Original Article

Lactose Intolerance among <5 years Children with Diarrhoea Admitted in the Paediatric Ward of a Medical College Hospital in a Rural Area of Bangladesh

DOI: dx.doi.org

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Received: 03 July 2024
Accepted: 15 August 2024
Published: 25 August 2024

Published by:
Sheikh Sayera Khatun Medical College (SSKMC), Gopalganj, Bangladesh

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ABSTRACT

Introduction: *Gastrointestinal disorders are a major health concern, especially in infants and young children. Laboratory tests, particularly sugar tests, are vital for diagnosing carbohydrate malabsorption. This study focused on assessing lactose intolerance in children under 5 with diarrhea admitted to Kumudini Hospital's pediatric ward.* ***Methods & Materials:*** *The study examined lactose intolerance in children under 5 admitted to Kumudini Hospital's pediatric ward for diarrhea from October 2023 to March 2024. Using a cross-sectional design and convenience sampling, data were collected through parental consent, covering demographics, medical history, and lactose tolerance tests. SPSS 26 was used for analysis to guide clinical management and dietary advice.* ***Results:*** *The study examined 180 individuals, predominantly aged 7-24 months (81.7%), with 59.4% males and 40.6% females. Most identified as Muslim (92.2%), with 60.6% weighing 8-11 kg. Maternal education varied, with 58.9% having secondary*

(The Insight 2023; 6(2): 95-102)

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education. Family income was mainly within 5000-25000 BDT (65.55%). Breast milk and complementary feeding were the most common feeding practices (32.8%). Stool Reducing Substance test done in 106 patients (58.9%). The laboratory findings revealed positive in 38 patients (35.8%), and negative in 68 patients (64.2%). In the stool acidity test, acidic results were predominant, with 106 cases (100.0%). while most sugar tests showed trace green (65.8%), with fewer orange and red results. ***Conclusion:*** *Early detection and appropriate management of lactose intolerance can lead to improved outcomes and reduced morbidity in affected children.*

Keywords: *Gastrointestinal disorders, Lactose intolerance, Pediatric diarrhea, Sugar test*

INTRODUCTION

Lactose intolerance among children under five years old with diarrhoea poses a significant health concern globally. Lactose intolerance, characterized by the inability to digest lactose due to deficient levels of lactase enzyme, results in gastrointestinal symptoms upon lactose consumption. Children suffering from diarrhoea are particularly vulnerable to the effects of lactose intolerance, as diarrheal illnesses can exacerbate lactose malabsorption due to intestinal damage and reduced lactase activity[1,2]. The prevalence of lactose intolerance varies across populations, with higher rates reported among certain ethnic groups and regions where dairy consumption historically has been low[3,4]. In young children, lactose intolerance may be transient or persistent, impacting nutritional status, growth, and overall health outcomes[5]. Diagnosis of lactose intolerance in this age group presents challenges, often relying on clinical assessment, dietary history, and, if available, lactose breath hydrogen testing[6]. Managing lactose intolerance in children with diarrhoea involves dietary modification, including lactose restriction or elimination, to alleviate symptoms and prevent dehydration. However, the diagnosis and management of lactose intolerance in resource-limited settings, where diarrheal diseases are prevalent, can be particularly challenging[7]. Understanding the relationship between lactose intolerance and diarrhoea in young children is crucial for implementing effective interventions and improving health outcomes in this vulnerable population[8]. Lactose intolerance not only affects the physical health of children but also impacts their psychosocial well-being and quality of life. Gastrointestinal symptoms such as abdominal pain, bloating, flatulence, and diarrhoea can lead to discomfort, embarrassment, and social withdrawal, especially in school-aged children[9]. Moreover, dietary restrictions imposed by lactose intolerance may affect food choices, meal patterns, and nutrient intake, potentially leading to nutritional deficiencies and growth faltering[10]. In resource-limited settings, where access to clean water, sanitation, and healthcare services is limited, the burden of lactose intolerance among children with diarrhoea is compounded by socioeconomic factors. Poverty, inadequate nutrition, and poor hygiene practices contribute to the prevalence and severity of diarrheal diseases, exacerbating the impact of lactose intolerance on child health[11]. Furthermore, cultural beliefs, traditional remedies, and misconceptions about lactose intolerance may hinder timely diagnosis and appropriate management[12]. Despite these challenges, efforts

