Prevalence of iron deficiency anemia in chronic diarrhoea and celiac disease – a western UP experience

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Abstract

Aim To study the prevalence of iron deficiency anaemia in chronic diarrhoea and celiac disease.

Methodology Cases included 45 children between 1-12 years with chronic diarrhoea, who underwent investigations like haemogram with GBP, RBC indices, serum iron and TIBC. After a course of antibiotic therapy for 6 weeks with iron and folic acid with no improvement noted within 2 weeks, they were subjected to duodenal biopsy. If biopsy showed features of celiac disease, then anti-endomysial antibody test was performed to substantiate the diagnosis.

Results 30 cases (66.7%) were males and 15 (33.3%) females. 8 cases (17.8%) had watery diarrhoea, 20 (44.4%) semiformal and 17 (37.8%) had watery and semiformal diarrhoea. Bloody diarrhoea was present in 5 (11.1%) and abdominal distension in 21 cases (46.7%). Pallor seen in all the cases. The mean age of the cases was 55 ± 1.5 months

and mean duration of diarrhoea was 18 ± 1.4 months. Mean haemoglobin observed was 8.1 ± 1.6 gm%. MCV, MCH and MCHC were 79.1 ± 8.6 fl, 26.9 ± 3 pg and 29.6 ± 2.3 g/dl respectively. Mean serum iron was 32.1 ± 1.2 g/ dl and TIBC was 432 ± 3.2 g/ dl. On peripheral smear, 28 cases (82.4%) showed microcytic hypochromic anaemia. 26 cases showed evidence of celiac disease on duodenal biopsy. Anti endomysial antibody (AEA) test was positive in 15 of the 19 celiac cases on which performed. Mean duration of diarrhoea (23.5 months) was significantly more in celiacs as compared to non-celiacs (11.6 months).

Conclusions Better awareness of the clinical profile and early detection of celiac disease would help detection and management of iron deficiency anaemia associated with celiac disease.

Keywords Iron deficiency anaemia · Chronic diarrhoea · Celiac disease

Introduction

Iron deficiency anemia (IDA) is a major health problem in India; it is pervasive and affects all age-sex groups; but mostly women in reproductive age group and young children are affected. One of the foremost causes of IDA is poor dietary intake and defective absorption due to gastrointestinal causes and invariably patients present with chronic diarrhoea.

Recent data reveals that 4–5% of all patients attending paediatric gastroenterology clinics in North India are due to celiac disease [1]. Another study from Lucknow showed that 26% of all chronic diarrhoea are due to celiac disease

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[2]. In a recent study on adults in PGI Chandigarh; out of 19 patients with refractory iron deficiency anemia, 11 were diagnosed as celiac disease and all responded to gluten free diet with clinical improvement [3].

Despite chronic diarrhoea and celiac disease being quite prevalent in Indian children or population, data regarding their association with iron deficiency anemia is still lacking. Hence, we planned the study keeping in view the need to understand the association of iron deficiency anemia with chronic diarrhoea and celiac disease in Western Uttar Pradesh.

Material and methods

The present study was conducted in 45 children aged 1–12 years with chronic diarrhoea attending the Outpatients and Inpatients Department of Paediatric of J.N. Medical College, A.M.U., Aligarh. After a detailed clinical history and thorough physical examination, investigations like haemogram with GBF, RBC indices, serum iron and total iron binding capacity was carried out. If no improvement was noted within 2 weeks after a course of antibiotic therapy with iron and folic acid for a period of 6 weeks; the children were subjected to duodenal biopsy. If biopsy showed features of celiac disease, then anti-endomysial antibody test was performed to substantiate the diagnosis.

Observations

The study included 30 males (66.7%) and 15 females (33.3%). 8 cases (17.8%) presented with watery diarrhoea, 20 cases (44.4%) had semiformal stools and 17 cases (37.8%) presented with watery as well as semiformal diarrhoea at the time of admission. Bloody diarrhoea was presented in 5 cases (11.1%). Abdominal distension was seen in 21 cases (46.7%), pedal oedema in 4 cases (8.8%) hepatosplenomegaly in 2 cases (4.4%) and signs of vitamin A deficiency in 5 cases (11.1%). But pallor was present in all the 45 cases.

The mean age of the cases was 55 ± 5 months and the mean duration of diarrhoea in these cases was 18 ± 4 months.

Haematological examination of the total cases revealed mean hemoglobin as 8.1 ± 1.6 gm%. MCV, MCH and MCHC was observed to be 79.1 ± 8.6 fl, 26.9 ± 3.1 pg and 29.6 ± 2.3 g/dl respectively; whereas mean serum iron was 32.1 ± 1.2 µg/dl and TIBC was 432 ± 3.2 µg/dl.

