The prevalence of Celiac Disease in symptomatic children in Punjab

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**Abstract**

**Background:** Celiac disease is auto immunologically mediated intestinal intolerance to wheat protein gliadin, in genetically susceptible individuals. It is manifested by chronic gastrointestinal (GI) symptoms associated with malabsorption of nutrients causing weight loss, anemia and metabolic bone disease. Serological screening of celiac disease was studied in symptomatic children.

**Material and Methods:** 1200 children (1-18 years, both sexes) presenting with GI symptoms, attending OPD (Pediatric, Medicine and Gastroenterology) of tertiary care hospital over period of 6 months were included in the study. Quantitative estimation of anti tTG IgA was done by ELISA using kits from Bio-rad, in blood sample of all the children. Children with anti-tTG IgA levels >20 U/ml were labeled as sero positive and those with levels <20 U/ml as sero negative.

**Results:** 17.9% children were found to be having raised levels (>20U/ml) of anti tTG IgA, levels were significantly higher (195.38 ± 119.93) in sero positive cases compared to sero negative cases (4.02 ± 4.98). No significant difference was observed in prevalence in both the genders. Maximum number of sero positive cases were found in 6-10 age group.
Conclusion: Serological screening by anti tTG IgA showed high prevalence of celiac disease in suspected children because of greater awareness of its presentation. It can be highly useful in detecting sub clinical cases of celiac disease as well.

Key words: celiac disease, gastrointestinal symptoms, anti tTG IgA

Introduction
Celiac disease (CD) is a chronic digestive system disorder characterized by malabsorption due to damaged villi. Villous atrophy is caused by autoimmune reaction induced by gliadin of wheat, in genetically susceptible individuals. Clinical manifestations result from complex interplay of three factors i.e. environmental (gluten containing grains: wheat, barley and rye), genetic (human leukocyte antigen (HLA) DQ2 and DQ8 haplotypes) and immunological (CD4+ T lymphocytes stimulated by deamidated gliadin peptide presented by HLA DQ2 and DQ8). It has been demonstrated that one of the target of autoimmune response in CD is tissue transglutaminase (tTG), the deamidating enzyme.1-3

Celiac disease is considered a pediatric problem with classical intestinal symptoms including bloated abdomen, loss of appetite, vomiting, diarrhea, steatorhea, weight loss and growth retardation, but many patients present with atypical symptoms as well. It can even be silent or latent.4-5 With broad clinical spectrum of disease correct diagnosis is extremely challenging, it relies on a sensitive, specific serological testing and accurate histological testing.6

Consumption of gluten by undiagnosed and untreated children can result in long term extra intestinal complications.7 Timely diagnosis of disease is extremely important to enable rapid treatment (lifelong dietary elimination of gluten8) which can save them from complications
later in life. On the other hand it is equally important to rule out CD in other GI diseases to avoid life long unnecessary commitment to gluten free diet.

People in Punjab, where wheat is staple food, may be having greater genetic as well as environmental predisposition for celiac disease. Studies have been conducted in this region on different subjects by screening population to detect CD. However, little efforts have been made to generate data in children, who are presenting with suspected symptoms. Therefore, the present study focused on children with suspected symptoms only.

**Material and Methods:**

The present study was conducted at a tertiary care hospital in Punjab, India. 1200 children (700 male and 500 female, 1-18 years) with gastro-intestinal symptoms attending Pediatric, Medicine and Gastroenterology OPD over the period of 6 months were taken for the study. Signs and symptoms of children included chronic diarrhea, abdominal distention, steatorrhea, pain abdomen, vomiting, loss of appetite, weight loss and short stature.

Quantitative estimation of anti tTG-IgA levels was done using ELISA-Bio-Rad kits based on recombinant human tTG as Ag (100% specificity & 98% sensitivity). Cut off value for positive serology is >20 U/ml. Patients were divided into two groups based on anti tTG IgA levels. Sero-positive CD group: levels ≥ 20 U/ml and Sero-negative CD group: levels < 20 U/ml.

**Statistical Analysis**

Mean and standard deviation were computed. The difference between two groups was seen by applying t-test. The level of significance considered was 0.05.

