

Impact of the Pediatric diet of three-fourth-strength Rice Suji with Green Banana in the Management of Persistent Diarrhea

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ABSTRACT

Introduction: Persistent diarrhea is a significant contributor to pediatric morbidity and malnutrition in Bangladesh. Some studies indicated that three-fourth strength rice suji plays a beneficial role in promoting clinical recovery. This study aimed to assess the impact of the pediatric diet of three-fourth-strength rice suji with green bananas in the management of persistent diarrhea. **Methods & Materials:** This prospective observational study was conducted at Bangladesh Shishu Hospital & Institute from January 2020 to December 2021. This study included 47 children with persistent diarrhea, selected through random sampling. MS Office tools were utilized for data analysis. **Results:** In this study, after initiating the three-fourth strength rice suji with green banana, the stool frequency of the patients decreased to 2.6 ± 0.7 times per day by day 3. Within 2-3 days, 78.7% of patients developed formed stool, and the rest achieved it by day 4-5, with a mean duration of 2.7 ± 0.8 days. In terms of hospital stay, 44.7% had a duration of 3-4 days, while 55.3% had a stay of 5-6 days, resulting in a mean hospital stay duration of 4.1 ± 0.9 days. **Conclusion:** Three-fourth-strength rice suji with green banana is a diet for managing persistent diarrhea. Further research can contribute to obtaining more reliable information about this diet.

Keywords: Pediatric diet, Three-fourth-strength rice suji, Green-banana, Persistent diarrhea, Fever, Vomiting.

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INTRODUCTION

Persistent diarrhea significantly impacts children's health in developing countries, with dietary management being the primary treatment approach^[1]. Diarrhea is officially defined as the passage of three or more loose or liquid stools per day, lasting 3 or more days, within 14 days. Notably, it is the consistency of stools, not just their quantity, that holds greater importance; frequent passing of formed stools is not considered diarrhea. For infants exclusively fed breast milk, the passage of loose "pasty" stools is not indicative of diarrhea. Persistent diarrhea, characterized by stool weight exceeding 200 g/day, is becoming increasingly prevalent in the developing world. Globally, diarrhea ranks as the second leading cause of mortality among children under 5, particularly in low- and middle-income countries^[2]. Recent estimates indicate a concerning 1.1–2.0 million deaths in children under 5 years worldwide due to diarrheal diseases^[3].

A noteworthy 10% to 20% of acute diarrheal cases progress into prolonged (>7 days) or persistent (>14 days) childhood diarrhea. In 2019, out of 89,796 under-five deaths in Bangladesh, diarrhea accounted for 7% of fatalities. Despite a global decline in persistent diarrhea (PD) prevalence from 8% in 1991 to 1% in 2010, low- and middle-income countries still bear a significant burden, contributing to 36%-56% of diarrheal deaths^[4]. Major risk factors, as reported by Umamaheswari et al., include malnutrition, vitamin A deficiency, lower respiratory tract infections, and prior antibiotic use^[5]. Factors contributing to persistent diarrhea encompass malnutrition, recent intestinal infections, and intolerance to non-human milk. Malnutrition contributes to immune intolerance and micronutrient deficiencies, leading to absorption defects and exacerbating diarrhea. Recent intestinal infections can result in villous atrophy and mucosal thinning, delaying mucosal repair. Intolerance to non-human

milk is another factor associated with persistent diarrhea. Other suggested mechanisms in the pathogenesis of persistent diarrhea include the persistence of acute diarrheal pathogens, continued mucosal injury, delayed mucosal repair, and bacterial overgrowth^[6]. Nowadays, commensal gut microbiota is recognized as responsible for the pathogenesis of persistent diarrhea^[7,8]. It is noted that alterations in gut normal flora led to prolonged inflammation through modified Toll-like receptor signaling. Toll-like receptors and gut microbiota play a crucial role in the pathogenesis of persistent diarrhea. Regardless of the primary insult to the intestinal tract, significant small intestinal mucosal damage is a prominent feature in the pathophysiology. The WHO recommends algorithm-based dietary management, extending hospital stays and potentially increasing the risk of hospital-acquired infections, particularly in resource-poor settings like Bangladesh^[9]. Various studies have sought suitable diets for early recovery. Cooked green banana has been found beneficial for both acute watery diarrhea and persistent diarrhea^[10]. Earlier research also highlighted the positive effects of rice powder and green bananas in the dietary management of persistent diarrhea. The objective of this study was to assess the impact of the pediatric diet of three-fourth-strength rice suji with green bananas in the management of persistent diarrhea.

METHODS & MATERIALS

This was a prospective observational study that was conducted at Bangladesh Shishu Hospital & Institute from January 2020 to December 2021. The study included 47 children with persistent diarrhea, selected through random sampling. A 7-day dietary therapy was administered, and observations were conducted to assess the diet's efficacy in clinical recovery and its impact on the duration of hospital stay. Ethical approval was obtained from the hospital's ethical committee, and written consent was secured from all participants before data collection. The inclusion criteria encompassed children aged 6 to 59 months with persistent diarrhea, while exclusion criteria ruled out patients with severe malnutrition and systemic infection, chronic diarrhea, and those requiring antibiotics. Demographic and clinical information for all participants was meticulously recorded and processed using MS Office tools for analysis and dissemination.

