Original Research Article

Evaluation of thyroid dysfunction (TD) in type 2 diabetes mellitus (DM) patients

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Abstract

Background: Association of thyroid dysfunction (TD) and diabetes mellitus(DM), well known in type 1 DM due to autoimmunity but in type 2 DM largely unknown. The prevalence of thyroid dysfunction varies between 10% to 31% in type 2 DM patients according to various studies. Identification of TD in DM, early intervention of TD if needed may significantly reduce the risk of adverse cardiovascular and cerebrovascular outcomes. So the present study aims to know the prevalence of TD among type 2 DM patients. Diabetic Patients attending medicine out-patient clinic and /or admitted as inpatient under department of medicine in Shridevi Institute of Medical Sciences and Research Centre, and satisifying the inclusion and exclusion criteria, and who gave consent to participate in the study were enrolled. **Results**: In our study majority of the patients were females (58%), maximum number of cases were reported in the age group of 41 to 50 years. Among patients studied for thyroid function 74% are euthyroid,18% subclinical hypothyroid,7% overt hypothyroid and only 1% having subclinical hyperthyroidism. Out of 26 patients of thyroid dysfunction in the study, 19 patients had increased TPO antibody among them 15 were female and remain 4 are male. **Conclusion:** The present study shows that prevalence of thyroid dysfunction is high in type 2 DM patients. Our study emphasizes the need to screen for thyroid dysfunction in all type 2 DM patients at the time of diagnosis and then annually.

Key words: Type 2 diabetes mellitus, thyroid dysfunction, autoimmunity.

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INTRODUCTION

The thyroid gland secretes two hormones, thyroxine (T4) and triiodothyronine (T3). Thyroid hormones play a major role in cell differentiation during development and helps to maintain thermogenic and metabolic homeostasis in the body.[1] The annual incidence rate of autoimmune hypothyroidism is 4 per 1000 women and 1 per 1000 men. Subclinical hypothyroidism is found in 6–8% of women (10% over the age of 60) and 3% of men. The annual risk of developing clinical hypothyroidism is about 4% when subclinical hypothyroidism is associated with positive TPO antibodies.[1] Graves' disease accounts for 60–80% of thyrotoxicosis. Graves' disease occurs in up to 2% of women but is one-tenth as frequent in men.[1] Thyroid dysfunction is very well known in Type 1 Diabetes Mellitus where it is due to autoimmune process.[1,2] Recently few studies have shown that Thyroid dysfunction especially hypothyroidism is found in patients with Type 2 Diabetes Mellitus but the mechanism for this is largely unknown. Diabetic patients have a higher prevalence of thyroid disorders compared with the normal population and the most common amongst them is SCH.[3,4] The prevalence of thyroid dysfunction in type 2 DM patients is as high as 31.4%.[4] Hyperthyroidism is typically associated with worsening glycemic control and increased insulin requirements.[1,3] Subclinical hyperthyroidism may increase the risk of cardiac arrhythmias and exacerbate angina.[3] In

hypothyroid patients, there will be reduced rate of insulin degradation which may lower the exogenous insulin requirement. Hypothyroidism is accompanied by abnormalities in plasma lipid metabolism, including elevated triglyceride and LDL cholesterol.[1,2] Even subclinical hypothyroidism can exacerbate the coexisting dyslipidemia commonly found in type 2 diabetes and further increase the risk of cardiovascular diseases.[3,5] Identification of associated thyroid dysfunction and early intervention may significantly reduce the risk of adverse cardiovascular and cerebrovascular events.[3,5] The relationship between TD and DM is characterized by a complex interaction of interdependence. Screening of TD, especially the subclinical dysfunction in patients with DM is justified because most patients can be asymptomatic. Determining the prevalence of clinical and subclinical thyroid disease in diabetic patients in our country and its implications in the course of diabetes care is necessary Hence this study aims to know the prevalence of thyroid dysfunction among type 2 diabetic patients.

MATERIALS AND METHODS

Diabetic Patients attending medicine out-patient clinic and /or admitted as inpatient under department of medicine January 2018 to October 2018 in shridevi institute of medical sciences and research centre, and satisfying the inclusion and exclusion criteria, and who gave consent to participate in the study were enrolled.

Inclusion Criteria

Patients with DM either newly diagnosed or on treatment.

All patients aged >14 years

Exclusion criteria

Patients with type 1 diabetes mellitus

Patients with Infections , trauma

Pregnant women

Patients with preexisting liver disease

Patients on medication that alter thyroid functioning.

Diabetic Patients with previously known Thyroid dysfunction

Written informed consent for the study was obtained from all of the patients aged 18 years or older or from the parents or guardians of the patients younger than 18 years.

Detailed clinical history, examination and required investigation were done as per proforma for all patients.

Definition used in the study[6,7]

We classified patients as SCH, overt hypothyroidism, hyperthyroidism, subclinical hyperthyroid based on the definitions as per ATA guidelines

SCH was defined as TSH-4.5 to 10 with normal FT4

Overt Hypothyroidism-TSH>10 with low FT4

Hyperthyroidism-<0.45 TSH with raised FT4

Subclinical Hyperthyroidism<0.45 TSH with normal FT4

Ethical clearance:

This study was approved by the ethical committee of Shridevi Institute of Medical Sciences and Research Center, Tumkur.

