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Assessment of relation between diabetes mellitus and thyroid dysfunction

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ABSTRACT
Background: Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice. The present study was conducted to assess relation between diabetes mellitus and thyroid dysfunction.
Materials & Methods:70 patients type II diabetes mellitus patients of either gender were assessed for fasting blood glucose, glycosylated hemoglobin (HbA1C), lipid profile and urine albumin were performed. Estimation of serum thyroid stimulating hormone, free triiodothyronine and free thyroxine were performed using chemiluminescent immunoassay method.
Results: Males were 42 and females were 28. The mean age of patients was 48.7 years, mean BMI was 27.5 Kg/m^2, mean HbA1C level was 8.7% and duration of diabetes was 6.4 years. Serum T3 was normal in 80%, increased in 12% and decreased in 8%. Free T3 was normal in 81%, increased in 4% and decreased in 15% and free T4 was normal in 87%, increased in 9% and decreased in 4%. The maximum hypothyroidism patients (12) were seen with >9 HbA1C level. Hyperthyroidism was seen in 10 with >9 HbA1C level.
Conclusion: Hypothyroidism was highly prevalent in diabetes patients as compared to hyperthyroidism.
Key words: Diabetes,hypothyroidism, Insulin resistance

I. 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. Thyroid disorders are widely common with variable prevalence among the different populations.
Patients with type 2 diabetes mellitus are more prone to develop thyroid disorders. Many diabetic patients show features of thyroid dysfunction over a period of time. Insulin resistance plays an important role in the development of hypothyroidism in patients with type 2 diabetes mellitus.Thyroid hormones affect glucose metabolism via several mechanisms. Hyperthyroidism has long been recognized to promote hyperglycemia. During hyperthyroidism, the half-life of insulin is reduced most likely secondary to an increased rate of degradation and an enhanced release of biologically inactive insulin precursors. In untreated Graves' disease, increased proinsulin levels in response to a meal were observed. In addition, untreated hyperthyroidism was associated with a reduced C-peptide to proinsulin ratio suggesting an underlying defect in proinsulin processing. Another mechanism explaining the relationship between hyperthyroidism and hyperglycemia is the increase in glucose gut absorption mediated by the excess thyroid hormones. Metformin decreases thyrotropin levels in patients with hypothyroidism. Studies showed that patients with prediabetes and type 2 diabetes mellitus (TDM) had a significantly increased thyroid volume and a higher prevalence of incident goiter and nodules. Diabetic patients treated with metformin had a smaller thyroid volume and a lower risk for the formation of thyroid nodules when compared with controls. The present study was conducted to assess relation between diabetes mellitus and thyroid dysfunction.

II. MATERIALS & METHODS

This study was conducted on 70 patients type II diabetes mellitus patients of either gender. After obtaining their written consent, all became part of the study.
A thorough clinical examination along with measurement ofbody weight, height and body mass index (BMI) was done. Blood pressure measurement following palpatory method was performed. Laboratory tests such as fasting blood glucose, glycosylated hemoglobin (HbA1C), lipid profile and urine albumin were performed. Estimation of serum thyroid stimulating hormone, free triiodothyronine and free thyroxinewere performed using

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chemiluminescent immunoassay method. Results were analysis using student's t test with level of significance set below 0.05.

III. RESULTS

Table I Patient parameters

Parameters	Mean value
Male	42
Female	28
Mean age (years)	48.7
BMI (Kg/m^2)	27.5
HbA1C (%)	8.7
Duration of diabetes (years)	6.4

Table I shows that males were 42 and females were 28.The mean age of patients was 48.7 years, mean BMI was 27.5 Kg/m^2, mean HbA1C level was 8.7% and duration of diabetes was 6.4 years.

Table II Thyroid profile in diabetic patients

TFT	Normal	Increased	Decreased	P value
Serum T3	80%	12%	8%	0.01
Free T3	81%	4%	15%	0.03
Free T4	87%	9%	4%	0.05

Table II graph I shows that serum T3 was normal in 80%, increased in 12% and decreased in 8%. Free T3 was normal in 81%, increased in 4% and decreased in 15% and free T4 was normal in 87%, increased in 9% and decreased in 4%. The difference was significant (P< 0.05).