RESULT

In this study, the majority of participants (61%) belonged to the 6 months to <1 year age group. Additionally, 14 participants (29.8%) were in the one to two years age group, and 4 participants (8.5%) were in the more than two years age group. The mean age of the patients was 11.9±6.0 months. It was found that nearly three-fourths of children (74%) were male and 26% were female. The majority of the participants (55.3%) were from urban areas, while 19.1% and 25.5% were from rural and slum areas, respectively. More than half of the children (51%) were being fed through breastfeeding and complementary feeding, while the remaining children (49%) were on formula feeding and complementary feeding. The laboratory parameter findings indicated mean values and

standard deviations for various parameters in the examined population: total count was 5865.0±2369.4, neutrophil levels averaged 50.4±11.5, lymphocyte levels were 36.4±9.9, sodium levels measured 136.5±2.2, potassium levels were 3.7±0.3, chloride levels were 97.3±1.5, and C-reactive protein levels averaged 7.8±4.2. The mean duration of diarrhea was 16.7±2.4 days, and the mean frequency was 14.9±2.8 per day. In approximately one-fourth of the children (23.4%), vomiting was observed, while in nearly half of the cases (48.90%), fever was reported. Dehydration was noted in 23.4% of the cases, and signs of perianal skin excoriation were found in more than one-third of the participants. Upon analyzing the stool examination of participants, it was observed that pus cells were present in more than one-third of the participants, E. coli was detected in 14%, and reducing substances were found in more than one-third of cases (36.2%). Following the intake of the study diet (three-fourth strength rice suji with green banana), there was a decrease in stool frequency, reaching 2.6±0.7 times per day by day 3. Additionally, 78.7% of patients developed formed stool within 2-3 days after receiving the study diet, while the remaining 21.3% achieved formed stool within 4-5 days. The mean duration for the formation of stool was 2.7±0.8 days. In the current study, among the total patients, 21 (44.7%) individuals had a hospital stay lasting 3-4 days, while the remaining 55.3% had a hospital stay lasting 5-6 days. The mean duration of hospital stay was 4.1±0.9 days.

Table - I: Age distribution of patients

Age	n	%
6 months <1 year	29	61.70
1 to 2 years	14	29.80
>2 years	4	8.50
Mean ±SD		11.9± 6.0

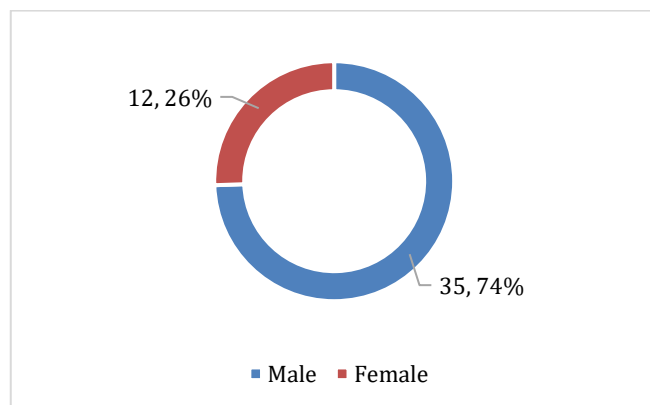


Figure - 1: Gender distribution

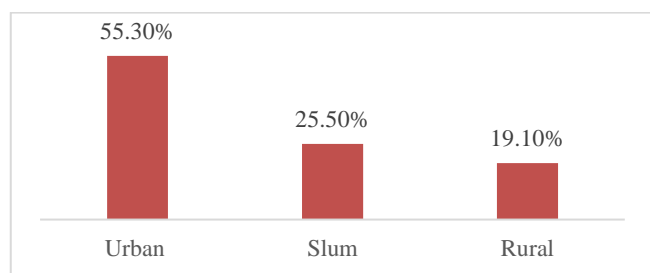


Figure - 2: Residential status of patients

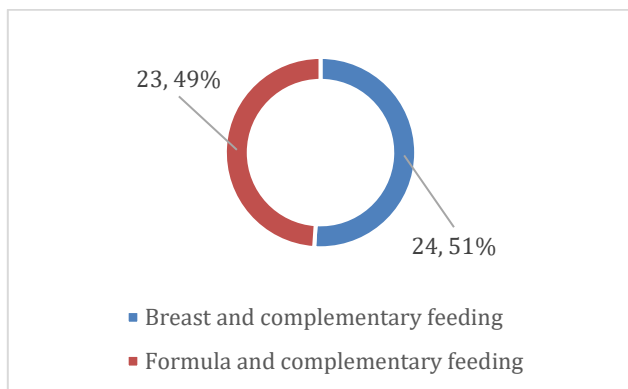


Figure – 3: Feeding status distribution

Table – II: Laboratory parameters

Parameters	Mean
Total count	5865.0±2369.4
Neutrophil	50.4±11.5
Lymphocyte	36.4±9.9
Sodium	136.5±2.2
Potassium	3.7±0.3
Chloride	97.3±1.5
C reactive protein	7.8±4.2

