Lactose intolerance in malnutrition: Do we guidelines?

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ABSTRACT... Objective: To determine the frequency of lactose intolerance in malnourished children presenting with acute watery diarrhea. Study Design: Cross Sectional study. Setting: Department of Pediatrics at The Children’s Hospital & the Institute of Child Health. Period: 20th December 2015 till 20th June 2016. Material & Methods: A total of 225 children fulfilling inclusion criteria were selected. Stool samples were tested for reducing substances after informed consent from parents. Approval from Ethical Committee was taken. Data was entered and analyzed through SPSS 2.0. Results: Out of total 225 patients with age 3 months to 2 years (mean age 13.41±5.93 months), 112 (49.8%) were males and 113 (50.2%) were females. Overall lactose intolerance was observed in 57 (25.3%) patients, out of which, 27 (24.1%) were males and 30 (26.5%) were females. Total of 129 (57.3%) had low socio-economic status out of which 35 (27.1%) had lactose intolerance. Conclusion: In these malnourished children with acute watery diarrhea, lactose intolerance is high and local guidelines are necessary for proper screening and management.

Key words: Acute Watery Diarrhea, Malnourished, Lactose Intolerance.

INTRODUCTION

Lactose intolerance is one of causes of diarrhoea that can lead to treatment failure in children with malnutrition.¹ So it is important that lactose intolerance should be identified as early as possible as change in diet can improve the outcome.

Lactose is converted into glucose and galactose by lactase enzyme which is present in enterocytes of small intestine. Deficiency of this enzyme leads to lactose intolerance as lactose is not absorbed.²³

Lactose draws water into intestinal lumen by increasing osmotic diarrhea, bloating, flatulence, abdominal distension, discomfort and perianal excoriation. Treatment options are; reduce or eliminate lactose from the diet or by lactase-enzyme replacement therapy.⁴⁻⁵ Lactose intolerance is of two types; primary and secondary.⁶ Congenital absence of enzyme activity in enterocytes of small intestine leads to primary intolerance. Inability to digest disaccharide lactose leads to secondary lactose intolerance. Causes of secondary lactose intolerance are; celiac disease, giardiasis, infectious enteritis, mucosal injury, bacterial overgrowth and drug induced enteritis.⁷⁻⁸

Malnutrition occurs when there is mismatch between body’s nutrient requirements and intake. That results in deficiency of energy, protein, and micronutrients that can affects growth, development, and other relevant outcomes.⁹ Malnourished children commonly have low activity of intestinal lactase and feeding may result in retardation of nutritional recovery. Secondary lactose intolerance prevalence has been reported ranging from 26% to as high as 100% in affected children.¹⁰ Children with protein-energy-malnutrition usually produce less lactase, and including this disaccharide interferes with recovery during nutritional rehabilitation.¹¹⁻¹²

Rationale of our study is to determine lactose...
Lactose intolerance frequency in malnourished children presenting with acute watery diarrhea in our hospital so that we can have local estimate, applicable to local population and guidelines can be made for the management of malnourished children and prevent treatment failure in malnourished children.

OBJECTIVE
- To determine the frequency of lactose intolerance in malnourished children presenting with acute watery diarrhea in The Children’s Hospital and The Institute of Child Health, Lahore.

MATERIAL & METHODS
This cross-sectional study was conducted at the Pediatric Department of the Children’s Hospital & The Institute of Child Health, Lahore from: 20-12-2015 to 20-06-2016. It comprised of 225 children aged three months to two years, who met the WHO criteria of severe acute malnutrition (Z-score of <-3SD with weight for height/length, age and sex) presenting with diarrhoea. Children already on lactose free diets were excluded from the study. Children who fulfil selection criteria were enrolled in the study after taking informed consent from parents. A sample of 5 ml of stool from liquid portion was taken into container and sent for testing of reducing substances in laboratory of the hospital. Results were received and analysed. Reports were discussed with consultant and lactose intolerance was labelled as per operational definition. All this information was recorded through proforma (attached). Malnutrition and lactose intolerance were managed as per hospital protocol. Approval from Ethical Committee was taken. Data was entered and analysed through SPSS 20. Mean and standard deviation were calculated for quantitative variables like age, height & weight. Frequency and percentage were calculated for qualitative variables like gender and presence of lactose intolerance. Data was stratified for age, gender and socio-economic status to deal with effect modifiers. Post-stratification Chi-square test was applied. P-value <0.05 was considered significant.

Operational Definition

Acute Severe Malnutrition
Malnutrition of less than 3months duration with WHO weight for length/height Z-score < -3.13

Secondary Lactose Intolerance
A child who was previously normal since birth, who develops diarrhea with signs and symptoms of lactose intolerance (diarrhea, abdominal distension, and perianal excoriation) and positive stool for reducing substances later in life.