to address lactose intolerance among children with diarrhoea are essential for reducing morbidity, mortality, and healthcare costs associated with diarrheal diseases. Public health interventions aimed at promoting breastfeeding, improving access to clean water and sanitation, and enhancing nutrition education can help prevent diarrheal illnesses and mitigate the impact of lactose intolerance[13]. Additionally, healthcare providers play a crucial role in raising awareness, conducting screening assessments, and providing appropriate dietary guidance and support to families affected by lactose intolerance[14]. This study aimed to assess lactose intolerance among <5 years children with diarrhoea admitted in the paediatric ward of Kumudini Hospital.

METHODS & MATERIALS

The study aimed to investigate the pattern of lactose intolerance among children under 5 years old admitted to the pediatric ward of Kumudini Hospital with diarrhea from October 2023 to March 2024. A cross-sectional design was employed for this research. The study population comprised children aged below 5 years who were admitted to the pediatric ward due to diarrhea. Convenience sampling was utilized to select participants for the study. Upon admission, informed consent was obtained from the parents or guardians of the children. Data collection involved a combination of methods. Firstly, demographic information such as age, gender, and medical history was gathered through interviews with the parents or guardians and by reviewing medical records. The clinical evaluation involved observing symptoms such as bloating, abdominal pain, and diarrhea after lactose consumption. Lactose tolerance tests involved administering a lactose solution orally and monitoring symptoms and blood glucose levels. Data analysis included descriptive statistics to determine the pattern of lactose intolerance among the study population. Ethical considerations were ensured throughout the study, and confidentiality of participant information was maintained. The findings from this study aimed to contribute to the understanding of lactose intolerance among young children with diarrhea, potentially informing clinical management and dietary recommendations in similar healthcare settings. Data analysis was performed in SPSS version 26.

RESULTS

Table I illustrates the distribution of the study population based on various basic characteristics, with a total sample size (N) of 180 individuals. Regarding age in months, the majority fell within the range of 7 to 24 months (81.7%), followed by those 1 to 6 months (11.1%), above 36 months (3.9%), and a smaller proportion 25 to 36 months (3.3%). In terms of sex, the population consisted of 59.4% males and 40.6% females. Religion-wise, the vast majority identified as Muslim (92.2%), while Hindu accounted for a smaller portion (7.8%). Regarding weight in kilograms, the highest frequency was observed in the 8-11 kg range (60.6%), followed by 3-7 kg (26.7%) and 12-16 kg (12.7%). Education levels of mothers varied, with the majority having a secondary education (58.9%), followed by those with education above Higher Secondary Certificate (HSC) (17.8%), primary education (21.7%), and a small percentage being illiterate (1.7%). Total monthly family income, measured in Bangladeshi Taka (BDT), predominantly fell within the 5000-25000 BDT range (65.55%), fol-

lowed by 26000-45000 BDT (21.11%), 46000-65000 BDT (7.77%), 66000-85000 BDT (2.22%), 86000-100000 BDT (2.77%), and a single case with an income of 200000 BDT (0.55%). Regarding current feeding practices, the highest proportion was found in the category of breast milk (BM) and complementary feeding (CF) (32.8%), followed by BM and infant formula (20.0%), infant formula and CF (15.6%), cow milk and CF (14.4%), BM and cow milk (CM) (5.6%), infant formula alone (5.0%), exclusive breast feeding (2.8%), and others (3.9%).

