

Original Research Article

A study of thyroid dysfunction in known cases of diabetes mellitus type 2 and their clinical profile

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Abstract

Introduction: Thyroid dysfunction is a disorder of the thyroid gland which manifests either as hyper - or hypothyroidism and is reflected in the levels of thyroid stimulating hormone (TSH). Type 2 Diabetes Mellitus is the commonest endocrine disorder and leading cause of morbidity worldwide. These two most common endocrine disorders encountered in clinical practice have been shown to mutually influence each other, and association between both the conditions has long been reported. The present study was conducted to find out the prevalence of thyroid disorders in patients of type 2 diabetes mellitus.

Materials and methods: 100 cases of type 2 diabetes mellitus were examined for thyroid dysfunction. A detailed history was taken regarding presenting symptoms, duration of type 2 diabetes mellitus and clinical course of disease. A family history was taken with special reference to type 2 diabetes mellitus and other comorbidities. BMI was calculated to diagnose obesity. A thorough clinical examination was done. Ophthalmic examination was done to diagnose retinopathy and cataract. Detailed blood investigations were done including serum TSH, free T₃ and free T₄.

Results: Males were more affected with diabetes than females and occurrence of thyroid dysfunction was found more common in females with Type 2 DM in our study. Hypothyroidism was most common type of thyroid dysfunction with affected age group was 51-60 years. DM and thyroid dysfunction were more common in overweight patients. Thyroid dysfunction in type 2 DM was seen more commonly with higher levels of HBA1C. Dyslipidemia was more in patients of diabetes with thyroid dysfunction. Patients taking insulin had more incidence of hypothyroidism than patients on OHA. Diabetes related microvascular complications increase the risk for thyroid dysfunction.

Conclusion: Thyroid dysfunction prevalence is very high in patients with diabetes. Patients with diabetes having microvascular complications are more affected with thyroid diseases. Dyslipidemia is also common in DM with thyroid diseases. So thyroid function test must be done on regular basis in each and every patient of DM 2.

Key words

Diabetes Mellitus, Hypothyroidism, Hyperthyroidism, Dyslipidemia, Microvascular complications, Retinopathy, Nephropathy, Neuropathy.

Introduction

Thyroid dysfunction is a disorder of the thyroid gland which manifests either as hyper - or hypothyroidism and is reflected in the levels of thyroid stimulating hormone (TSH). Type 2 Diabetes Mellitus is the commonest endocrine disorder and leading cause of morbidity worldwide. These two most common endocrine disorders encountered in clinical practice have been shown to mutually influence each other, and association between both the conditions has long been reported. Defective insulin secretion leads to various metabolic aberrations in T2DM, spanning from hyperglycemia due to defective insulin-stimulated glucose uptake and up regulated hepatic glucose production, along with dyslipidemia, which includes impaired homeostasis of fatty acids, triglycerides, and lipoproteins [1, 2]. DM appears to influence thyroid function at two sites; firstly at the level of hypothalamic control of TSH release and secondly at peripheral tissue by converting T_4 to T_3 . Hyperglycemia causes reduction in hepatic concentration of T_4 , 5-deiodinase, low serum concentration of T_3 , raised levels of reverse T_3 and low, normal, or high level of T_4 . Thyroid hormones regulate metabolism whereas diabetes can alter metabolism of glucose, fatty acids, triglycerides and lipoprotein [3, 4, 5]. Thyroid hormones contribute to the regulation of carbohydrate metabolism and pancreatic function and on the other hand, diabetes also affects thyroid function tests to a variable extent. However, underlying thyroid disorders may go undiagnosed because the common signs and symptoms of thyroid disorders are similar to those for diabetes and can be overlooked or attributed to other medical disorders². The

recognition of this interdependent relationship between thyroid disease and diabetes is of importance to guide clinicians on the optimal management of both these conditions. Thus, all patients with diabetes mellitus should be screened for thyroid function [6]. The present study was conducted to find out the prevalence of thyroid disorders in patients of type 2 diabetes mellitus.

Materials and methods

100 cases of type 2 diabetes mellitus were examined for thyroid dysfunction in Civil Hospital, B J Medical College, Asarwa, Ahmedabad, from January 2018 to November 2018. A detailed history was taken regarding presenting symptoms, duration of type 2 diabetes mellitus and clinical course of disease. A family history was taken with special reference to type 2 diabetes mellitus, hypertension, coronary artery disease and cerebrovascular accident. BMI was calculated to diagnose obesity. A thorough clinical examination was done. Ophthalmic examination was done to diagnose retinopathy and cataract. Detailed blood investigations were done including serum TSH, free T_3 and free T_4 . We included patients with Type 2 diabetes aged more than 30 years, irrespective of glucose control and irrespective of type of treatment (OHA/insulin). We excluded known cases of hypothyroidism, type 1 diabetes mellitus, pregnant females and patients on drugs that affect thyroid profile.

