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Prevalence of celiac disease in school children in Bikaner region of North West Rajasthan.

Paediatrics

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ABSTRACT

Background: Celiac disease is under diagnosed and considered to be uncommon disease in Indian children due to lack of awareness in Paediatricians and general practitioners.

Objective: To determine the prevalence of celiac disease in school children in the Bikaner region of North West Rajasthan.

Methodology: The study was carried out in school going children of Bikaner region.

Results: A total of 1627 school children (861male, 766 female) were screened. Out of which, 354 were suspected as having celiac disease. A total of 321 children underwent anti-tTG level estimation and 22 children found to be positive for anti-tTG assay. 17 children showed histopathological findings consistent with CD. 5 children with high anti-tTG had normal histology. Thus the final prevalence of CD among school children in Bikaner region was 1.04% (1 in 96).

Conclusion: Our study suggests that CD in India is more prevalent than previously appreciated, a vast majority of which still remains under diagnosed. Hence there is an urgent need to enhance the awareness of the disease among paediatricians and general practitioners.

KEYWORDS:

Celiac disease, anti-tTG titers.

Introduction

Celiac disease (CD), also known as gluten-sensitive enteropathy or celiac sprue, is defined as a permanent intolerance to ingested gluten (the storage protein components of wheat, barley and rye). The intolerance to gluten results in immune-mediated damage to the mucosa of the small intestine characteristically inducing villous atrophy and crypt hyperplasia that resolve with the removal of gluten from the diet[1]. In the past, CD was considered to be a rare disorder in the United States, with a prevalence ranging from 1 in 3000 to 1 in 6000. Recent studies conducted using more appropriate experimental designs and powerful screening tools demonstrated that CD in United States is as frequent as in Europe in both risk groups and the general population[2,3].

Similar results were obtained in Africa, South America and Asian continents where CD was considered a rare disorder. Combined together, these studies revealed that CD is one of the most frequent lifelong genetically based disease of mankind occurring in 1 out of every 100-300 individuals in the general population worldwide[4,5]. Over the last 10 to 15 years a plethora of information on CD has emerged which has enabled us to better understand the genetics, pathogenesis, epidemiology and vast spectrum of clinical man ifestations of this disease. Despite this wealth of information CD is still significantly under diagnosed in India, even in subsets of pat ients that have been shown to be at increased risk of having the disease.

There is a general perception that CD is uncommon in India. As the origin of North Indians is Indo-European, it is likely that CD would be more common in North India than previously thought. Exact prevalence of CD is not known in many states of India because of lack of awareness among pediatricians and general population, lack of expertise in the field of Pediatric Gastroenterology, varied picture of CD and lack of facilities for serological tests and duodenal biopsy at many places. The present study was conducted to determine the prevalence of celiac disease in school going children in Bikaner region of North West Rajasthan.

Material & Methods

The current cross sectional descriptive study was carried out in school going children of age group 4-17 years over a period of 6 months after obtaining ethical clearance from ethical committee of SP Medical College Bikaner. Children from both Government and Private school were enrolled for the study so that children representing all socio economic groups may be included in the study. Prior approval from the head of the school was obtained. Out of various schools whose principals gave consent for participation in the study, two private/public schools (having a total of 806 children between 4-15 years) and two government school (having a total of 821 children between 4-15 years) were randomly selected for the study. Data on socio-demographic features, and symptoms and signs known to be related to CD like diarrhea, abdominal discomfort, anorexia, constipation, recurrent aphthous ulcers and family history of CD was collected using a structured questionnaire. A general physical examination including anthropometric measurement (height, weight) of all children was done within the school premises. The following screening criteria were used to identify suspected cases:

(i) Chronic or recurrent diarrhea (i.e. an increase in the frequency and liquidity of stools above normal, for ≥2 weeks) with or without abdominal pain;
(ii) Short stature (Height for age below the 3rd percentile);
(iii) Underweight (Weight for age below the 3rd percentile);
(iv) Pallor on examination;
(v) Miscellaneous (recurrent vomiting, abdominal bloating/ discomfort, aphthous ulcer, constipation)
(vi) Known case of disease such as type I diabetes mellitus, hypothyroidism, down syndrome and
(vii) Being a sibling or descendent of celiac patients.

Children who were suspected based on above criteria were tested for anti tissue-transglutaminase (anti-tTG) antibody by enzyme linked immunosorbant assay (ELISA); the cut off for positivity of these antibodies being 50 IU/mL.

Children with high anti-tTG (>50 IU/mL) underwent upper gas trointestinal endoscopy for small bowel biopsy from the second part of the duodenum after obtaining written consent from the parents. At least 4 biopsy samples were taken and were analysed and interpreted by a senior histopathologist. Histopathology was expressed according to the modified Marsh classification:

Marsh 0: Normal mucosa

Marsh I: Intraepithelial lymphocytosis

Marsh II: Intraepithelial lymphocytosis and crypt hyperplasia
Marsh III: Intraepithelial lymphocytosis, crypt hyperplasia and villous
atrophy. Marsh type III is further subdivided as: IIIa, Partial villous atrophy; IIIb, subtotal villous atrophy; and IIIc, total villous atrophy.

Marsh IV : Hypoplastic (total villous atrophy +Hypoplastic crypts)
The diagnosis of CD was established on the basis of the revised European Society of Paediatric Gastroenterologists and Nut ritionists (ESPGAN) criteria[6,7]. Gluten free diet was recom mended for all newly diagnosed patients and follow up was done at monthly interval to assess dietary compliance and symptomatic improvement. Data were analysed using appropriate statistical method.