Table I: Distribution of study Population Based on Basic Characteristics (*n*=180)

Basic characteristics	***n*(%)**
Age (months)	
1-6	20 (11.1)
7-24	147 (81.7)
25-36	6 (3.3)
>36	07 (3.9)
Sex	
Male	107 (59.4)
Female	73 (40.6)
Religion	
Muslim	166 (92.2)
Hindu	14 (7.8)
Weight (kg)	
3-7	48 (26.7)
8-11	109 (60.6)
12-16	23 (12.7)
Education of mother	
Primary	39 (21.7)
Secondary	106 (58.9)
Above HSC	32 (17.8)
Illiterate	03 (1.7)
Total monthly family income (BDT)	
5000-25000	118 (65.55)
26000-45000	38 (21.11)
46000-65000	14 (7.77)
66000-85000	4 (2.22)
86000-100000	5 (2.77)
200000	1 (0.55)
Current Feeding	
Exclusive breast Feeding	5 (2.8)
BM and Infant formula	36 (20.0)
Infant formula	9 (5.0)
BM and CF	59 (32.8)
BM and CM	10 (5.6)
Cow milk and CF	26 (14.4)
Infant formula and CF	28 (15.6)
Others	7 (3.9)

**BDT = Bangladeshi Taka *BM = Breast Milk*
**CF = Complementary Feeding *CM = Cow Milk*

Table II: Distribution of study Population Based on Clinical Feature (*n*=180)

Clinical features	***n*(%)**
Clinical features other than diarrhoea	
Vomiting	106 (58.9)
Nausea	08 (4.4)
Abdominal pain	14 (7.8)
Abdominal cramping	01 (0.6)
Abdominal distension	02 (1.1)
Fever	57 (31.7)
Cough	8 (4.4)
Cold	27 (15.0)
Type of diarrhoea	
AWD	171(95.0)
persistent diarrhoea	08 (4.4)

Dysentery	1 (0.6)
Prognosis	
Recovered	173 (96.11)
DOR & DORB	07 (3.88)

Table II provides a breakdown of the study population concerning clinical features, with a total sample size (N) of 180 individuals. Among the clinical features other than diarrhea, vomiting was the most prevalent, affecting 106 individuals (58.9%), followed by fever in 57 cases (31.7%), and cold symptoms in 27 cases (15.0%). Abdominal pain was reported in 14 cases (7.8%), while nausea and cough were less common, each affecting 8 individuals (4.4%). Abdominal distension was observed in 2 cases (1.1%), and abdominal cramping was reported in 1 case (0.6%). Regarding the type of diarrhea, Acute Watery Diarrhea (AWD) was predominant, affecting 171 individuals (95.0%), followed by persistent diarrhea in 8 cases (4.4%), and dysentery in 1 case (0.6%). In terms of prognosis, the majority of cases, accounting for 173 individuals (96.11%), experienced recovery, while a smaller proportion, comprising 7 cases (3.88%), were discharged upon request (DOR) before recovery.

Table III: Distribution of study Population Based on Laboratory Test (*n*=180)

Stool for reducing substance done	***n*=(%)**
Positive	38 (35.8)
Negative	68 (64.2)
Stool acidity test (n=106)	
Acidic	106 (100)
Stool for Sugar test (n=38)	
Green(trace)	25 (65.8)
Yellow+	7 (18.4)
Orange++	05 (13.2)
Red+++	1 (2.6)

Table III displays the distribution of the study population based on laboratory test results, with a total sample size (N) of 180 individuals. Stool Reducing Substance test done in 106 patients (58.9%). The laboratory findings revealed positive in 38 patients (35.8%), and negative in 68 patients (64.2%). In the stool acidity test, acidic results were predominant, with 106 cases (100.0%). Regarding the sugar test, the majority of cases showed green (trace) results in 25 instances (65.8%). A smaller proportion exhibited yellow + in 7 cases (18.4%), orange++ in 5 cases (13.2%), and red +++ in 1 case (2.6%).

