

Prevalence of autoimmune disorders in pediatric type-1 diabetes mellitus in western, Uttar Pradesh, India

Abstract

Background: Various autoimmune disorders are associated with pediatric-type-1 diabetes mellitus (DM), but are usually ill-defined and not usually suspected until the disease becomes advanced, and the prevalence of these autoimmune conditions is usually not very well defined in developing part of the world. **Aim:** To find out the prevalence of various autoimmune disorders associated with pediatric-type-1 DM. **Materials and Methods:** Total of 164 patients were screened (90 males and 74 females) during the study period of 1-year, patients were evaluated for the clinical signs, biochemical investigations and family history of autoimmune disorders in a tertiary health care center in western Uttar Pradesh. **Results:** Autoimmune thyroiditis was found to be most commonly associated with type-1 diabetes, followed by the celiac disease, and Graves' disease, others less commonly seen were pernicious anemia, juvenile rheumatoid arthritis and vitiligo. **Conclusion:** Autoimmune hypothyroidism was found to be significantly associated with type-1 diabetes, timely identification of these disorder are of paramount important for better glycemic control and to reduced the morbidity and mortality associated with the conditions.

Key words: Autoimmune thyroiditis, celiac disease, pernicious anemia, type-1 diabetes mellitus

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INTRODUCTION

Type-1 diabetes mellitus (DM) is a common autoimmune disorder of pediatric population, and it is frequently associated with other autoimmune conditions, especially with autoimmune hypothyroidism with the prevalence varying from 30% to 40% in Indian context.^[1] Because of high prevalence of autoimmune hypothyroidism, American Diabetes Association (ADA) recommends routine screening at the time of diagnosis of type-1 diabetes. Celiac disease is also frequently associated with type-1 diabetes, but less frequently than autoimmune thyroiditis. Its prevalence in children and adolescents with type-1 diabetes ranges from 5% to 7%,^[2] the metabolic control is usually poor with frequent episodes of hypoglycemia. ADA recommends screening for celiac disease in patients with type-1 DM. Other less common manifestations are Graves's disease, pernicious anemia, juvenile rheumatoid arthritis and vitiligo.^[3] Hence, far no study has been done in western Uttar Pradesh.

MATERIALS AND METHODS

A total of 164 children and adolescents with type-1 diabetes, aged <18 years, presenting to the endocrine outpatient department or admitted to the ward of endocrinology and metabolism, were enrolled in the study after taking informed consent. Patients were evaluated clinically; biochemically and inquired about family history of autoimmune disorders, during the study period of 1-year from July 2012 to June 2013. Serum thyroid-stimulating hormone (TSH) was assessed in all patients, by the chemiluminescence method, using a commercial kit. Goiter was assessed, and graded as per the WHO grading system.^[4] The diagnosis of celiac disease was made as per the ESPGHAN diagnostic criteria. Blood samples were collected for: Anti-tissue transglutaminase (TTG) immunoglobulin subclass A using enzyme linked immunosorbent assay, Endoscopic duodenal biopsies were undertaken, in patients negative for anti-TTG antibody, after

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informed consent. Screening for other autoimmune disorders was done only when sign or symptoms or family history suggestive of disorder were present. No statistical analysis was done due to cross sectional study design.

RESULTS

One hundred and sixty four children with type-1 DM were enrolled in the study. The children comprised of 90 boys and 74 girls. The age ranged from 2.5 years to 18 years (mean age \pm standard deviation -11.5 ± 6.4), the age at diagnosis of type-1 diabetes (years) was found to be 9.6 ± 6.2 , while duration of diabetes varying from newly diagnosed to 12 years. Patients who refused to give consent, were excluded from the study. Detail clinical examination was done to detect goitre, alopecia, vitiligo, joint complaints followed by appropriate biochemical investigation were done.

In our study, the male to female ratio was found to be 1.2:1. The sex wise distribution of the various autoimmune disorders in our type I diabetes patients is given in Table 1.

- Autoimmune hypothyroidism were found in 07 males (7.7%) and 21 females (28.3%).
- Celiac disease was found in 03 males (3.3%) and 2 females (2.7%).
- Grave's disease was found in 01 males (1.1%) and 2 females (2.7%).
- Pernicious anemia was found in 01 males (1.1%) and 1 females (1.3%).
- Juvenile rheumatoid arthritis was found in only 01 male (1.1%).
- Vitiligo was found only in 03 males (3.3%).