RESULTS

In the present study a total of 1627 (861 male & 766 Female) school children of 4 to 15 years age group were screened using structured questionnaire, for signs & symptoms of CD and social & demographic profile. Out of 1627 children, 354 were suspected as celiac disease based on aforementioned screening criteria. Anti-tTG estimation by ELISA method in serum was carried out in above 321 suspected children (parents of 33 children refused for blood sampling).

Of these 321 children, 126 had history of recurrent or chronic diarrhoea, 226 had pallor on examination, 86 had short stature, 101 were underweight, 38 were short stature as well as underweight. Five children were having type 1 diabetes mellitus as a co morbid condition. Twenty two out of 321 children who underwent serum anti-tTG estimation returned with a positive result (>50 IU/ml). Anti-tTG value of seropositive children ranged between 70 IU/ml to 345 IU/ml. Out of these 22 anti-tTG positive children, parents of two children refused for upper GI endoscopy and another three children had normal histopathology on duodenal biopsy, remaining 17 children showed histopathological findings consistent with CD. Out of these 17 children 10 belonged to Marsh stage 3 and 7 were categorized in Marsh stage 2 based on histopathological finding. Out of 17 children whose histopathology was consistent with celiac disease, 8 were Male and 9 were female. However this difference in prevalence based on gender was statistically non significant (p value >0.05) .Mean age of celiac confirmed cases was 8.2+ 2.4 years. No statistically significant difference was observed when the prevalence was analysed based on rural-urban back ground (p value >0.05). Similarly no significant difference was observed when the prevalence was analysed based on socioeconomic background. Maximum prevalence was seen in children who were both short and underweight (23.68%). Sociodemographic profile and prevalence based on these parameters is shown in table 1.

Table 1:Sociodemographic profile

Parameter		Confirmed celiac	Prevalence
Gender	Male(n=861)	8	0.93%
	Female(n=766)	9	1.17%
Age group	< 5 years(n=484)	4	0.83%
	5-10 years(n=617)	9	1.46%
	>10 years(n=526)	4	0.76%
Sign & Symptoms	Chronic /recurrent diarrhoea(n=126)	6	4.76%
	Pallor(n=226)	13	5.75%
	Short stature(< 3rd percentile)(n=86)	12	13.95%
	Underweight (Weight for age < 3rd percentile)(n=101)	11	10.89%
	Short stature and underweight(n=38)	9	23.68%
	Type 1 Diabetes mellitus(n=5)	1	20%

Discussion

Celiac disease is an immune mediated condition caused by the ingestion of gluten containing grains in genetically susceptible individuals. We now know CD to be a highly protean disease, with a prevalence of approximately 1 out of every 100 to 300 individuals in the general population[5]. Despite this CD is still significantly under diagnosed in India, even in subsets of patients that have been shown to be at increased risk of having the disease. Incidence of CD is high in British islands, Europe, Australia and North America, where wheat is staple diet. A high prevalence of 5.6% has been reported from African population living in Sahara desert, the Saharawi of Areb-berber origin[8]. Also in India CD is not an uncommon disease but exact prevalence of disease is not known in many states because of lack of awareness about the disease. Investigation facilities of specific serology tests and duodenal biopsy are scanty. High prevalence of protein energy malnutrition and pleomorphic and varied clinical picture of disease also impose diagnostic problem. We report a disease prevalence of 1.04% (1 in 96) among school children in Bikaner, Northwest India. In a similar study, Sood et al[9] reported disease frequency of 1 in 310 school children in Punjab, North India. Result of our study shows that prevalence of CD in our region is comparable to prevalence reported from western countries. The prevalence reported in Sweden is 1.3%, Italy 1.06%, Finland 1.01%, Great Britain 1.0% and Switzerland 0.75%[10-14]. This reported prevalence in our study may be an under-assessment because of following limitation of our study:

1. Screening with anti-tTG has been reported to carry a certain risk of underestimation, especially in IgA deficient individuals15-17. We did not screen for serum IgA levels in clinically suspected children with negative anti-tTG results.
2. Out of 354 screen positive children, parents of 33 children refused for blood sampling of their children for estimation of serum anti-tTG.
3. Out of 22 children who had positive anti-tTG test results, parents of 2 children did not give consent for upper GI endoscopy for duodenal biopsy.
4. Three children with positive serology had normal small bowel biopsies and were not labeled as CD since they did not fulfill the criteria. Result of small bowel biopsy might be truly normal in these children or it may be due to inter-observer variability, patchy mucosal damage, low grade histo-pathological abnormality and technical limitation.

It is interesting to note that none of the children was diagnosed before we conducted this study. This was mainly due to the lack of awareness about this condition among general population & among pediatricians because the symptoms of CD may have been attributed to many other frequently occurring conditions like recurrent gastrointestinal tract infections, infestations, malnutrition, and nutritional deficiencies18. This has been highlighted by the fact that many of our cases received multiple courses of antibiotics, blood transfusions, and even anti-tubercular therapy before diagnosis was made in our study. Out of 17 celiac patients, only 6 (35.2%) had history of chronic or recurrent diarrhea, confirming that if the disease is to be suspected only in the presence of diarrhea then it is likely that many cases may remain undetected.

In conclusion, our study suggests that CD in India is more common than previously appreciated; its prevalence being comparable to the West, at least in the northern parts of the country where wheat is one of the staple food constituents.

The overall prevalence of CD in Bikaner Northwest India is 1.04% (1 in 96), but majority of Celiac patients are still undiagnosed mainly due to the lack of awareness. Hence there is an urgent need to enhance the awareness of the protean nature of CD not only in the community but also among paediatricians and general practitioners.

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