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Original Research Article

A study of Thyroid disorder in Type 2 Diabetes Mellitus

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Abstract: Diabetes mellitus and thyroid dysfunction are the two most common endocrine disorders in clinical practice. Untreated thyroid disorder can adversely affect glucose and lipid metabolism and predisposes patient to atherosclerotic diseases like coronary artery disease and stroke. The aim of this study was to estimate the prevalence of thyroid disorder in patients with type 2 diabetes mellitus. This is an observational cross-sectional study. Three hundred patients with T2DM that regularly attended the medicine department of a tertiary care centre participated in the study. Laboratory tests like thyroid profile, blood sugar and HbA1c done in all patients. Thyroid dysfunction was classified as clinical hypothyroidism if TSH > 5.50 µUI/mL and FT4 < 0.93 ng/dL; subclinical hypothyroidism if TSH > 5.50 µUI/ml and FT4 ranged from 0.93 to 1.7 ng/dL; subclinical hyperthyroidism if TSH < 0.27 µUI/ml and FT4 in the normal range (0.93 and 1.7 ng/dL) and clinical hyperthyroidism if TSH < 0.27 µUI/ml and FT4 > 1.7 µUI/mL. The prevalence of thyroid dysfunction in all diabetic patients was 13.7%. The most frequently thyroid disorder was subclinical hypothyroidism, in 12% of patients with T2DM. Clinical hypothyroidism was identified in 0.9 % of cases, subclinical hyperthyroidism in 0.7 % cases and clinical hyperthyroidism in 0.1% cases. We conclude that screening for thyroid dysfunction among patients with type 2 diabetes mellitus should be routinely performed considering the high prevalence of new cases. Timely diagnosis can prevent early onset atherosclerotic disease like coronary artery disease, stroke and hypertension arising from an undiagnosed thyroid disorder.
Keywords: thyroid disorder, diabetes, atherosclerosis.

INTRODUCTION

Diabetes Mellitus (DM) and thyroid dysfunction (TD) are commonly encountered endocrine disorders [1]. First report was published in 1979 about association between DM and TD and since then many researchers have worked over it [2].

Thyroid disorder varies in different population depending on environmental and host factors, ranging from 6.6% to 13.4% [3, 4]. Prevalence of TD further increases in specific populations like diabetics, where prevalence varies from 10 to 24% [5-7]. The presence of TD may affect diabetes control. Hyperthyroidism is typically associated with worsening glycemic control and increased insulin requirements. There is underlying increased hepatic gluconeogenesis, rapid gastrointestinal glucose absorption, and probably increased insulin resistance. Indeed, thyrotoxicosis may unmask latent diabetes.

In practice, there are several implications for patients with both diabetes and hyperthyroidism. First, in hyperthyroid patients, the diagnosis of glucose intolerance needs to be considered cautiously, since the hyperglycemia may improve with treatment of thyrotoxicosis. Second, underlying hyperthyroidism should be considered in diabetic patients with unexplained worsening hyperglycemia. Third, in diabetic patients with hyperthyroidism, physicians need to anticipate possible deterioration in glycemic control and adjust treatment accordingly. Restoration of euthyroidism will lower blood glucose level.

The relationship between TD and DM is characterized by a complex interaction of interdependence. Screening of TD, especially the subclinical disorder, in patients with DM is justified because most patients can be asymptomatic.
The aim of this study is to investigate the prevalence of TD in patients with type 2 diabetes mellitus (T2DM) in a tertiary care hospital.

METHODS

All type 2 diabetic patients who were treated at a tertiary care centre, between March 2015 and September 2016 were selected. The number of patients randomized for the study was 1000, 92 were excluded according to the exclusion criteria; the data of the remaining 908 was analyzed. All patients were assessed for signs and symptoms related to thyroid disorder.

A group of 304 subjects, 174 (57.2%) females and 130 (42.8%) males, were included as a control group. This group was neither diabetics nor known to have any endocrine disorder nor any other disease that may affect the thyroid function. Venous blood samples were withdrawn and assayed for thyroid function such as free thyroxine (FT4), free tri-iodothyronine (FT3), thyroid stimulating hormone (TSH), thyroid autoantibodies (Tab), antimicrosomal antibodies (AMA), thyroglobulin antibodies (Tgab) and hemoglobin A1C (HbA1C). Tests were either directly analyzed from venous blood samples. All participants were given informed consent and the study was approved by the ethical committee of the institute.

RESULTS

Table 1 shows characteristics of all subjects.

A random sample from 908 adult T2DM patients was recruited for this study, 480 females (52.9%) and 428 males (47.1%). The mean age ± standard deviation (SD) of the investigated patient was 50.4+9.8, and the age range was 26-85 years.

A group of 304 subjects, 174 (57.2%) females and 130 (42.8%) males, were included as a control group. The mean age ± SD of the control group was 49.4 ± 14.2 and the age range was 30-80 years. The mean duration of type 2 DM was 48±18 months among study group. The prevalence of thyroid disorder in all diabetic patients was 13.7%. The most frequently thyroid disorder was subclinical hypothyroidism, in 12% of patients with T2DM. Clinical hypothyroidism was identified in 0.9 % of cases, subclinical hyperthyroidism in 0.7 % cases and clinical hyperthyroidism in 0.1% cases. Most of the subjects with thyroid disorder were seen in the age group of 40-58 years. Patients with BMI > 25 were at increased risk of having thyroid disorder (P < 0.009).

Table 1: Demographic Characteristics

Characteristics	Study Group	Control Group	P Value
Number (n)	908	304	
Sex (Female)	52.9%	57.2%	0.55
Mean Age (±SD)	50.4±9.8	49.4±14.2	0.58
Mean duration of DM (months)	48±18	-	-
Prevalence of thyroid disorder	13.7%	1.8%	<0.0001
Prevalence of Subclinical hypothyroidism	12%	1%	<0.0001
Prevalence of Overt hypothyroidism	0.9%	0.4%	0.001
Prevalence of subclinical hyperthyroidism	0.7%	0.3%	0.05
Prevalence of Clinical hyperthyroidism	0.1%	0.1%	Nonsignificant

DISCUSSION

This study showed a high prevalence of thyroid disorder in type 2 DM (13.7%). Subclinical hypothyroidism was the most frequent disorder found. This frequency found is higher than those described in the study of Fremantle (8.6%) [8] And in the study Chu *et al.;* (8.4%) [9]. Previous studies have shown that the risk of thyroid disorder increases with age.[10] Our observations are consistence with previous similar studies performed by Ghazali SM *et al.;* [11], Singh G *et al.;* [12], Radaideh AR *et al.;* [13], Laloo Demitrost *et al.;* [14], reported 29.7 %, 30 %, 12.5 %, 31.2 % respectively.

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 dyslipidaemia, which includes impaired homeostasis of fatty acids, triglycerides, and lipoproteins [15].

DM appears to influence thyroid function in two sites; 1stly at the level of hypothalamic control of TSH release and 2ndly at peripheral tissue by converting T4 to T3. Hyperglycemia causes reduction in hepatic concentration of T4-5 deiodinase, low serum concentration of T3, raised levels of reverse T3 and low, normal, or high level of T4. Thyroid hormone regulate metabolism and diabetes can alter metabolism [16].

CONCLUSION

We conclude that screening for thyroid disorder among patients with type 2 diabetes mellitus should be routinely performed considering the high prevalence of new cases. Timely diagnosis can prevent early onset atherosclerotic disease like coronary artery

disease, stroke and hypertension arising from an undiagnosed thyroid disorder.

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