e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(7); 517-523

Original Research Article

Single Centric Hospital Based Observational Prospective Assessment of Clinico-Laboratory Profile of Seropositive Celiac Diseases in Severe Acute Malnutrition

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Received: 14-05-2022 / Revised: 20-06-2022 / Accepted: 10-07-2022
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Conflict of interest: Nil

Abstract

Aim: To study clinico-laboratory profile of seropositive Celiac Diseases in Severe Acute Malnutrition.

Material & Methods: The present study was single centric hospital based observational prospective study, conducted at Department of Pediatrics, Chacha Nehru Bal Chikitsalaya, Lady Hardinge Medical College, Delhi, India. The study was conducted over a period of one year. All the children of 1-5 years age group suffering from Severe Acute Malnutrition (SAM) admitted in Department of Pediatrics. Total 100 children with Severe Acute Malnutrition in age group 1-5 years, admitted in MTC were enrolled and screened for celiac serology. Out of these 100 cases celiac serology was positive in 25 cases with sero-positivity of 25%.

Results: While mean MUAC was 11.88±1.47 v/s 11.38±1.14. The difference in MUAC in seronegative and seropositive cases was statistically insignificant (p-value>0.5). Total no. of cases in form of Z-score (<-2SD, <-3SD) in seronegative group and seropositive group were 2,73 and 0,25 respectively. This difference in sero-negative and sero-positive cases was statistically insignificant (P-value= >0.05).

Conclusions: Recurrent diarrhoea and blood in stool were common presenting feature on admission in celiac seropositive patients suffering from severe acute malnutrition. Vit. B12 and Folic acid deficiency were also observed as a common finding in seropositive patients.

Keywords: Celiac Disease, Sero-positive, Severe Acute Malnutrition (SAM), Vit. B12.

Introduction

Celiac disease, known as gluten-sensitivity enteropathy, is a chronic autoimmune inflammatory disease in the small intestine. It is characterized by permanent gluten intolerance and malabsorption syndrome. The etiology of CD could be environmental factors such as the ingestion of gluten and genetic factors such as HLA and tTG auto-antigen. Therefore, CD affects genetically susceptible individuals. Gluten is recognized as a protein found in prolamine fragments of barley (hordein), wheat (glutenin and gliadin), or rye (secalin) [1–5].

Nutrition in Celiac Disease is an important issue. When someone who has Celiac Disease consumes food containing gluten,

it reacts by attacking the intestinal villi. Eventually, those tiny tentacles can be completely flattened, leaving them unable to do their job of absorbing nutrients. It doesn't matter how well a person eat if villi are destroyed by untreated celiac disease he is almost certain to be malnourished [6-8].

The clinical features of Severe Acute Malnutrition (SAM) often overlap with the common manifestations of Celiac Disease such as recurrent diarrhea, failure to thrive, vomiting, abdominal distension, anemia and weight loss [9-10]. As per NFHS-4 (2015-16) Severe Acute Malnutrition afflicts nearly 7.5% of children below 60 months of age in India [11].

Thus, we aim to study clinico-laboratory profile of seropositive Celiac Diseases in Severe Acute Malnutrition.

Material & Methods:

The present study was single centric hospital based observational prospective study, conducted at Department of Pediatrics, Chacha Nehru Bal Chikitsalaya, Lady Hardinge Medical College, Delhi, India. The study was conducted over a period of one year.

Study subject: All the children of 1-5 years age group suffering from Severe Acute Malnutrition (SAM) admitted in Department of Pediatrics.

Inclusion Criteria

1. All the children admitted with Severe Acute Malnutrition (meeting the WHO criteria for SAM) of age 1 to 5 years, exposed to gluten containing diet and
2. Parents willing for informed and written consent to enroll in the study.

Exclusion Criteria

1. Seriously sick children with SAM admitted in PICU. Patients with secondary malnutrition–known case of chronic medical or surgical disorders leading to malnutrition- Congenital Heart Diseases with CHF, Chronic renal failure, Hepatic Cholestas is, Thyrotoxicosis, Isolated Childhood Diabetes Mellitus, HIV, Childhood Tuberculosis, Cerebral Palsy, Genetic/ Chromosomal Syndromes, Inborn errors of Metabolism (IEM), Malignancies, Surgical resection of intestine etc.
2. Patients with known celiac serology.

Methodology

Intervention: Prior approval for ethical clearance was sought from Institutional Ethical Committee. After obtaining informed written consent from both the parents, patients were enrolled for the study.

