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Prevalence of thyroid abnormalities among type 2 diabetes patients

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***Abstract*---**Background: The present study was conducted for assessing the prevalence of thyroid abnormalities among type 2 diabetes patients. Materials & methods: This was a hospital based cross sectional study .A total of 100 type 2 diabetic patients were enrolled. Complete demographic and clinical details of all the patients was obtained. Clinical examination was carried out in all the patients and detailed medical history was recorded. Blood samples were obtained and glycemic profile was evaluated. Thyroid profile was evaluated using auto-analyzer. All the results were recorded and analyzed using SPSS software. Results: Thyroid dysfunction was present in 18 percent of the patients. Out of 52 patients with HbA1c>8%, thyroid dysfunction was present in 26.92 percent while out of 48 patients with HbA1c<8%, thyroid dysfunction was present in 8.33 percent of the patients. Significant correlation was observed while correlation thyroid dysfunction with glycemic profile. Conclusion: Significant proportion of diabetic patients are affected by thyroid dysfunction. Also, its prevalence significantly correlates with glycemic profile.

***Keywords*---**diabetes, glycemic profile, thyroid.

Introduction

Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice. Diabetes and thyroid disorders have been shown to mutually influence each other and associations between both conditions have long been reported. On one hand, thyroid hormones contribute to the regulation of carbohydrate metabolism and pancreatic function, and on the other hand, diabetes affects thyroid function tests to variable extents.[1- 3] Thyroid dysfunction (TD) and diabetes mellitus (DM) are two of the most frequent chronic endocrine disorders with variable prevalence among different populations. The prevalence of TD in Europe and the United States is ~6.6% in adults; it increases with age and is higher in women than in men. Both hyperthyroidism and hypothyroidism can develop in severe or subclinical forms. T3, the active thyroid hormone (TH), exerts a negative feedback at the level of both thyrotrophs in the pituitary and tanycytes in the hypothalamus; it induces a reduction in TRH, as well as TSH secretion in response to adequate tissue levels of TH. Therefore, subclinical thyroid disorders (STDs) are characterized by low or increased serum TSH with TH levels at the upper and lower limits of their reference range, respectively, in subclinical hyperthyroidism (SHyper) and subclinical hypothyroidism (SHypo).[4- 6] Hence; the present study was conducted for assessing the prevalence of thyroid abnormalities among type 2 diabetes patients.

Materials & Methods

The present cross-sectional study was conducted from April 2021 to Feb 2022 for assessing the prevalence of thyroid abnormalities among type 2 diabetes patients in a Tertiary care hospital, Bolangir, Odisha. A total of 100 type 2 diabetic patients were enrolled. The written consent was obtained from all subjects. Patients with known thyroid disease, acute illness and with impaired mental function were excluded from the study. Complete demographic and clinical details of all the patients were obtained. Clinical examination was carried out in all the patients and detailed medical history was recorded. Blood test was done and glycemic profile was evaluated. Thyroid profile was evaluated using auto-analyzer. Thyroid dysfunction was classified as clinical hypothyroidism if TSH > 4.20 µUI/mL and FT4 < 0.93 ng/dL; Subclinical hypothyroidism if TSH > 4.20 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. All the results were recorded and analyzed using SPSS software. Chi-square test was used for evaluating the level of significance.

Results

Mean age of the patients was 45.6 years. 63 patients were males while the remaining were females. Mean BMI of the patients was 25.6 Kg/m^2. Mean HbA1c was 8.9%. Thyroid dysfunction was present in 18 percent of the patients. Out of 52 patients with HbA1c>8%, thyroid dysfunction was present in 26.92 percent while out of 48 patients with HbA1c<8%, thyroid dysfunction was present in 8.33 percent of the patients. Significant correlation was observed while correlation thyroid dysfunction with glycemic profile.

