Thyroid Disease Screening in Children and Adolescents with Type 1 Diabetes Mellitus

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Abstract

Objective: Changed thyroid chemicals have been depicted in patients with diabetes particularly those with poor glycemic control. This project's objective was to evaluate; the prevalence of autoimmune thyroid disease in children with type 1 diabetes mellitus and the presence of autoantibodies to serum anti-thyroid peroxidase (serum anti-TPO).

Patients and methods: The study included fifty diabetic children who attended El-Shatby University Children's Hospital's diabetes clinic on a regular basis. Twenty healthy children who were identical in age and sex served as controls. Serum anti-TPO autoantibodies, serum TSH levels, a clinical examination, and a measurement of HbA1c were all carried out. Samples with an abnormal serum TSH level were tested for serum T4 and T3.

Results: Serum anti-TPO came back positive in 100% of controls and positive in 12% of cases. 50.0% of cases with positive serum anti-TPO had abnormal serum TSH levels, while 97.7% of cases with negative serum anti-TPO had normal serum TSH levels, which was statistically significant (P = 0.004). 42% of diabetic children had good metabolic control, but only 19% of them had a positive serum anti-TPO. 36% had fair control, but only 5% had a positive serum anti-TPO. 22% had poor control, and 9.1% had a positive serum anti-TPO. These differences were not statistically significant, P = 0.550.

Conclusion: Despite the fact that serum TSH screening is more effective at detecting thyroid abnormalities in children and adolescents with type 1 diabetes, positive serum anti-TPO antibodies may be an earlier indicator of thyroid disease. As a result, patients with positive antibodies should have their serum TSH levels checked annually.

Keywords: Screening; Thyroid disease; Auto antibodies; Children; Anti TPO

Introduction

Kids with type 1 diabetes mellitus (T1DM) are more inclined to foster organ-explicit immune system illnesses, among which immune system thyroiditis (AIT) is all the more regularly experienced, is described by the creation of autoantibodies against the thyroid organ, T-lymphocytic penetration of the organ, and resulting advancement of different levels of thyroid brokenness. Thyroglobulin (Tg), a key component of the thyroid colloid, and thyroid peroxidase (anti-TPO), an enzyme involved in the production of thyroid hormones, are the targets of these autoantibodies [1]. Uncontrolled diabetic patients have been found to have lower serum T3 levels. This "low serum T3 state" may be caused by a decrease in the peripheral conversion of serum T4 to serum T3, which returns to normal with improved glycemic control. Hyperthyroidism has long been known to cause high blood sugar levels; As hypothyroidism affects glucose metabolism via multiple mechanisms, the half-life of insulin is likely reduced as a result of an increased rate of degradation and increased release of biologically inactive insulin precursors [2]. Hypothyroidism results in a slower rate of glucose production in the liver, which is why hypothyroid diabetics require less insulin. Thyroid antibody tests and thyroid function should be considered close to the time of diagnosis and repeated if clinical circumstances suggest the possibility of thyroid disease; if normal, consider rechecking every one to two years [3]. Recurrent hypoglycemic episodes may be the presenting signs for the development of hypothyroidism in patients with type 1 diabetes. The American Diabetes Association (ADA) and the International Society for Pediatric and Adolescent Diabetes (ISPAD) recommend this. Thyroxine replacement therapy started early in patients with subclinical hypothyroidism reduces the risk of hyperlipidemia and atherosclerotic heart disease. Hyperthyroidism alters glucose metabolism, potentially resulting in the deterioration of metabolic control [4]. Up until now, there is no consensus about the best policy for screening for thyroid dysfunction in diabetic children and the time point of therapeutic intervention. The purpose of this study was to evaluate; the prevalence of autoimmune thyroid disease and the presence of autoantibodies to serum anti-thyroid peroxidase (serum anti-TPO) in children with type 1 diabetes who attend the diabetes clinic at Alexandria University Children's Hospital [5].

Methods

The presence of serum anti-TPO antibodies in children and adolescents with type 1 DM was examined in a cross-sectional hospital study. Between October 2011 and May 2012, the study included 50 diabetic children who were coming to the diabetes clinic for follow-up, and 20 healthy children of the same age and sex served as controls. The diabetic group's inclusion criteria were as follows: Age: Type 1 DM 1–18 years. The prohibition models included: Subjects with a positive history of thyroid disorders in the past, patients with obvious organ system diseases like Thalassemia, congenital heart disease, and corticosteroids users. All of the children in the study will go through:

Itemized history and clinical assessment.

Analyzing anthropometric measurements (such as height and weight). On the basis of the WHO Child Growth Standards7, anthropometric measurements were expressed as age- and sex-specific standard deviations (SDs) from the mean (z scores).

Evaluation of serum anti-TPO Ab levels: Chemiluminescent, enzyme-labeled, solid-phase, sequential immunometric assay The definition of normal levels is less than 35 IU/ml.

TSH in the blood: Chemiluminescent immunometric assay in solid phase. Range of reference: ages 1 to 6: 0.85–6.5, 7–12 years: 0.28–4.3, 13–16 years: (uIU/ml/ml): 0.36–4.7

On samples with an abnormal serum TSH level, serum T4 and T3.

HbA1c was estimated by Nyco Card, the mean of the last four readings for HbA1c was determined. Range of reference: In diabetic children, values between 6 and 8.5% indicate good metabolic control, 9 to 10% indicate fair control, and values greater than 10% indicate poor control.

Serum anti-TPO positive cases were followed for six months.