Graph I Thyroid profile in diabetic patients

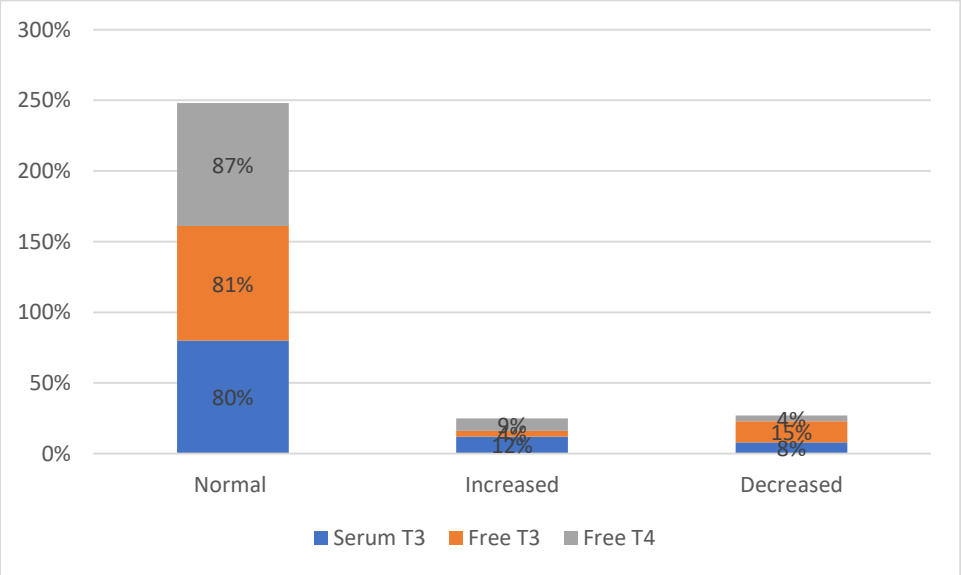

Table III Thyroid dysfunction andglycemic status

HbA1C (%)	Hypothyroidism	Hyperthyroidism
6.5-7	2	2
7.1-8	2	2
8.1-9	2	3
>9	12	10

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Table III, graph II shows that maximum hypothyroidism patients (12) were seen with >9 HbA1C level. Hyperthyroidism was seen in 10 with >9 HbA1C level.

IV. DISCUSSION

It is well known that diabetic patients with hyperthyroidism experience worsening of their glycemic control and thyrotoxicosis has been shown to precipitate diabetic ketoacidosis in subjects with diabetes.[8]As for hypothyroidism, glucose metabolism is affected as well via several mechanisms. A reduced rate of liver glucose production is observed in hypothyroidism and accounts for the decrease in insulin requirement in hypothyroid diabetic patients.[9] Recurrent hypoglycemic episodes are the presenting signs for the development of hypothyroidism in patients with type 1 diabetes and replacement with thyroid hormones reduced the fluctuations in blood glucose levels.[10] In a case control study involving type 1 diabetic patients, those with subclinical hypothyroidism experienced more frequent episodes of hypoglycemia during the 12 months prior to the diagnosis of hypothyroidism compared to euthyroid diabetics. On the other hand, both clinical and subclinical hypothyroidisms have been recognized as insulin resistant states.[11]The present study was conducted to assess relation between diabetes mellitus and thyroid dysfunction.

In present study, males were 42 and females were 28. The mean age of patients was 48.7 years, mean BMI was 27.5 Kg/m^2, mean HbA1C level was 8.7% and duration of diabetes was 6.4 years. Palma et al[12]in their study 386 patients with T1DM or T2DM participated in the study. All patients underwent a clinical and laboratory evaluation. Thyroid dysfunction was classified as clinical hypothyroidism (C-Hypo) if TSH > 4.20 µUI/mL and FT4 < 0.93 ng/dL; Subclinical hypothyroidism (SC-Hypo) if TSH > 4.20 µUI/ml and FT4 ranged from 0.93 to 1.7 ng/dL; Subclinical hyperthyroidism (SC-Hyper) if TSH < 0.27 µUI/ml and FT4 in the normal range (0.93 and 1.7 ng/dL) and Clinical hyperthyroidism (C-Hyper) if TSH < 0.27 µUI/ml and FT4 > 1.7 µUI/mL. Autoimmunity were diagnosed when anti-TPO levels were greater than 34 IU/mL. The prevalence of TD in all diabetic patients was 14,7%. In patients who had not or denied prior TD the frequency of TD was 13%. The most frequently TD was subclinical hypothyroidism, in 13% of patients with T1DM and in 12% of patients with T2DM. The prevalence of anti-TPO antibodies was 10.8%. Forty-four (11.2%) new cases of TD were diagnosed during the clinical evaluation. The forty-nine patients with prior TD, 50% with T1DM and 76% with T2DM were with normal TSH levels.

We found that serum T3 was normal in 80%, increased in 12% and decreased in 8%. Free T3 was normal in 81%, increased in 4% and decreased in 15% and free T4 was normal in 87%, increased in 9% and decreased in 4%. Ghazali et al[13]determined the prevalence of thyroid dysfunction in Type 2 diabetics. Thyroid dysfunction was present in 19 (29.7%) of 64 type 2 diabetics and 1 (2.8%) of 36 non diabetic controls (P< 0.05). The prevalence of thyroid dysfunction is 32.4% in females and 25.9% in males. Secondary hypothyroidism was seen in 78.9%, sub-clinical hypothyroidism in 15.8%, and sub-clinical hyperthyroidism 5.2% of subjects with thyroid dysfunction. Abnormal lipid profiles were seen in 35.4% of euthyroid type 2 diabetics and 100% of hypothyroid type 2 diabetics.

We found that maximum hypothyroidism patients (12) were seen with >9 HbA1C level. Hyperthyroidism was seen in 10 with >9 HbA1C level. Mehalingamet al[14] assessed the level of thyroid dysfunction in patients with type 2 diabetes mellitus and to identify the association of thyroid dysfunction with diabetic complications. Hypothyroidism was seen in 13.9%, while hyperthyroidism was observed in 3.6% of the study subjects. Thyroid dysfunction was more common among females than males. No correlation was seen between thyroid dysfunction and diabetic complications in the study subjects.

V. CONCLUSION

Authors found that hypothyroidism was highly prevalent in diabetes patients as compared to hyperthyroidism.

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