Table 1: Demographic data

Variable	Mean	SD
Age (years)	45.6	12.8
Males (%)	63	
Females (%)	37	
BMI (Kg/m^2)	25.6	3.8
HbA1c (%)	8.9	2.8

Table 2: Prevalence of thyroid dysfunction

Thyroid dysfunction	Number	Percentage
Present	18	18
Absent	82	82

Table 3: Correlation of thyroid dysfunction and glycemic profile

Thyroid dysfunction	HbA1c<8%		HbA1c>8%		Total		p-value
	N	%	N	%	N	%	
Present	4	8.33	14	26.92	18	18	0.00*
Absent	44	91.67	38	73.08	82	82	
Total	48	100	52	100	100	100	

*: Significant

Discussion

Diabetes mellitus is being one of the greatest health threats for the 21st century. Prevalence of diabetes is rising rapidly in developing countries, and the global number of diabetes is estimated to reach 366 million in 2030 among adults aged ≥20 years. Both type 1 and type 2 diabetes are powerful and independent risk factors for coronary artery disease (CAD), stroke, and peripheral arterial disease. The global rise in diabetes burden has led to significant increase in health care expenditure.[6- 8] The thyroid hormones play an important part in key metabolic pathways as the balance is controlled by them by regulation of expenditure and storage of energy. “metabolism is regulated by TH primarily by actions in the brain, brown fat, white fat, liver, skeletal muscle, and pancreas”. Although the autoimmune mechanism is very clear in establishing the association between Type I diabetes and Thyroid dysfunction, the connection between Type II Diabetes mellitus and Thyroid dysfunction is still not completely understood. It is very complex and involves many variables such as synthesis of TRH, the circadian rhythm of TSH, insulin resistance, autoimmunity, and the use of metformin.[7, 8] There is a deep underlying relation between diabetes mellitus and thyroid dysfunction. Studies have found that thyroid dysfunction is much common in diabetic population compared to nondiabetic population, and diabetes and thyroid disorders have been shown to mutually influence each other. Most often thyroid dysfunction and type 1 diabetes are due to an autoimmune condition, whereas type 2 diabetes is mainly due to insulin resistance. [8- 10] Hence; the present study was conducted for assessing the prevalence of thyroid abnormalities among type 2 diabetes patients.

In the present study, mean age of the patients was 45.6 years. 63 patients were males while the remaining were females. Mean BMI of the patients was 25.6 Kg/m^2. Mean HbA1c was 8.9%. Thyroid dysfunction was present in 18 percent of the patients. As per a large European meta-analysis, TD is present in 3.82% of the general population. Its prevalence among those with T2DM is significantly higher, ranging from 9.9 to 48%. This wide range of prevalence can be explained by the use of different definitions for TD diagnosis, depending on the presence of anti-thyroid peroxidase (anti-TPO), antithyroglobulin antibody (anti-TG), or both. In many studies, most T2DM patients with TD had subclinical hypothyroidism (SCH), and several new cases of TD were diagnosed during clinical evaluations, highlighting the need for enhanced screening for TD in T2DM patients. Just as in the nondiabetic population, TD was found to be more common in females than in males with diabetes. TD is more common in T1DM than in T2DM patients, but the pathophysiology is more complex in T2DM patients and has greater clinical implications.[5- 8]

In the present study, out of 52 patients with HbA1c>8%, thyroid dysfunction was present in 26.92 percent while out of 48 patients with HbA1c<8%, thyroid dysfunction was present in 8.33 percent of the patients. Significant correlation was observed while correlation thyroid dysfunction with glycemic profile. Telwani AA et al evaluated the prevalence of thyroid disorders in patients of type 2 diabetes mellitus. They assessed 100 diabetic patients and 100 controls. All the participants were evaluated for thyroid dysfunctions by testing thyroid profile. The prevalence of thyroid dysfunctions were high in diabetic patients compared to controls (29% versus 9%, P value <0.001). Most common thyroid disorder in diabetic patients was subclinical hypothyroidism (16%) while least common was hyperthyroidism (1%). The levels of serum T3 and T4 were significantly low while serum TSH levels were significantly high in diabetic group compared to control group. Prevalence of thyroid disorders in diabetics were significantly more in patients with age ≥ 50 years, more in females, more in patients with BMI ≥ 30 and more in patients with duration of diabetes ≥ 5 years. The association of prevalence of thyroid disorders with HBA1C was not significant. Their study showed high prevalence of thyroid dysfunctions in diabetic patients. They concluded that screening for thyroid dysfunction among patients with diabetes mellitus should be routinely performed, so as to recognize these dysfunctions early.[11]

Conclusion

Significant proportion of diabetic patients are affected by thyroid dysfunction. Also, its prevalence significantly correlates with glycemic profile.

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