Results

Total 100 cases of proved type 2 diabetes mellitus were studied for thyroid dysfunction.

Results were depicted as per **Table – 1 to 19** with comparison to other studies [7-12].

Table - 1: Age wise distribution of cases of Type 2 DM patient.

Age (Years)	Male	Female	Total
21-30	-	-	-
31-40	2	2	4
41-50	7	7	14
51-60	29	14	43
61-70	16	6	22
71-80	6	5	11
>80	4	2	6
Total	64	36	100

Table - 2: Sex wise distribution of cases of Type 2 DM patient.

Gender	Observation
Male	64
Female	36
Total	100

Table - 3: Family history wise distribution of Type 2 DM Patient.

Family history	Male (n=64)	Female (n=36)	Total (n=100)
None	49	26	61
Either parent	10	06	30
Both parent	05	04	09

Table - 4: BMI wise distribution of Type 2 diabetic patient.

BMI		Male (n=64)	Female (n=36)	Total (n=100)
<18.5	Below Normal	-	-	-
18.5-24.9	Normal	23	08	31
25- 29.9	Over weight	30	21	51
30- 34.9	Class 1 obesity	9	7	16
35- 39.9	Class 2 obesity	2	-	2
>40	Morbid obesity	-	-	-

Table - 5: Distribution of cases according to HbA1c level.

HbA1c level	Number of cases (%) (n=100)
<7	8 (8%)
≥7	92 (92%)
Total	100

Discussion

100 patients of type 2 diabetes were studied for the presence of thyroid dysfunction. 64% were

male and 36% were female. Males were more affected than females and ratio was 1.77:1. Occurrence of thyroid dysfunction was found in 16% of patients with Type 2 DM in our study. 10% patients had overt hypothyroidism and 6% patients had subclinical hypothyroidism whereas hyperthyroidism was not seen in any patients. The incidence of thyroid dysfunction in the 2 DM was seen more in the age group 51-60 years. Out of 16 patients with abnormal thyroid profile, 10 were females and 6 were males. Thyroid dysfunction was seen more in females. 14 patients with thyroid abnormality had family history of DM. In the present study 52% patient were overweight, 16% patients were in class 1 Obesity group, 2% patients were in class 2 obesity group . Most commonly affected DM2 patients were overweight. DM and thyroid dysfunction are more common in overweight patients. Out of 16 patients with altered thyroid profile, 93.75% had HbA1C value 7% and above and the remaining 1 patient had HbA1C <7 compared with normal thyroid profile group. Thus, thyroid dysfunction in type 2 DM is seen more commonly with higher levels of HBA1C. The mean HbA1C level of the patients with abnormal thyroid profile was 9.02% compared to 8.67% in patients with normal thyroid profile. In our study, mean level of total cholesterol was 159.63 mg/dl, triglycerides -142.75mg/dl, HDL - 47.78 mg/dl, LDL - mg/dl. The common abnormalities were increased level of LDL, reduction in HDL value, increased triglyceride level and increased total cholesterol level. Out of 100 patients with DM, 71% had abnormal lipid profile. Out of 16 diabetic patients with abnormal thyroid profile, 37.5% had hypertension and the rest had normal blood pressure. Out of the 16 diabetic patients who had thyroid disorders, 4 had DM since 5 years, 8 had diabetes for 6 - 10 years and 4 had diabetes for > 10 years. Out of the 16 diabetic patients with thyroid abnormality, 43.75% were treated with OHA, 37.5% were on insulin and the rest (18.75%) were on both OHA + insulin. Patients taking insulin had more incidence of hypothyroidism than patients on OHA. Among patients with diabetic retinopathy, 33.3% had thyroid dysfunction. Among patient

with diabetic nephropathy, 15.7% had thyroid dysfunction and among patient with diabetic neuropathy, 36.3% had thyroid dysfunction. Thus, diabetes related microvascular complications increase the risk for thyroid dysfunction.

Table - 6: Lipid profile in type 2 DM patients.

Lipoproteins	Desirable	Present study values (mean) n=100	% of patients with abnormal serum level
Total cholesterol	<150	159.63	64%
TGs	<70	142.75	71%
HDL	>60	47.78	49%
LDL	<80	125.86	52%

Table - 7: Diabetic cases with abnormal thyroid function.

