

Estimation of thyroid hormone status and thyroid antibodies in type-1 diabetes mellitus

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Abstract

Autoimmune thyroid diseases are frequent in patients with type-1 diabetes mellitus. The aim of the study is to determine the incidence of autoimmune thyroid diseases (AIT) in type 1 diabetes mellitus patients which helps to provide early care and treatment. Thirty cases of type-1 diabetes mellitus were included. Serum TSH, serum FT3, serum FT4, anti Tg Ab, anti TPO levels were measured. A significant increase in the levels of anti Tg Ab, anti TPO and serum FT3 was observed. There was no significant difference in the levels of serum FT4 and serum TSH. These findings suggest that there is a strong association between type 1 DM and autoimmune thyroid disorders. The detection of these abnormalities in early stage will help the patients to improve quality of life and reduce the morbidity rate.

Keywords: Serum TSH, serum FT3, serum FT4, anti TPO antibodies, anti Tg antibodies.

Introduction

Diabetes mellitus comprises a group of common metabolic disorders that share the phenotype of hyperglycemia. Diseases of thyroid gland are amongst the most abundant endocrine disorder in world second only to diabetes. Thyroid diseases affect approximately 10-15% of patients with diabetes mellitus whereas in non-diabetics, the prevalence is approximately 6%. The prevalence is much more in type-1 than type-2 DM. Mode of association between DM and thyroid diseases are more complex and very unclear. Neither DM nor thyroid disorders present a homogenous nosologic unit, pathogenesis of different types of DM as well as thyroid diseases is diverse. Therefore, even the relations between them are different (Perros *et al.*, 1995).

Autoimmune thyroiditis is a group of inflammatory thyroid disorders with either hypothyroid, euthyroid or hyperthyroid state (Slatosly *et al.*, 2000). DM-1 is often accompanied by autoimmune diseases. Autoimmune thyroid diseases are amongst the most common (Kinova *et al.*, 1998; Vondra *et al.*, 2002). Recent studies confirm an increased incidence of autoimmune thyroid diseases even in type-2 DM. The occurrence of common features of autoimmune diseases and the co-association of multiple autoimmune diseases in the same individual or family supports the notion that there may be common genetic factors (Mangmade *et al.*, 1999). The objective of our study was to evaluate the thyroid antibodies and also thyroid hormone status in type-1 DM.

Materials and methods

The present study was conducted in the Dept. of Biochemistry, SV Medical College, Tirupati. Thirty diagnosed type-1 DM patients are chosen for study

who belong to age group of 12-30 yrs. Thirty age matched subjects without DM-1 are taken as controls. All the subjects had no history of previous thyroid diseases. Informed consent was obtained from all the subjects. Fasting blood samples were collected by venipuncture technique and for separation of serum, the blood is centrifuged at 3000 rpm for 5 min. The separated serum is used to estimate serum TSH, FT3, FT4, TPO antibodies and anti TG abs. Serum TSH, T3 and T4 are estimated by ELISA method (Frazer & Browning, 1985; Holl *et al.*, 1999). Estimation of thyroid auto antibodies by using ELISA for semi quantitative detection of thyroglobulin antibodies (TG-Ab) and thyroid peroxidase antibody (TPO-Ab) which are also called as microsomal antibodies were done. All the results were expressed as mean \pm SD and statistical comparison was done.

Results and discussion

Table 1 showed that there was a significant decrease in the values of FT3 in type-1 DM when compared to controls. There is no statistical difference in the values of FT4 and TSH between type-1 DM and control groups. There was a significant increase in the values of anti-TPO and anti-TG antibodies in type-1 DM when compared to controls. Autoimmune thyroid diseases are common in diabetics with DM type-1 (Kinova *et al.*, 1998). Schroner *et al.* (2008) found incidence of autoimmune thyroid disorders in 40% patients of type-1 DM and in patients with diabetes of LADA in 50% respectively. Holl *et al.* (1999) and Roldan *et al.* (1999) also found incidence of AITD up to 5% patients in type-1 DM with manifestation in pre-school age, 15-25% in adolescence. The international literature data about the incidence of AITD in patients with DM type-1-subtype LADA differ

quite a bit from one source to another which may be caused by ethnic and regional differences (Groop *et al.*, 1988; Matejkova & Vondra, 2000). There is significant higher incidence of AITD in women as well as diabetics with positive family history of thyroid diseases in the group of patients with DM and currently present AITD in comparison with the group of diabetics without AITD (Vondra & Zamrazil, 2002). The family history data can be suggestive of increased risk for thyroid diseases in patients with DM.

Table 1. Comparison between type-1 DM and control.

	Diabetics Mean±S.D	Control Mean±S.D	P Value
FT3 (pmol/l)	3.21±0.52	3.76±0.57	<0.05 (S)
FT4 (pmol/l)	9.33±0.26	9.26±0.28	N.S
TSH (µIU/ml)	3.51±0.55	3.58±0.49	N.S
TPO Ab(units)	0.87±0.16	0.38±0.21	<0.01(H.S)
TG Ab (units)	0.84±0.15	0.56±0.18	<0.01(H.S)

S = Significant; H.S = Highly significant;
N.S = Not significant.

It is mainly accumulation of autoimmune and allergic diseases and especially thyroid diseases in their consanguineous relatives. In the present study, the serum levels of FT4 and TSH were not statistically different from that of controls. But the serum FT3 levels were found to be lower in type-1 diabetics as compared to controls. The decreased serum level of FT3 may be due to impairment of 5-monodeiodinase enzyme activity, which controls the peripheral conversion of T4 into T3 (Suzuki *et al.*, 1992). Perros *et al.* (1995) found subclinical hypothyroidism in 6.5% of type-1 diabetic male patients. The likely explanation for this association with thyroid abnormalities is a common underlying predisposition leading to co existing autoimmune destruction of pancreatic islet cells and autoimmune attack on thyrocytes.

The involvement of organ specific antibodies in the pathogenesis of the disease is secondary to tissue destruction by thyroid infiltrating T-cells is still unknown. It is also unclear that whether anti-TPO antibodies are able to induce hypothyroidism by blocking the enzyme thyroid peroxidase. The benefits of identifying thyroid dysfunction at an early stages in the clinical disorder and even in asymptomatic patients are considerable particularly in view of high like hood of progression to overt thyroid dysfunction. It could be concluded that estimation of thyroid antibodies should be done periodically for every type-1 diabetic patients. Patients with positive antibodies should be monitored for TSH elevation at yearly intervals with the goal of early detection to prevent the possible adverse effects on the human body metabolism. Without these regular and specific laboratory tests, early diagnosis of autoimmune thyroid diseases in routine diabetologic practice is a very difficult task.

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