Diarrhea
Defined as the passage of three or more than three loose watery tools per day.14

Inclusion Criteria
1. Acute watery diarrhea
2. Age 3 months to 2 years
3. Malnourished children

Exclusion Criteria
1. Dysentery
2. Co-morbid conditions like celiac disease, CHD
3. Age <3months and > 2 years

RESULTS
Out of 225 cases aged 3 months to 2 years, 112 (49.8%) were males and 113 (50.2%) were females. Mean age was 13.41±5.93 months. Overall lactose intolerance (who had diarrhea and positive reducing substance) was found in 57 (25.3%) patients, whereas it was negative in 168 (74.7%) patients. The mean stool pH value of 225 patients in this study was noted as 5.86±1.03 with minimum and maximum values of 3.4 & 7.5 respectively. Among 112 male cases, 27 (24.1%) had lactose intolerance while 85 (75.9%) did not. While out of 113 female cases, 30 (26.5%) were positive for lactose intolerance and 83 (73.4%) were not lactose intolerant. Total of 129 (57.3%) had low socio-economic status out of which 35 (27.1%) had lactose intolerance The difference was insignificant (P>0.05).
Lactose intolerance in malnutrition

| Sex                  | Male            | Female           | Total       |
|----------------------|-----------------|------------------|-------------|
| Lactose Intolerance  | Yes             | No               |             |
| Yes                  | 27(24.1%)       | 30(26.5%)        | 57(25.3%)   |
| No                   | 85(75.9%)       | 83(73.4%)        | 168(74.7%)  |
| Total                | 112(49.8%)      | 113(50.2%)       | 225(100%)   |

Table-I. Comparison of lactose intolerance between both genders

Chi Value = 0.177, p-value = 0.674 (Insignificant)

| Reducing substance | Yes | No | Total |
|--------------------|-----|----|-------|
| Age recorded       |     |    |       |
| 3 to 12 months     | 32  | 111| 143   |
| 13 to 24 months    | 25  | 57 | 82    |
| Total              | 57  | 168| 225   |

Table-II. Age recorded reducing substance

| Abdominal distension | Yes | No | Total |
|----------------------|-----|----|-------|
|                      | 43(75.4%) | 14(24.6%) | 57 |

| Perianal excoriation | Yes | No | Total |
|----------------------|-----|----|-------|
|                      | 38(66.6%) | 19(33.3%) | 57 |

Table-III. Showing percentages of abdominal distension and perianal excoriation

DISCUSSION
Severe malnutrition is often complicated by diarrhea. In 2013, it was estimated that 2 million deaths occur annually due to diarrhea and almost 1.7 billion cases are reported each year that kills around 760,000 children under five. More than half of these were in Africa and South Asia. Diarrhea is the second leading cause of mortality (16%) in children under five. In 2008, nearly 465,000 child deaths occur in Pakistan due to diarrhea. Pakistan is fourth in number that is contributing 5% (1 in every 20 child deaths) to the child mortality pie.

In our study, Lactose intolerance incidence was almost same that is 57(25.33%) as in Senegalese study and Z. A Bhutta study held in Karachi 26% and (25%24 respectively however it was lower than other studies report.17-19

In our study secondary lactose intolerance was 56.1% in infantile age group (3-12 months), while in Nyeko et al study at Mulago it was 68%.20

Mira Verma described lactose intolerance in 40 children suffering from protein energy malnutrition and 10 control children. Two cases of kwashiorkor show evidence of lactose intolerance by a flat curve, diarrhea, low stool pH, and positive reducing substances in stools. Four out of 38 marasmus children shows no signs of intolerance except maximum blood sugar rise below 20–30 mg/dl.21

Perianal rash (p value 0.00) and abdominal distention (p value, 0.00) are more common in children with secondary lactose intolerance. Lactose that is not metabolized is a nutritive source for intestinal bacteria (especially large bowel). Lactose metabolism by bacteria results in formation of volatile fatty acids and gases (carbon dioxide, methane and hydrogen), leading to flatulence. The fatty acids decrease stool pH, causing excoriation and rash on contact with perianal region. With significant intestinal gas by the intestinal bacteria, abdominal distention occurs.

Our study results showed the mean age of the children with diarrhea as 13.41±5.93 months, while study done by Molbak K et al and Woldemicael G, shows highest rates in children of 6-11 months age and it decreases as children grows old.22-23

Our study findings are primary in local targeted population, and it needs some-other studies to validate our findings.

CONCLUSION
It was concluded that the rate of lactose intolerance is high among malnourished. Its clinical signs in severely malnourished children included perianal skin rash and abdominal distention and positive stool examination for reducing substances. It is common in infantile age group. Local guidelines are required for proper screening and management of patients with acute watery diarrhea, also having malnutrition.

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