.* had demonstrated an overall prevalence of 13.4 p.c of thyroid diseases in diabetics with the highest prevalence in type-1 female diabetics (31.4 p.c) and lowest prevalence in type-2 male diabetics (6.9 p.c).[8]

MATERIAL AND METHODS

A hospital-based, analytical cross-sectional study was conducted in the Department of General Medicine, Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore. Patients older than 30 years of age with type-2 DM were included. Patients with type-1 diabetes, gestational diabetes, fibro-calculous pancreatitis, steroids induced diabetes, pancreatitis and those with known thyroid disorder were excluded. The study was conducted for a period of 6 months from 1st August 2019 to 31st January 2020. IEC approval and written consent were obtained in prior. A detailed history was taken and examination done. For all the patients hematological, urine routine and organ evaluation for diabetes were performed. For all the patient's thyroid assessment of T3, T4 and TSH levels and FNAC and biopsy was done by pathologist if required. The data obtained was entered in Microsoft Excel and analyzed in SPSS version-22 trial. Appropriate statistical tests were used.

RESULTS

About 50 patients with diabetes were included in the present study. Patients were screened for thyroid disorders by TFT. Table-1 and figure-1 reports the prevalence of thyroid dysfunction among the type-2 DM cases was 30 p.c (15), among them low thyroid function was reported in 16 p.c (8) of the patients and hyper functioning of thyroid was reported in 14 p.c (7) of the patients respectively. Among the patients with a low thyroid function, 14 p.c (7) of the patients had Sub-clinical hypothyroidism while only 2 p.c (1) had hypothyroidism. Table-2 reports the relation between demographic factors and thyroid dysfunction among diabetics, in the present study sub-clinical hypothyroidism was more among females 20 p.c compared to males 8 p.c also sub-clinical hypothyroidism was more common among elderly patients 26 p.c when compared to the patients who were less than 60 years of age. Hyperthyroidism was almost equal among both the genders with 12 p.c prevalence among males and 16 p.c prevalence among females. Overt hypothyroidism was present in only one male patient. Table-3 reports the comparison between DM and DM with thyroid dysfunction in terms of TFT values, diabetic patients with thyroid disorders had higher levels of TSH compared to those without thyroid disorders but there was no much difference in T3 and T4 levels. The present study had reported that patients with hyperthyroidism presented with clinical features of heat intolerance, sweating, palpitations, fine tremors, fatigue, weakness, increased appetite and menstrual disturbances. There was an increase in triglyceride level among patients with thyroid dysfunction, while HDL, VLDL and TC where in normal ranges (Table-4).

Table 1: PREVALENCE OF THYROID DYSFUNCTION IN DIABETES

Thyroid Disorders	Number of patients	Percentage (%)
Normal	35	**70**
Hypothyroidism	1	**16**
Sub-clinical Hypothyroidism	7	
Hyperthyroidism	7	**14**

Table 2: DEMOGRAPHIC FACTORS IN RELATION TO THYROID DYSFUNCTION IN DIABETES

DEMOGRAPHIC FACTORS		NORMAL	HYPO THYROIDISM	SUB-CLINICAL HYPOTHYROIDISM	HYPER THYROIDISM	TOTAL	p-value
GENDER	**MALE**	76% (19)	4% (1)	8% (2)	12% (3)	100% (25)	0.012
	FEMALE	64% (16)	0% (0)	20% (5)	16% (4)	100% (25)	
AGE	**<60 YEARS**	72% (25)	3% (1)	8% (3)	17% (6)	100% (35)	-
	≥ 60 YEARS	67% (10)	0% (0)	26% (4)	7% (1)	100% (15)	

Table 3: COMPARISON OF TFT VALUES AMONG DIABETICS AND DIABETICS WITH THYROID DYSFUNCTION

THYROID FUNCTION TEST	WITH ONLY T2DM	T2DM WITH THYROID DYSFUCNTION
TSH	2.03 ± 1.2	8.6 ± 10.2
T3	1.29 ± 0.8	1.6 ± 1.3
T4	7.03 ± 2.0	8.1 ± 5.4

Table 4: COMPARISON OF BIOCHEMICAL VALUES AMONG DIABETICS AND DIABETICS WITH THYROID DYSFUNCTION

PARAMETER	T2DM SUBJECTS	T2DM WITH THYROID DYSFUNCTION	p-value
FBS	162.6 ± 73.6	138.6 ± 40.1	-
PPBS	247.7 ± 101.9	219.4 ± 66.8	-
TC	170.3 ± 44.2	158.4 ± 45.6	**0.01**
TG	199.1 ± 123.3	171.4 ± 66.5	**0.02**
LDL-C	94.4 ± 29.2	91 ± 26.7	>0.05
HDL-C	43.8 ± 12.7	38.8 ± 11.3	**0.0002**

DISCUSSION

In the present study 50 patients with type 2 diabetes comprised of 25 males and 25 females. Prevalence of thyroid dysfunction among the type-2 DM cases was 30 p.c (15) of which 16 p.c (8) of the patients had a low thyroid function and 14 p.c (7) had a hyper functioning of thyroid. A study conducted by Palanisamy Pasupathi[9] reported that the prevalence of thyroid disorder was 45 p.c among type 2 diabetics of which 28 p.c had hypothyroidism and 17 p.c had hyperthyroidism respectively. Similarly, in a study conducted by C. E. J. Udiong *et al.*[10] it was reported that the prevalence of thyroid disorder was 46.5 p.c among type 2 diabetics of which 26.7 p.c had hypothyroidism and 20 p.c had hyperthyroidism respectively.

CONCLUSION

Prevalence of thyroid dysfunction was 30 p.c among diabetics, sub-clinical hypothyroidism was more common among diabetics. Thyroid disorders were more among females. The incidence of thyroid disorders increases with age among diabetics. There exists no relation between thyroid disorders and duration of diabetes.

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Source of Support: None Declared
Conflict of Interest: None Declared