In our patients we were unable to detect the cases of alopecia, immune thrombocytopenic purpura and myasthenia gravis.

In addition two females were diagnosed with goitre without the elevation of TSH; none of them had any symptoms on detailed history, and were above the 3rd percentile for height and weight, as per current Indian charts. On examination, none of the boys had a palpable or visible goiter.

Table 1: Autoimmune disorder associated with type-1 DM

Parameters	Males (90 males)	Females (74 females)
Autoimmune hypothyroidism	07	21
Celiac diseases	03	02
Grave's diseases	01	02
Pernicious anemia	01	01
Juvenile rheumatoid arthritis	01	00
Vitiligo	03	00
Alopecia	00	00
Immune thrombocytopenic purpura	00	00
Myasthenia gravis	00	00

DM = Diabetes mellitus

DISCUSSION

Type-1 DM is the most common endocrine disorder, with onset during the childhood or adolescence, and present with classical symptoms of polyuria and polydipsia, and it is frequently present with the various autoimmune conditions like autoimmune thyroiditis, celiac diseases, pernicious anemia etc.

The prevalence rate of type-1 diabetes in male and females varies from region to region from 1:1 to 2:1,^[1,5] in present study the prevalence rate was found to be 1.2:1 which is very much similar to the study done by Kalra *et al.*^[5]

The low rate of prevalence of type-1 diabetes in females may be because of poor socioeconomic status of families and gender discrimination against girls in the Indian society (suboptimal health care seeking behavior for girls)^[1] and autoimmune hypothyroidism is the most common endocrine abnormality in type-1 DM patients. In general population the prevalence of autoimmune thyroid diseases ranges from 2.9% to 3.2%, while in patients with type-1 diabetes the prevalence is much higher, ranging from 19% to 23.4%.^[6] The prevalence of autoimmune hypothyroidism and type-1 diabetes varies widely worldwide and range from 10% to 50%. In the present study the prevalence of autoimmune hypothyroidism was found to be 36%, 7.7% in males and 28.3% in females which is very similar to the study done by Kalra *et al.*^[1] It is important to diagnose and treat thyroid disorders, especially in type-1 diabetes, as this may lead to better glycemic control.

Celiac disease is an autoimmune-mediated enteropathy precipitated by the ingestion of gluten-containing foods (including wheat, rye and barley) in genetically susceptible persons. Celiac disease also frequently associated with type-1 diabetes, but less frequently than autoimmune thyroiditis. Its prevalence in children and adolescents with type-1 diabetes ranges from 5% to 8%,^[7] in the previous study done by Bhadada *et al.*^[8] showed the prevalence rate of 11.1% in type-1 diabetic population while in present study the prevalence was found to be 6%, which is half of the prevalence rate in above study.

Type-1 diabetes may be associated with Grave's diseases as a part of polyglandular syndromes. In autoimmune polyglandular syndrome, type II, mutations in the CTLA-4 gene may lead to simultaneous presence of Grave's diseases or autoimmune hypothyroidism and type-1 DM.^[6] And the prevalence rate of autoimmune thyroiditis varies from 20% to 30%. In present study the prevalence rate of Grave's disease was found to be 3.8%.

Pernicious anemia or autoimmune gastritis is rarely seen in pediatric population with type-1 diabetes, because the incidence of pernicious anemia becomes evident as the age advances. Prevalence of pernicious anemia was found to be 4% in type1 diabetic population as compared with 1.9% in general population.^[9] In the present study the prevalence of pernicious anemia was found to be 2.4% which is still very high as compared to general population.

The association with juvenile rheumatoid arthritis and type-1 diabetes is very rare, and it is mostly reported in cases,^[10] in the present study only one child was found to be having juvenile rheumatoid arthritis.

Vitiligo is an acquired disorder resulting in loss of melanocytes which leads to white spots or leukoderma. Vitiligo is frequently associated with other autoimmune disorders like type-1 diabetes, autoimmune thyroiditis, celiac diseases etc., vitiligo was found in 6% of type-1 diabetic patients.^[11]

In the present study we did not find any patient with alopecia, immune thrombocytopenic purpura and myasthenia gravis while incidentally during the enrollment we found one patient of myasthenia gravis is association with autoimmune hypothyroidism.

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