ORIGINAL RESEARCH

Evaluation of thyroid function in type 2 Diabetes mellitus patients in a known population

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ABSTRACT
Thyroid dysfunction (TD) and diabetes mellitus (DM) are two of the most frequent chronic endocrine disorders with variable prevalence among different populations. This study was conducted to assess the thyroid function in type 2 diabetes mellitus patients in a known area. **Material and methods:** This study was conducted as a cross-sectional analysis on a sample of 100 individuals who were diagnosed with type 2 diabetes and were over the age of 20. The participants were selected from those who visited the hospital over a span of 4 months. Thyroid-stimulating hormone (TSH), free triiodothyronine (fT3), free thyroxine (fT4), and insulin resistance (IR) were assessed in all individuals. The subjects were subsequently categorized into hypothyroid, hyperthyroid, and euthyroid groups based on their thyroid profiles. Assessment of results was done using SPSS software. **Results**: Out of the total of 100 patients, 30 (30%) were diagnosed with hypothyroidism, 6 (6%) were diagnosed with hyperthyroidism, and 64 (64%) were determined to have normal thyroid function (euthyroid). Among people with diabetes, the incidence of thyroid dysfunction was determined to be 36%. **Conclusion:** Failure to identify thyroid hormone abnormalities can significantly contribute to inadequate management of type 2 DM.
Keywords: thyroid function, diabetes mellitus

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INTRODUCTION

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 (4). T3, the active thyroid hormone (TH), exerts 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.[1- 3] 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, 5] Nair et al, in a previous study, evaluated patients with type 2 diabetes for presence of hypothyroidism and the clinical factors associated with it. The demographic, anthropometric, clinical, and biochemical parameters of consecutively enrolled patients with diabetes were systematically collected and analyzed. A total of 1152 middle aged patients with type 2 diabetes with a mean duration of diabetes of around 10 years were enrolled. Nearly 40 percent of the patients were obese and overweight, respectively, for South Asian standards and abdominal obesity was seen in around 90% patients. Clinical hypothyroidism (TSH>10 mIU/ml) was present in 113 of patients (9.83%) and another 68 patients (5.9%) had subclinical hypothyroidism (TSH 5-10 mIU/ml). Anemia (odds ratio : 2.19), overweight/obese status (odds ratio 2.07), and known dyslipidemia (odds ratio : 1.99) were found to have independent association with clinical hypothyroidism. HbA1c, abdominal obesity, poor control of hypertension, lipid parameters, microalbuminuria, and renal dysfunction showed no difference among patients with hypothyroidism when compared with euthyroid patients. Subclinical hypothyroid patients had no difference in any of the above analyzed parameters when compared to the euthyroid patients.[6] Hence, this study was conducted to assess the thyroid function in type 2 Diabetes mellitus patients in a known area.

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MATERIAL AND METHODS

This study was conducted as a cross-sectional analysis on a sample of 100 individuals who were diagnosed with type 2 diabetes and were over the age of 20. The participants were selected from those who visited the hospital over a span of 4 months. Thyroid-stimulating hormone (TSH), free triiodothyronine (fT3), free thyroxine (fT4), and insulin resistance (IR) were assessed in all individuals. The subjects were subsequently categorized into hypothyroid, hyperthyroid, and euthyroid groups based on their thyroid profiles. The study excluded individuals with chronic inflammatory diseases and infections, liver disease, kidney disease, heart failure, ascites, abdominal hernias, tumors, complications of diabetes, previous history of thyroid abnormalities, and pregnant women. Subjects for the study were collected using consecutive sampling. The study comprised newly diagnosed type 2 DM patients without any complications who presented to the hospital over the specified time period and met the inclusion criteria. All the results were recorded and analysed using SPSS software.

RESULTS

In this study, there were 50 males and 50 females. Mean age of the patients was 51.5 years. Out of the total of 100 patients, 30 (30%) were diagnosed with hypothyroidism, 6 (6%) were diagnosed with hyperthyroidism, and 64 (64%) were determined to have normal thyroid function (euthyroid). Among people with diabetes, the incidence of thyroid impairment is determined to be 36%.