Detailed clinical and dietary history followed by anthropometric measurements and examination was done. Blood sample was collected for relevant investigations. Celiac serology was accessed by screening for tissue trans- glutaminase IgA/IgG by ELISA method (AeskulisattTg-IgA/ tTG-IgG new generation antigen based kit by Aesku. Diagnostics. Gmbh & Co. Kg). As per manufacturer manual of the kit cut off value for seropositivity for tTg-IgA/IgG was >18 U/ml (As per manufacturer manual of the kit-normal range for tTg-IgA &tTg-IgG: 12-18 unit/ml).

All the collected data were managed and analyzed with standard software (SPSS Version 20). P-value of <0.05 was considered significant.

Results:

Total 100 children with Severe Acute Malnutrition in age group 1-5 years, admitted in MTC were enrolled and screened for celiac serology. Out of these 100 cases celiac serology was positive in 25 cases with sero-positivity of 25%.

Out of total 25 seropositive cases, 48% cases were seropositive for both tTg-IgA and IgG, while only tTg-IgA and only tTg-IgG were positive in 28% and 24% cases, respectively (Table-1).

Table 1: Sero-positivity pattern according to tTg-IgA/IgG

Sero-positivity*	No.	(%)
Only tTg-IgA Positive	7	28
Only tTg-IgG Positive	6	24
Both tTg-IgG&IgA Positive	12	48
Total Seropositive	25	100

*Cut-off values: tTg-IgA/tTg-IgG = >18 U/ml (As per manufacturer manual for the kit)

Celiac Disease sero-positivity was more in males 60% as compared to females 40%, and this difference in sero-positivity was statistically insignificant (P-value>0.05) (Table 2)

Table 2: Gender wise distribution of Sero-positivity

Gender	Sero-positivity	%
Male	15	60
Female	10	40
Total Seropositive	25	100

Seropositivity of only Serum tTg IgA and only tTgIgG was maximum (4/9, 57.14%; 3/7, 33.33%) in age group 1-2 years while sero-positivity of both tTg-IgA and IgG was maximum (7/14, 50%) in age group 4-5 years (Table -3).

Table 3: Distribution of seropositivity according to age group.

Age group (yrs)	Seronegative (n=75)		Seropostive (n=25)							
			Only tTg IgA Positive		Only tTgIgG Positive		tTg IgA + IgG both Positive		Total	
	No.	%	No	%	No.	%	No.	%	No	%
1-2	47	62.67	4	57.14	2	33.33	2	16.67	8	32
2-3	14	18.67	1	14.29	1	16.67	3	25	5	20
3-4	54	72	1	14.29	1	16.67	1	8.333	3	12
4-5	10	13.33	1	14.29	2	33.33	6	50	9	36
Total	75	100	7	100	6	100	12	100	25	100

The mean age, mean weight and mean height in seronegative v/s seropositive was 1.52 ± 1.36 v/s 2.83±1.73, 6.48±1.80 v/s 7.43±2.20 and 73.71±10.13 v/s 81.61±12.34. The difference among the all three parameters was statistical significant (P-value<0.5). While mean MUAC was 11.88±1.47 v/s 11.38±1.14. The difference in MUAC in seronegative and seropositive cases was statistically insignificant (p-value>0.5) (Table-4).

Table 4: Mean age and anthropometric measurements in cases

Parameters	Seronegative		Seropositive		P-Value
	Mean	SD	Mean	SD	
Age (yrs)	1.52	±1.36	2.83	±1.73	0.01
Anthropometric Measurements					
Weight (Kg)	6.48	±1.80	7.43	±2.20	0.01
Height (cm)	73.71	±10.13	81.61	±12.34	0.01
MUAC (cm)	11.88	±1.47	11.38	±1.14	0.782

Total no. of cases in form of Z-score (<-2SD, <-3SD) in seronegative group and seropositive group were 2, 73 and 0, 25 respectively. This difference in sero-negative and sero-positive cases was statistically insignificant (P-value= >0.05) (Table-5).

Table 5: Weight/Height Z-score in cases

Weight/ Height	Seronegative		Seropositive	
	No.	%	No.	%
<-2SD	2	2.66	0	0
<-3SD	73	97.33	25	100
Total	75	100	25	100

Recurrent diarrhoea 52 cases which was a common clinical features at the time of admission (P value <0.001). In seropositive cases chelosis of tongue was common sign in more that 50% of cases followed by nail changes and pallor but there was no statistically significant difference (P value >0.05) among the clinical signs between seropositive and seronegative groups (Table-6).