The Statistical Package for the Social Sciences (SPSS 14.0) was used to analyze the data. Contrasts between the gatherings were determined by the chi-square test for clear cut factors, ANOVA test for at least two consistent factors, the review convention was supported by the institutional survey leading body of the school of medication in Alexandria College (Egypt), and a composed parental assent and kid consent were gotten.

Discussion

Because a significant portion of the population is affected by autoimmune diseases, there is a strong incentive for research into methods for detecting, preventing, and even curing these conditions. Although autoimmune thyroid disease (ATD), celiac disease, idiopathic adrenal insufficiency, and pernicious anemia are all known to occur together, the most common combination is type 1 diabetes and ATD [6]. The purpose of this study was to determine the prevalence of autoimmune thyroid disease in children with type 1 diabetes and the presence of serum anti-TPO autoantibodies [7].

The present study found that 12.0% of children with T1DM had serum anti-TPO antibodies that were positive. According to Mantovani et al., studies on antimicrosomal antibodies in Brazilian children with type 1 diabetes revealed an average prevalence of 16.7% [8]. European whites had a prevalence of 11.1%, while American Hispanic patients had a prevalence of 35% and Iranian children had a prevalence of 39.6%, according to Sharifi et al. India had a higher incidence (54.3%) [9]. Similarly, the large-scale cohort of type 1 DM patients aged 0.1–20 years conducted by Kordonouri et al. found a prevalence of 10% overall of positive serum anti-TPO antibodies, which is comparable to the prevalence reported in the current study. However, studies conducted on Arab children with type 1 DM showed different prevalence figures than the current study; Mohamed et al. found a lower overall incidence of 6% in their study on Sudanese children [10]. Abdullah et al. reported a figure of 8% in Saudi Arabia that was comparable.

Sharifi et al. used RIA to set the cut-off value for anti-TPO antibody at 35 IU/ml in this study; serum hostile to TPO antibodies was set at 16 IU/ml. The ELISA technique was used by Moayeri et al, Sarah et al. and Kordounori et al.14's RIA technique. The normal reference range was up to 100 IU/ml. It should come as no surprise that previous research on the prevalence of thyroid autoimmunity and autoantibodies in children and adolescents with type 1 diabetes has yielded varying results due to differences in cutoff points, patient age, the number of cases, the duration of diabetes, and, possibly, the ethnicity of the patients studied [11].

As the production of serum anti-TPO is inheritable in an autosomal fashion in females but not in males, the present study showed that the presence of positive serum anti-TPO antibodies was more common among females, with a ratio of 5/1, but no statistical difference was found. It is well known that organ-specific endocrine autoimmunity develops more frequently in females, including type 1 diabetes mellitus with thyroid auto-immunity. According to Holl et al., despite the fact that the proportion of female patients with positive serum anti-TPO antibodies was higher than that of male patients, there was no significant difference in the frequency of positive serum anti-TPO antibodies between the sexes. Kordonouri et al., said that girls were more affected than boys [12].

Serum anti-TPO antibody levels were found to significantly correlate with abnormal serum TSH levels in the current study, with cases with positive serum anti-TPO antibodies being more likely to have abnormal serum TSH. Kordonouri et al.14 reported similar findings in which serum TSH levels were higher in patients with thyroid autoimmunity than in control subjects, and even higher serum TSH levels were observed in patients with both serum anti-TPO and anti-TG antibodies. Ghoraishian et al. reported strong statistically significant differences in regards to the levels of serum TSH between those with normal and raised serum anti-TPO antibody titers. In line with this, Kakleas et al. also found that, in addition to other factors, the presence of serum anti-thyroid antibodies—including serum anti-TPO antibodies—was positively correlated with serum TSH levels. The researchers found that the degree of anti-thyroid antibody positivity was directly correlated with the rise in serum TSH levels. The group without thyroid autoimmunity had the lowest values, while the group with double thyroid antibody positivity had the highest [13].

It is possible that the association of these autoantibodies with tissue destruction by thyroid-infiltrating T cells or the direct involvement of autoantibodies in the pathophysiologic mechanism of thyroid gland destruction is the cause of the elevated serum TSH levels that are associated with the degree of anti-thyroid antibody positivity23. After six months of follow-up, we discovered that one case out of six (16 percent of positive serum anti-TPO cases) developed hyperthyroidism (defined as a raised free serum T4 level with a low serum TSH level) [14]. Clinical hypothyroidism (defined as both a low free serum T4 level and a raised serum TSH level) and subclinical hypothyroidism (defined as elevated serum TSH concentrations with serum free thyroxin (T4) levels within the reference While Mohamed et al. found that among 6% of anti-TPO positive cases, 16% of them had biochemical evidence of hypothyroidism, despite clinically appearing euthyroid, and there was no evidence of subclinical hypothyroidism or hyperthyroidism, Moayeri et al.9 reported that serum anti-TPO antibodies were found in 34 patients (or 23.4%).

Conclusion

The present study found no correlation (p = 0.550) between serum anti-TPO antibody positivity and diabetes control (HbA1c level). Prazny et al.20, Kakleas et al.23, and Hansen et al.19 reported the same result. It is possible to draw the conclusion that, despite the fact that serum TSH screening is more effective at detecting thyroid abnormalities in children and adolescents with type 1 diabetes24, the presence of positive serum anti TPO antibodies may be an earlier marker for thyroid disease due to its specificity and sensitivity; Consequently, serum TSH elevation should be monitored annually in patients with positive antibodies.

Acknowledgement

None

Conflict of Interest

None

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