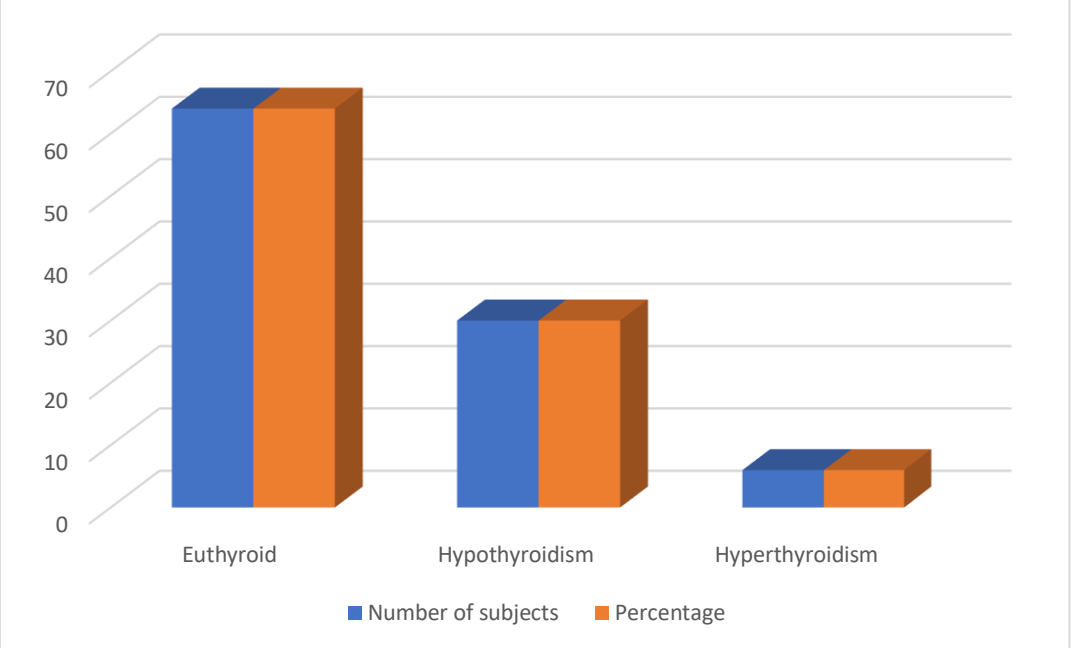
Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects	Percentage
Males	50	50%
Females	50	50%
Total	100	100%

Table 2: Prevalence rates of thyroid diseases in the study group.

Thyroid diseases	Number of subjects	Percentage
Euthyroid	64	64%
Hypothyroidism	30	30%
Hyperthyroidism	06	06%

Graph 1: Prevalence rates of thyroid diseases in the study group.



DISCUSSION

Diabetes mellitus (DM) and thyroid dysfunction (TD) are endocrinopathies that are commonly seen in routine practice, and they frequently coexist. A high prevalence of TD is seen among both type 1 (T1DM) and type 2 (T2DM) diabetes mellitus patients. Autoimmunity can explain the common linkage between T1DM and autoimmune thyroid diseases; however, the linkage between T2DM and TD is more complicated. T2D is due to a progressive loss of β cell insulin secretion commonly on the background of insulin resistance.[5- 7] In 2013 it was estimated that

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~382 million people had DM, of whom 90% to 95% had T2D.[7] According to the World Health Organization, the prevalence of DM is expected to increase to 592 million by 2035, developing in ~7.8% to 8.8% of adults with an epidemic risk of T2D in populations such as China, Oceania, South and Central Asia, Latin America, and the Middle East.[8- 11] Hence, this study was conducted to assess the thyroid function in type 2 Diabetes mellitus patients in a known area.

In this study, out of the total of 100 patients, 30 (30%) were diagnosed with hypothyroidism, 6 (6%) were diagnosed with hyperthyroidism, and 64 (64%) were determined to have normal thyroid function (euthyroid). Among people with diabetes, the incidence of thyroid impairment is determined to be 36%. Vamshidhar IS et al[12] evaluated the frequency of thyroid dysfunctions in patients with type 2 diabetes mellitus and compare them with a normal control population. Laboratory investigations included measurements of fasting blood sugar [FBS] and HbA1c values after overnight fasting for eight hours, serum triglycerides, along with serum TSH, FT3, and FT4, which were measured by chemiluminescence immunoassay. Among all cases of type 2 diabetes mellitus, eight (16%) presented thyroid disorders, with 10% in male patients and 6% in female patients. The overall frequency of thyroid disorders was found in four (8%) cases, of which two (4%) in males and two in females. The values of TSH μIU/ml and FBS mg/dl in type 2 diabetes mellitus cases were plotted and a Pearson correlation coefficient of +0.70 was calculated, indicating a positive correlation between the TSH and FBS. Along with TSH levels, the values of HbA1c were plotted in patients with type 2 diabetes mellitus and a Pearson correlation coefficient of +0.76 was calculated.

In another study conducted by Ozair M, et al, authors determined the incidence and prevalence of thyroid dysfunction in patients with T2DM in relation to age, sex, metabolic syndrome and other co-morbid conditions. 250 Type 2 DM patients were enrolled aged between 40 and 75 years. All the patients were evaluated for thyroid dysfunction by testing thyroid profile (T3, T4 and TSH. These subjects were also investigated for fasting blood sugar (FBS), post prandial glucose (PPG) glycosylated hemoglobin (HbA1c), serum cholesterol, serum triglycerides, high density lipoprotein (HDL), low density lipoprotein(LDL), very low density lipoprotein(VLDL), blood urea, serum creatinine and presence of other co-morbid conditions. A high prevalence of thyroid dysfunction (28%) was observed in type 2 diabetic patients with subclinical hypothyroidism (18.8%) as the commonest thyroid disorder. Thyroid dysfunction was more prevalent in females, with presence of dyslipidemia, retinopathy, poor glycemic state (HbA1c ≥7) and longer duration of diabetes as significant contributing factors associated. In addition to glycemic status, screening of thyroid disorder should be routinely done in type 2 diabetic subjects along with other comorbid conditions.[13]

CONCLUSION

Failure to identify thyroid hormone abnormalities can significantly contribute to inadequate management of type 2 DM. Hence, it is necessary to regularly measure thyroid hormone levels in individuals with type 2 diabetes in order to enhance medical treatment and minimize their
morbidity.

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