Table 6: Distribution of clinical sign & symptoms according seropositivity

Clinical Features	Seronegative (n=75)		Seropositive (n=25)						P value
			Only tTg IgA Positive (n=7)		Only tTg IgG Positive (n=6)		Both tTg IgA &IgG Positive (n=12)		
	No.	%	No.	%	No.	%	No.	%	
Rec. Diarrhea	23	30.67	7	28	4	16	11	44	<0.001
Rec. Blood in stool	4	5.333	0	0	2	8	2	8	<0.001
Rec. Vomiting	17	22.67	1	4	2	8	6	24	0.281
Rec. Abd. Pain	18	24	2	8	1	4	5	20	0.222
Abd. Distension	30	40	2	8	4	16	9	36	0.071
Anorexia	22	29.33	1	4	2	8	2	8	0.382
Wt. loss	12	16	2	8	1	4	3	12	0.739

Irritability	26	34.67	4	16	1	4	1	4	0.482
Clinical Sign									
Pallor	65	86.67	4	16	5	20	10	40	0.529
Oedema	10	13.33	1	4	1	4	1	4	0.820
Skin change	16	21.33	2	8	1	4	1	4	0.221
Nails change	6	8	1	4	1	4	1	4	0.379
Tongue Chelosis	1	1.333	1	4	0	0	0	0	0.629
Hairs hypopig.	52	69.33	3	12	2	8	7	28	0.801

In Seronegative v/s Seropositive cases mean haemoglobin (7.37 ± 2.72 v/s 8.47 ± 2.63 gm%), mean Hct (26.38 ± 7.63 v/s 26.41 ± 8.38 %), mean MCV (69.18 ± 15.62 v/s 71.59 ± 15.29 fl), mean MCH (23.59 ± 17.49 v/s 23.59 ± 17.49pg), mean MCHC (29.32 ± 4.07 v/s 30.84 ± 3.20 g/dl) were lower in Seronegative group. while mean TLC (11621.66 ± 7629.13 v/s. 12913.73 ± 7629.22 cells/mm^3) were lower in seropositive cases but there was no statistical significant (P-value >0.05) (Table -7).

Table 7: Hematological profile in cases

Hematological indices	Seronegative (n=75)		Seropositive (n=25)		P value
	Mean	SD	Mean	SD	
Hb	7.37	±2.72	8.47	±2.63	0.382
Hct	26.38	±7.63	26.41	±8.38	0.738
MCV	69.18	±15.62	71.59	±15.29	0.382
MCH	23.59	±17.49	23.42	±6.30	0.593
MCHC	29.32	±4.07	30.84	±3.20	0.454
TLC	11621.66	±7629.13	12913.73	±7629.22	0.488

Discussion:

In western countries, the prevalence is around 0.6% histologically confirmed and 1% in serological screening of the general population. The female-to male ratio ranges from 1:3 to 1.5:1. CD is known to affect all age groups, including the elderly; more than 70% of new patients are diagnosed above the age of 20 years. [12] Some of these adults probably have had undetected disease since childhood; in other cases they have contracted the disease in adulthood. [13]

Anthropometric measurements were comparable in sero-nergative and sero-positive cases without statistical significant difference. Anthropometric measurements were consistent with Severe Acute Malnutrition. There was no significant difference in mean age of starting gluten containing diet in sero-negative and sero-positive cases. Beniwal N et al [10] reported mean age of starting gluten containing diet in Celiac Disease children of 10.33±5.20 months.

The loss of villi and surface epithelium due to CD increases the plasma protein leakage in such patients [14]. Iron is the

major micronutrient depleted in subjects with CD caused by iron malabsorption, reduced duodenal iron absorption, gastrointestinal blood loss, autoimmune diseases, and microcytic anemia. The frequency of Iron Deficiency Anemia (IDA) among those with CD ranged from 12% to 69% [14]. It was stated that the depletion in body iron storage and reduced hemoglobin levels were observed among patients with celiac disease [15,16].

Conclusion:

Recurrent diarrhoea and blood in stool were common presenting feature on admission in celiac seropositive patients suffering from severe acute malnutrition. Vit. B12 and Folic acid deficiency were also observed as a common finding in seropositive patients.

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