There were 34 cases with $MCV \leq 80$ fl and only 11 cases showed $MCV > 80$ fl. On peripheral blood smear examina-

tion, 28 cases (82.4%) showed microcytic hypochromic anemia where $MCV \leq 80$ fl as compared to only 3 cases (27.3%) where $MCV > 80$ fl (Table 1).

In our study, 26 out of 45 cases, showed evidence of celiac disease on histopathological examination with subtotal or total villous atrophy and infiltration of lamina propria with mononuclear cells. Antiendomysial antibody (AEA) test was done for 19 of the celiacs, out of which 15 were positive. The rest 4 cases responded clinically to gluten free diet (GFD).

Small intestinal histologic features were interpreted according to the Marsh [4] classification. This scoring system comprised a spectrum of consecutive mucosal abnormalities in 17 cases of gluten sensitive enteropathy. Marsh score I was present in 2 cases, which showed normal mucosal architecture with marked infiltration of villous epithelium by lymphocytes (Fig. 1), and Score II in 1 case showing elongated and branching crypts with intraepithelial lymphocytosis (Fig. 2). Marsh score III was observed in 12 cases; of which Marsh score III A was present in 4 cases with partial villous atrophy Marsh score III B in 5 cases with subtotal villous atrophy, and Marsh score III C in 3 cases where all the cases showed features of total villous atrophy with rudimentary or absent villi (Fig. 3). In 2 cases Marsh O was the grading score of the duodenal biopsy.

Total number of celiacs showing mild, moderate and severe anemia were 4, 13 and 9 cases respectively and it can be inferred that moderate to severe grade of anemia was more prevalent in celiacs (Table 2).

Out of the remaining 19 non-celiac cases, there were 6 cases of contaminated small bowel syndrome (CSBS) in whom duodenal biopsy showed partial villous atrophy and non-specific duodenitis; and all cases improved on broad spectrum antibiotic. 5 cases had bloody stools with stool culture revealing non pathogenic bacteria. Giardiasis was observed in only a single case.

The comparative characteristic of the cases in the two groups: celiac and non-celiac showed that the mean Hb in celiacs and non-celiacs was 7.1 ± 1.5 g% and 8.8 ± 1.7 g% respectively. The MCV in celiacs was 70.4 ± 1.9 fl and 79.9 ± 1.6 fl in non-celiacs. All the comparisons in hematological characteristics between the celiacs and non-celiacs was significant (Table 3).

The comparable characteristics of the celiac and non-celiac cases showed the mean age of celiacs was 55.6 months as compared to 51.2 months in non-celiacs. All the anthropometric parameters showed that celiacs were comparatively more wasted and stunted than non celiacs. Also the duration of diarrhoea 23.5 months was significantly more in celiacs as compared to 11.6 months in non-celiacs (Table 4).

Discussion

The present study was conducted on 45 children between 1–12 years of age, attending the Paediatric Gastroenterol-

Fig. 1 Marsh I: Lymphocytic enteritis. H & E Stain $\times 20$

Fig. 2 Marsh II: Intraepithelial lymphocytosis, elongated and branching crypts. H & E Stain $\times 40$

Fig. 3 Marsh IIIC: Total villous atrophy. H & E Stain $\times 40$

Table 1 Comparison of RBC indices and iron studies in the total cases

Iron Studies	MCV ≤ 80 (n = 34)	MCV > 80 (n = 11)
Haemoglobin (gm%)	7.8 $\pm$ 1.6	8.8 $\pm$ 1.1
Serum Iron (μ g/ dl)	30.3 $\pm$ 2.7	37.6 $\pm$ 1.6
Total iron binding capacity (μ g/ dl)	459.9 $\pm$ 4.5	415.8 $\pm$ 4.8
Normocytic hypochromic anemia	6 (17.6%)	8 (72.7%)
Microcytic hypochromic anemia	28 (82.4%)	3 (27.3%)

Table 2 Correlation between celiacs and non-celiacs with different grades of anemia

Disease Feature	Total No. of Cases	Mild Anemia	Moderate Anemia	Severe Anemia
Celiac	19	4	13	9
Contaminated small bowel syndrome	6	2	3	1
Bloody diarrhoea	5	1	2	2
Giardiasis	1	-	1	-

Table 3 Comparative haematological characteristic in celiacs versus non-celiacs

	Celiacs	Non-celiacs	p value
Hb (gm%)	7.1 $\pm$ 1.5	8.8 $\pm$ 1.7	< 0.01
MCV (fl)	70.4 $\pm$ 1.9	79.9 $\pm$ 1.6	< 0.05
MCH (pg)	23.5 $\pm$ 1.6	27.5 $\pm$ 1.5	< 0.05
MCHC (gm/ dl)	26.3 $\pm$ 1.2	29.9 $\pm$ 1.6	< 0.05
Serum Iron (μ g/dl)	29.2 $\pm$ 2.8	36.1 $\pm$ 3.5	< 0.01
TIBC (μ g/dl)	473.3 $\pm$ 4.5	443.5 $\pm$ 2.7	< 0.05