Thyroid function	Number of cases (n=100)	Percentage (%)
With normal thyroid profile	84	84%
With abnormal thyroid profile	16	16%
Total	100	100%

Table - 8: Comparing other studies with the other studies.

Studies	Prevalence of thyroid disorder in T2DM (%)
Uppal, et al. [7] (2013) n=120	24.5
Demitrost [8] (2012) n=202	31.5
Radaideh, et al. [9] (2004) n=908	12.5
Papazafiropoulou [10] (2010) n=1,092	12.3
Chubb, et al. [11] n= 420	8.6
Akbar, et al. [12] n = 100	16
Present study n=100	16

Table - 9: Distribution of thyroid disease.

Thyroid profile	Number of cases (n=100)	Percentage (%)
Normal	84	84%
Overt hypothyroidism	10	10%
Subclinical hypothyroidism	6	6%
Hyperthyroidism	0	-
Total	100	100%

Table - 10: Age distribution of patients with type 2 DM with thyroid dysfunction.

Age (Years)	Patients with abnormal thyroid function (n=16)	Percentage (%)
35-40	0	-
41-50	2	12.5%
51-60	7	43.75%
61-70	3	18.75%
>70	4	25%
Total	16	100%

Table - 11: Sex distribution of thyroid dysfunction in diabetes.

Sex	Patients with thyroid dysfunction(n=16)	Percentage (%)
Female	10	62.5%
Male	6	37.5%
Total	16	100%

Table - 12: Sex distribution and type of thyroid dysfunction.

Sex	Overt hypothyroidism (n=10)	Subclinical hypothyroidism (n=6)	Hyperthyroidism	Total (n=100)
Male	4 (40%)	2 (33.33%)	-	64 (64%)
Female	6(60%)	4 (66.67%)	-	36 (36%)
Total	10 (100%)	6 (100%)	-	100 (100%)

Table - 13: Abnormal thyroid profile and family history of diabetes mellitus.

Family history	Thyroid Status		Total (n=100)
	Normal (n=84)	Abnormal (n=16)	
No	59(70.23%)	2 (12.5%)	61 (61%)
Yes	25(29.7%)	14(87.5%)	39 (39%)
Total	84 (100%)	16 (100%)	100 (100%)

Table - 14: Distribution of hypertension in diabetics with thyroid dysfunction.

Hypertension	Thyroid Status		Total (n=100)
	Normal (n=84)	Abnormal (n=16)	
No	43 (51.1%)	10 (62.5)	53 (53%)
Yes	41 (48.8%)	6 (37.5%)	47 (47%)
Total	84 (100%)	16 (100%)	100 (100%)

Table - 15: Relation of HbA1c and thyroid dysfunction in diabetic patients.

HbA1c	Abnormal thyroid function (n=16)	Percentage (%)
<7	1	6.25%
≥7	15	93.75%

Table - 16: Distribution of BMI in patients with abnormal thyroid profile.

BMI	Abnormal thyroid function (n=16)	Percentage (%)
<18.5	-	-
18.5- <24.9	5	31.2%
25 – 29.9	9	56.2%
30 – 34.9	2	12.5%
35 – 39.9	-	-
Total	16	100%

Table - 17: Abnormal thyroid profile in relation to duration of diabetes.

Duration of diabetes (years)	Patients with thyroid dysfunction (n=16)	Percentage (%)
Upto 5	4	25%
6 – 10	8	50%
>10	4	25%
Total	16	100%

Table - 18: Abnormal thyroid profile verses type of treatment.

Type of treatment	Patients with thyroid dysfunction (n=16)	Percentage (%)
OHA	7	43.75%
Insulin	6	37.5%
OHA + insulin	3	18.75%
Total	16	100%

Table - 19: Thyroid dysfunction in patients with diabetic complication.

DM complication	Total number of patients (n=100)	Number of patients with thyroid dysfunction	Percentage (%)
Retinopathy	24	8	33.3%
Nephropathy	19	3	15.7%
Neuropathy	22	8	36.3%

Conclusion

Males were more affected with diabetes than females and Occurrence of thyroid dysfunction was found more common in patients with Type 2 DM in our study. Hypothyroidism was most common type of thyroid dysfunction. The incidence of thyroid dysfunction in the DM was seen more in the age group 51-60 years. DM and thyroid dysfunction are more common in overweight patients. Thyroid dysfunction in type 2 DM is seen more commonly with higher levels of HBA1C. Dyslipidemia is more in patients of diabetes with thyroid dysfunction. Patients taking insulin had more incidence of hypothyroidism than patients on OHA. Diabetes related microvascular complications increase the risk for thyroid dysfunction.

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