OBSERVATION AND RESULTS

Of the 100 patients studied, majority of the patients were females (58%) (Table no 1). In our study maximum number of cases were reported in the age group of 41 to 50 years (Table no 2). Among patients studied for thyroid function 74% are euthyroid,18% subclinical hypothyroid,7% overt hypothyroid and only 1% having subclinical hyperthyroidism. No overt hyperthyroid cases seen (Table no.3). Out of 58 females in the study, 19(19%) had thyroid dysfunction of which 13 had SCH, 5 had overt hypothyroidism and 1 had subclinical hyperthyroidism. And out of 42 males in the study, 7(7%) had thyroid dysfunction of which 5 being SCH, 2 overt hypothyroid and none are hyperthyroid (Table no.4). According to age we divided patients in to 7 groups. Among groups, 5 patients between 18-30 yrs,of which 4 were euthyroid and 1 had thyroid dysfunction. Out of 15 patients between 31-40yrs age group, 11 were euthyroid and 4 had thyroid dysfunction. Out of 30 patients between 41-50yrs age group, 23 were euthyroid and 7 had thyroid dysfunction. Out of 27 patients between 51-60yrs age group, 19 were euthyroid and 8 had thyroid dysfunction. Out of 13 patients between 61-70yrs age group, 10 were euthyroid and 3 had thyroid dysfunction. Out of 8 patients between 71-80yrs age group, 6 were euthyroid and 2 had thyroid dysfunction. Out of 2 patients studied in age group morethan 81,one had euthyroid and another had thyroid dysfunction (Table no.5). Out of 26 patients of thyroid dysfuntion in the study, 19 patients had increased TPO antibody among them 15 were female and remaing 4 are male (Table no 6).

Table 1: Gender distribution in the study

Gender	Patients No.(%)
Female	58 (58%)
Male	42 (42%)
Total	**100**

Table 2: Age distribution in the study

Age in years	Patients No.(%)
18-30	5 (5 %)
31-40	15(15%)
41-50	30(30%)
51-60	27(27%)
61-70	13(13%)
71-80	8(8%)
>81	2(2%)
Total	**100 (100%)**

Table 3: Distribution of thyroid function in the study

Thyroid function	No. of patients(%)
Euthyroid	74(74%)
Subclinical hypothyroidism	18(18%)
Overt hypothyroidism	7(7%)
Subclinical hyperthyroidism	1(1%)
Overt hyperthyroidism	0
Total	**100 (100%)**

Table 4: Gender distribution of thyroid function

Gender	Euthyroid	Thyroid dysfunction				Total
		Overt Hypothyroidsn	SCH	Hyperthyroidism	Subclinical hyperthyroidism	
Female	39	5	13	0	1	58
Male	35	2	5	0	0	42
Total	**74**	**7**	**18**	**0**	**1**	**100**

Table 5: Age and thyroid dysfunction

Age in years	Euthyroid	Thyroid dysfunction	Patients No.
18-30	4	1	5
31-40	11	4	15
41-50	23	7	30
51-60	19	8	27
61-70	10	3	13
71-80	6	2	8
>81	1	1	2
Total	**74**	**26**	**100**

Table 6: TPO antibody in thyroid dysfunction patients among gender

Gender	TPO antibody among thyroid dysfuction		Total
	Increased	Normal	
Female	15	4	19
Male	4	3	7
Total	19	7	26

DISCUSSION

There are few studies on diabetes and thyroid dysfunction. They seem to indicate a higher prevalence of thyroid disorder among diabetic patients when compared to general population. This study was concluded 26 % of type 2 diabetic patients have thyroid dysfunction. The higher percentage of patients had sub clinical hypothyroidism 18%. In present study shows thyroid disease prevalent in 26% of diabetes patients as compared to 6.8 % in perros *et al.*.[8] The commonest thyroid dysfunction in the present study is SCH 18% followed by hypothyroidism 7% and 1% subclinical hyperthyroidism as compared to 4.8 % of SCH ,0.9% of hypothyroidism,0.5% of hyperthyroidism and subclinical hyperthyroidism each in perros *et al.*,[8] In present study 26% of type 2 diabetic patients have thyroid dysfuction

as compared to 31.4% in Celani MF *et al.*,[4] 28% in Kiran Babu *et al.*,[12] 12.3 % reported in greek type 2 diabetic patients, [9] 16% of Saudi patients with type 2 diabetes [10] and 12.5 % in Radaideh AR *et al.*. [11] In the present study thyroid dysfunction prevalent in 32.75% of females and 16.66% of males as compared to study by perros *et al.*, [8] the prevalence was 10.9% in females and 6.9% in males. The NHANES III [13] study reported that the prevalence of subclinical hypothyroidism was 3.4% in males and 5.8% in females but in our study SCH prevalent in 22.41 % of females and 11.90% of males . In our study total 26% of patients with type 2 diabetes mellitus had thyroid dysfuntion of which 73% had elevated anti-TPO antibody among them 78.9% were females and only 21.05% are males as compared to study done by Celani Mf *et al.*,[4] had 33% and Schroner Z *et al.*,[14] had 40% of elevated TPO antibody.

CONCLUSION

To conclude most of the patients with thyroid dysfunction were in the middle age group, majority of them were females. SCH is the most prevalent form of TD followed by overt hypothyroid. Only 1% had subclinical hyperthyroidism, none of them have hyperthyroidism. Thyroid autoimmunity was found in 73% of patients with thyroid dysfunction. Our study emphasizes the need to screen for thyroid dysfunction in all type 2 DM patients at the time of diagnosis and then annually.

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