Table 4 Comparison of the clinical/ anthropometric parameters in celiacs versus non-celiacs

Clinical/ Anthropometric parameters	Celiacs	Non-Celiacs
Age (in months)	55.6	51.2
Weight for age	67.9	73.1
Height for age	85.6	89.3
Weight for height	82.4	86.5
Duration of Diarrhoea (in months)	23.5	11.6

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Pallor was observed in all the 45 cases, which shows that anemia is very common in patients with chronic diarrhoea. Quite similarly, BR Thapa [5] reported pallor in 100% cases, diarrhoea in 94% with malabsorption in 73% of their celiac cases.

The mean haemoglobin was 8.1 ± 1.6 gm% in our study, a finding similar to Kapur et al [6] who reported mean haemoglobin as 7.8% in their study on 523 children between the ages 9–36 months. Also a large multicentric study by Raman et al [7] reported mean haemoglobin of 8.8% in 250 children between 1–6 years.

The comparable characteristic of celiac and non-celiac in the present study showed that the mean age of celiac was 55.6 months as compared to 51.2 months in non-celiacs. Also, the duration was diarrhoea was significantly less among the non-celiac as compared to the celiac; which shows late reporting of celiacs to the hospital.

The present study showed failure to thrive, mild to moderate degree of wasting, stunting and anemia to be present in all cases of chronic diarrhoea and celiac disease. Very similarly, Mohinder S et al [8] reported short stature in 62% cases and anemia in 90% cases in their study on 42 children with celiac disease. Also Patwari et al [9] reported stunting and anemia in 100% of their celiac cases.

The mean haemoglobin in the celiacs of the present study was 7.1 ± 1.5 gm% and mean corpuscular volume of 70.4 ± 1.9 fl; a finding similar to Mohinder S et al [8] who reported hemoglobin of 6.4 ± 2.0 gm% and mean corpuscular volume of 82.2 ± 2.7 fl in North Indian children with celiac disease. Qari AF [10] reported anemia in 8 of their 16 Arabs with celiac disease with mean hemoglobin of 10.4 gm%.

The present study revealed serum iron value as 29.2 ± 2.8 µg/ dl, a finding which asserts the diagnosis of iron deficiency anemia in the celiacs of the study; a finding concordant to the report by Patwari et al [9] and Qari AF [10] of serum iron values as 28.4 ± 5.6 µg/ dl and 38.2 ± 2.6 µg/ l respectively.

Chronic diarrhoea and especially celiac disease cause iron deficiency anemia. Hence presence of iron deficiency

anemia associated with stunting with or without diarrhoea should raise the clinical suspicion of celiac disease.

Conclusion

Iron deficiency anemia is more prevalent in celiacs. Better awareness of the clinical profile and early detection of celiac disease would help detection and management of iron deficiency anemia associated with celiac disease.

References

1. Mittal SK, Agarwal V, Kalrah K (1994) Chronic diarrhoea in children of tropics. *Ind J Paediatrics* 61:635–642
2. Yaccha SK, Mishra S, Malik A, Nagi B (1993) Spectrum of malabsorption syndrome in north Indian children. *Ind J Gastroenterology* 12:120–125
3. Verma S, Malhotra R, Kochar R, Kumari S (2001) Celiac disease presenting as iron deficiency anemia in northern India. *Ind J Gastroenterology* 20:211–213
4. Marsh MN (1995) Morphology of the mucosal lesion in gluten sensitivity. *Baillieres Clinical Gastroenterology*. 9: 273–293
5. Thapa BR (1995) Celiac disease – Indian Experience Sachdeva and Chaudhary – Nutrition in Children of Developing Country Concern. 1st edn. B1 Publication Pvt Ltd, New Delhi 355–375
6. Kapur D, Agarwal KN, Sood M (2002) Iron status of children aged 0–36 month in an urban slum integrated child development services (ICDS) project in Delhi. *India Paediatr* 39:136–144
7. Raman L, Ravvashi AB, Gomber S (1992) Iron nutritional status of preschool children. *Ind J of Paediatr* 59:209–212
8. Mohinder S, Yacha SV, Srivastava A, Agarwal R, Prasad K, Naik SK (2001) Celiac disease in Indian children – assessment of clinical nutritional and pathological characteristics. *Ind J Pediatrics* 19 (3):204–208
9. Patwari AK, Anand VR, Gawar K, Narayan S (2003) Clinical and nutritional profile of children with celiac disease. *J of Ind Academy of Pediatrics* 40 (4):100–114
10. Qari AF (2002) Clinical presentation of adult celiac disease in Western Saudi Arabia. *Saudi Medical Journal* 23(12): 1514–1517