DISCUSSION

This study investigated the distribution of the study population based on basic characteristics, clinical features, and laboratory test results among infants and young children presenting with gastrointestinal symptoms. The distribution of basic characteristics in our study revealed a predominantly young population. The majority fell within the range of 7 to 24 months (81.7%), followed by those 1 to 6 months (11.1%), > 36 months (3.88%), and a smaller proportion above 25 to 36 months (3.3%). This age distribution aligns with previous research indicating that infants and young children are particularly susceptible to gastrointestinal infections due to immature immune systems and exploratory behaviors leading to exposure to pathogens[15,16]. Regarding sex distribution, our study showed a higher proportion of males (59.4%) compared to females (40.6%). This finding is consistent with some previous studies, although others have reported

equal distribution or a slight female preponderance[17-20]. In terms of feeding practices, exclusive breastfeeding was relatively low (2.8%), while a substantial proportion received breast milk along with complementary feeding (32.8%). This finding shows the importance of promoting optimal breastfeeding practices to enhance infants' immune responses against diarrheal pathogens[21]. Additionally, the distribution of education levels among mothers highlights the need for targeted health education interventions, especially among those with lower educational attainment[22]. The clinical features observed in our study, such as vomiting (58.9%) and fever (31.7%), are consistent with previous reports of common symptoms associated with gastrointestinal infections in children[23,24]. However, the prevalence of cold symptoms (15.0%) was relatively lower in our study compared to some prior studies, suggesting potential variations in seasonal patterns or viral etiologies[16]. The predominance of acute watery diarrhea (AWD) in our study (95.0%) aligns with global trends indicating AWD as the most common type of diarrhea among children in resource-limited settings[23]. However, the proportion of persistent diarrhea (4.4%) was lower compared to some studies from similar contexts, indicating potential differences in healthcare-seeking behaviors or healthcare infrastructure[16]. Stool Reducing Substance test done in 106 patients (58.9%). The laboratory findings revealed positive in 38 patients (35.8%), and negative in 68 patients (64.2%), consistent with the expected findings in diarrheal illnesses, indicating carbohydrate malabsorption and increased fecal acidity due to bacterial fermentation[19]. However, the distribution of sugar test results showed variations, with the majority exhibiting trace green results (65.8%) unlike some studies reporting higher proportions of abnormal sugar tests indicative of carbohydrate malabsorption[22]. Moreover, a smaller proportion of cases showed higher sugar levels, with18.4% exhibiting yellow+ results, 13.2% exhibiting orange++, and 2.6% exhibiting red+++ results. These sugar test findings are crucial indicators of carbohydrate malabsorption or maldigestion, which can be associated with various gastrointestinal disorders. High sugar levels in the stool may indicate malabsorption syndromes such as lactose intolerance, where the inability to digest lactose results in its presence in the stool[6,8].

The study observed a significant proportion of children testing positive for reducing substances in stool samples, indicative of lactose intolerance. This suggests that lactose intolerance may play a significant role in pediatric diarrhea cases, warranting attention in clinical practice. Additionally, the high prevalence of symptoms such as vomiting, fever and cold symptoms among the study population underscores the potential severity of gastrointestinal infections in this age group. The predominance of Acute Watery Diarrhea (AWD) further emphasizes the need for effective management strategies to address diarrheal illnesses in young children.

Conclusion:

In conclusion, this study highlights the importance of recognizing lactose intolerance as a potential contributing factor to diarrhea in children under 5 years old. The prevalence of reducing substances in stool samples and associated symptoms suggests that lactose intolerance may be a significant concern in pediatric healthcare settings. Therefore, clinicians should consider lactose intolerance as part of the differen-

tial diagnosis in children presenting with diarrhea, especially in settings where it is prevalent. Early detection and appropriate management of lactose intolerance can lead to improved outcomes and reduced morbidity in affected children.

Recommendation:

Recommendations include routine screening for lactose intolerance in children under 5 with diarrhea, especially in high-prevalence areas. Healthcare providers should be trained to identify lactose intolerance and use appropriate diagnostic tests. Management should include dietary modifications like lactose restriction or lactase enzyme supplementation. Further research is needed on the impact of lactose intolerance on child health, and public health initiatives should raise awareness and promote proper dietary practices.

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