**Results**

Signs and symptoms of the children are shown in Table 1. On examination about 50% of these children were having short stature. Mean Levels of anti tTG-IgA are given in table 2, levels are significantly higher in CD positive cases (195.38 ± 119.93) compared to CD.
negative cases (4.02 ± 4.98). Prevalence of sero positive CD in male children was 17.4% and that in female children it was 18.6%, there was no significant difference of prevalence among both the genders, Table 3. Prevalence in total children was 17.9%, they had anti tTG IgA levels ≥ 20 U/ml and were labeled as CD sero positive cases which were referred for confirmatory test (upper GI endoscopy and duodenal biopsy) and started on gluten free diet. Table 4 shows age and gender wise distribution of sero positive children. In younger age group (0-5 and 6-10 years) male children were more than the females whereas this order is reverse in the older age group i.e. > 15 years. Percentage sero positive children was observed to be highest in the age group of 6-10 years (34.4%).

Discussion

Anti tTG IgA levels were estimated in CD suspected children. CD is manifested by the age of 6-24 months in children upon introduction of complementary feeding consisting of wheat products. The classic symptoms are diarrhea, abdominal distension, flatulence and weight loss. In older children (>7 years) it present with less classic symptoms along with symptoms of chronic malabsorption (growth retardation, dental enamel defect etc.).9 17.9% of total children tested for anti tTG levels were found to be sero positive (Anti tTG IgA ≥ 20 U/ml) for CD. Prevalence rate found in the present study is higher than reported earlier, because of specific subjects group studied. Other workers have studied prevalence in total population of north India,10-11 whereas in our study children with symptoms suggestive of CD were studied. We could pinpoint the disease in larger number of children, may be because of greater awareness of its presentation and availability of accurate serology test. Moreover genetic predisposition may also be playing a role, as high incidence is expected in wheat eating state. It could be attributed to environmental change also as pointed out by some workers.12 In another study CD have been detected in 10% of patients reporting abdominal
symptom after consuming cereals. In the present study 50% children presented with short stature, which may be the primary manifestation of CD.

No significant gender difference could be observed in percentage sero positive cases in our study. In other studies also gender difference is not reported in children but is present in adults, females being affected more than males. Almost similar observation has been seen in our study as well in >15 years age group.

It has been estimated that time gap between onset of symptoms and diagnosis of disease is 10 years. Even if clinically silent it can be damaging as it increases risk of Lymphoma, Gastrointestinal neoplasm and predisposes for other autoimmune disease. In order to reduce suffering of patient and complications of undiagnosed CD, all the suggestive symptoms and risk group children must be screened using simple, non invasive serology testing: anti tTG IgA (shows 100% specificity and sensitivity). This test is equally important for following dietary compliance in proven cases of CD as only 50% patients adhere to gluten free diet.

**Conclusion:**

With such a high prevalence rate of sero positive CD in children with susptive symptoms, population based screening should be considered seriously in wheat eating state like Punjab.
References:


Table 1: Signs and symptoms of study group children (n=1200)

<table>
<thead>
<tr>
<th>S no</th>
<th>Signs and symptoms</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chronic diarrhea</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>Recurrence pain abdomen</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Abdominal distention</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Vomiting</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Bulky stool</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Short stature</td>
<td>50</td>
</tr>
</tbody>
</table>

* Total exceeds 100 because of multiple signs and symptoms

Table 2: Mean Levels of anti-tTG IgA

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Levels in U/ml</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sero negative (&lt;20 U/ml)</td>
<td>4.02 ± 4.98</td>
<td>p = 0.001 significant</td>
</tr>
<tr>
<td>Sero positive (≥ 20 U/ml)</td>
<td>195.38 ± 119.93</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Prevalence of celiac disease (sero positive) in children

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of children</td>
<td>700</td>
<td>500</td>
<td>1200</td>
</tr>
<tr>
<td>Number of sero positive children</td>
<td>122</td>
<td>93</td>
<td>215</td>
</tr>
<tr>
<td>Percentage of sero positive children</td>
<td>17.4</td>
<td>18.6</td>
<td>17.9</td>
</tr>
</tbody>
</table>
Table 4: Age and Gender wise distribution of sero positive children (n=215)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Gender</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>percentage</td>
</tr>
<tr>
<td>0-5</td>
<td>36</td>
<td>29.5</td>
</tr>
<tr>
<td>6-10</td>
<td>40</td>
<td>32.8</td>
</tr>
<tr>
<td>11-15</td>
<td>32</td>
<td>26.2</td>
</tr>
<tr>
<td>&gt;15</td>
<td>14</td>
<td>11.5</td>
</tr>
</tbody>
</table>