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Study of Thyroid Dysfunction in Patients with Type 2 Diabetes Mellitus

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Abstract

Background and Objective

Diabetes mellitus and thyroid disorders are among the most common endocrine disorders in the world. The association between these two disorders has long been recognized, although the prevalence of thyroid dysfunction in diabetic population varies widely between studies. With insulin and thyroid hormone being intimately involved in cellular metabolism, either excess or deficit of these hormones results in a functional derangement of the other. Association of poorly controlled diabetes and thyroid results in a low triiodothyronine (T3) state, loss of thyroid stimulating hormone (TSH) response to thyrotropin releasing hormone (TRH) and there is an absence of nocturnal TSH peak.

Diabetics with hyperthyroidism are associated with poor glycemic control and those with hypoglycaemia may suffer from recurrent episodes of hypoglycemia. So, the present study was taken up to assess the prevalence and spectrum of thyroid dysfunction in patients with type 2 diabetes mellitus.

Methods

A sample of 120 diabetic patients were randomly selected. They are interviewed and physical examination was done. To assess thyroid dysfunction among them, T3, T4 (thyroxine) and TSH levels were done. Anti thyroid peroxidase (Anti-TPO) antibodies and thyroglobulin (Tg) antibodies were done in patients with thyroid dysfunction. Other tests like fasting blood sugar (FBS), post-prandial blood sugar (PPBS), glycosylated hemoglobin (HbA1c), total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C), very low density lipoprotein cholesterol (VLDL-C), triglycerides (TG) and urine spot albumin creatinine ratio (UACR) were done in all the patients. Target organ evaluation for diabetes was also done.

Keywords: Thyroid dysfunction, Prevalence, Diabetes mellitus, Glycosylated hemoglobin, Anti-thyroid peroxidase antibodies, Coronary artery disease.

Inclusion criteria

1. All cases of type 2 diabetes mellitus detected denovo or on treatment [Diet/Exercise/Oral hypoglycemic agent (OHA)/Insulin], irrespective of glucose control are included in the study.
2. All type 2 diabetics in whom thyroid dysfunction is detected already or in whom it is detected denovo are included.

Exclusion criteria

1. Patients with Secondary diabetes
2. Patients with Autoimmune diseases
3. Gestational diabetes mellitus subjects
4. Patients with previous thyroid surgery, radio-iodine therapy or patients receiving drugs with anti-thyroid activity

5. Seriously ill patients

Results

Out of 120 diabetic cases, thyroid dysfunction is found in 40.83% (subclinical hypothyroidism 15%, hypothyroidism 21.67% and hyperthyroidism 4.16%). The prevalence of thyroid dysfunction among males and females is 13.3% and 27.4% respectively.

Subclinical hypothyroidism is more common in the elderly (20.68%) compared to that in the adult & middle aged group (9.67%), hypothyroidism in the adult & middle aged group (27.41%) compared to that in elderly (15.51%) and hyperthyroidism had no much difference between the two groups. The prevalence of hypothyroidism in elderly females is 18.18% compared to 12% in elderly males, subclinical hypothyroidism is 21.21% in elderly females compared to 20% in elderly males and hyperthyroidism is 8% in elderly males and none among elderly females. Anti-TPO antibodies were positive in 38.77% (12.24% males and 26.53% females) and Tg antibodies in 24.48% (4.08% males and 20.04% females) of cases with thyroid dysfunction.

There is a statistically significant difference in the T3, T4 and TSH values between diabetics without thyorid dysfunction and diabetics with various thyroid disorders. FBS, PPBS and HbA1c were higher in hyperthyroid patients and lower in subclinical hypothyroidism and hypothyroidism.

The prevalence of thyroid dysfunction in patients with retinopathy is 25%, nephropathy 40% and neuropathy 35%. 53.06% of patients with thyroid dysfunction had microvascular complications compared to 64.78% of patients without thyroid dysfunction.

The prevalence of thyroid dysfunction in patients with coronary artery disease (CAD) is 77.77%, cerebrovascular accident/disease (CVA) 28.57% and peripheral arterial disease (PAD) 50%. 20.40% of patients with thyroid dysfunction had macrovascular complications compared to 11.26% of patients without thyroid dysfunction. There is a slightly higher prevalence of thyroid dysfunction among diabetics on treatment with OHA (42.35%) compared to those on insulin (38.46%) or OHA & insulin (33.33%) and among the group with 6-10 yrs duration of diabetes (50.00%), compared to the groups 0-5 yrs (43.39%) and ≥ 11 yrs (30.76%), but statistically it is not significant. Heat intolerance and palpitation are consistently present in hyperthyroid patients. Diabetic patients with thyroid dysfunction had higher levels of total cholesterol, LDL-C, triglycerides and lowerlevels of HDL-C and VLDL-C (except for a lower level of triglycerides in hypothyroidism).

Interpretation and Conclusions

Prevalence of thyroid dysfunction in diabetics is high (40.83%). Most common thyroid disorder is hypothyroidism followed by subclinical hypothyroidism. Thyroid dysfunction is more common in females. Subclinical hypothyroidism is more common in the elderly group. Hypothyroidism and subclinical hypothyroidism are more prevalent in elderly females than elderly males. Anti-TPO and Tg antibodies are more prevalent in females and anti-TPO antibodies are more common in thyroid disorders than Tg antibodies. There is a statistically significant difference in the T3, T4 and TSH values between diabetics without thyorid dysfunction and diabetics with various thyroid disorders.

Hyperthyroid patients had poor glycemic control and hypothyroid patients may be prone to hypoglycemia. Prevalence of thyroid dysfunction is more in patients with nephropathy than neuropathy and retinopathy, and in CAD than CVA and PAD.

There is no significant effect of treatment of diabetes on thyroid dysfunction. There is no relation between thyroid dysfunction and duration of diabetes. Heat intolerance and palpitations are specific symptoms of hyperthyroidism in

diabetics. Diabetic patients with thyroid dysfunction have hyperlipidemia and are also at increased risk of CAD.

Biography

Swetha Reddy has completed her MBBS and Post graduation in internal medicine from India .I am currently working as a registrar in Acute Medicine In NHS trust ,United Kingdom,