Table – III: Characteristics of diarrhea

Characteristics	Mean
Duration (in days)	16.7±2.4
Frequency (per day)	14.9±2.8

Table – IV: Signs and symptoms distribution

Signs and symptoms	n	%
Vomiting		
Absent	36	76.60
Present	11	23.40
Fever		
Absent	24	51.10
Present	23	48.90
Dehydration		
Absent	36	76.60
Present	11	23.40
Perianal Skin excoriation		
Absent	30	63.80
Present	17	36.20

Table – V: Stool examination findings

Stool examination	n	%
Stool R/M/E		
Pus cell absent	31	66.00
Pus cell present	16	34.00
Stool C/S		
Negative	40	85.10
E. coli	7	14.90
Reducing substance		
Absent	30	63.80
Present	17	36.20

Table – VI: Stool frequency at day 3

Characteristics	n	%
Stool frequency(day)		2.6± 0.7
Days to have formed stool		
3-4	37	78.70
5-6	10	21.30
7	0	0.00
Mean ±SD		2.7± 0.8

Table – VII: Duration of hospital stay

Hospital Stay (day)	n	%
3-4	21	44.70
5-6	26	55.30
7	0	0.00
Mean ±SD		4.1± 0.9

DISCUSSION

This study aimed to evaluate the impact of a pediatric diet consisting of three-fourth-strength rice suji with green bananas on managing persistent diarrhea. The majority of the children in the study (61%) were in the 6-month to under 1-year age group, with an average age of 11.9±6.0 months. This age distribution is similar to the findings of Moy et al., who also reported that persistent diarrhea peaked in the infant age group [11]. Regarding gender, nearly three-fourths (74%) of the participants were male, while 26% were female. This gender distribution aligns with the study by Sharmin et al., which also showed that male children were more affected by persistent diarrhea than female children[12]. A significant portion of the study's participants (55.3%) lived in urban areas. This finding contrasts with Sharmin et al., who reported a higher prevalence of persistent diarrhea in rural areas[13]. The observed disparity might be due to differences in hygiene practices between urban and rural settings. In terms of feeding practices, more than half of the children (51%) were being fed through a combination of breastfeeding and complementary feeding. The remaining children (49%) were on a combination of formula feeding and complementary feeding. These findings are consistent with Rabbani et al., who reported that 62.3% of children in their study received both breastfeeding and formula feeding[11]. The study found that the mean duration of diarrhea among the participants was 16.7±2.4 days, with an average frequency of 14.9±2.8 episodes per day. In contrast, Rabbani et al. reported a higher frequency of 21.6±6.3 episodes per day in their control group, which might be influenced by differences in the age groups studied[12]. Among the participants in this study, about one-fourth (23.4%) experienced vomiting, nearly half (48.9%) had a fever, 23.4% showed signs of dehydration, and more than one-third exhibited perianal skin excoriation. Sharmin et al. similarly found that 50% of children in their study suffered from fever[13]. The presence of E. coli was detected in 14% of our participants, whereas Rabbani et al. found a higher prevalence of 40% E. coli in their study [14]. Sarkar et al. noted that E. coli could prolong the duration of diarrhea[7]. After administering the study diet of three-fourth-strength rice suji with green bananas, there was a significant reduction in stool

frequency, which decreased to an average of 2.6 ± 0.7 times per day by the third day. The mean duration required to achieve formed stool was 2.7 ± 0.8 days. Ashraf et al. reported an 80% algorithm-based treatment response rate in their multi-center cohort study conducted across various countries, which is consistent with the findings of the present study^[15]. The mean duration of hospital stay for the participants in this study was 4.1 ± 0.9 days. This is in stark contrast to the findings of Sharmin et al., who reported a mean hospital stay of 11 days for the green banana group and 16 days for the rice suji group^[13].

Limitation of the study:

This study has several limitations, including the absence of direct measurements for diet osmolality and stool volume quantification (g/kg). The study also lacks a systematic measurement of gradual weight gain in children and a specific examination of the effects of green bananas on stool mixed with blood or mucus. Furthermore, the study did not observe associated extra-intestinal infections. Addressing these limitations in future research would contribute to enhancing the robustness and comprehensiveness of the study's findings.

CONCLUSION

The use of a diet consisting of three-fourth-strength rice suji with green banana shows promise in the management of persistent diarrhea. However, to establish its efficacy and understand its potential benefits more comprehensively, further research is needed. Conducting additional studies will contribute to obtaining more reliable and detailed information about the effectiveness of this specific dietary approach in managing persistent diarrhea. This ongoing research can inform healthcare practices, dietary recommendations, and potential interventions for individuals experiencing prolonged episodes of diarrhea, ultimately improving the quality of care in this context.

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Conflict of interest:

None declared.

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