Role of Probiotic in the Management of Acute Watery Diarrhoea in Children: A Single Center Study in Bangladesh

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ABSTRACT

Background: Diarrhoeal disease in childhood accounts for a large proportion (18%) of childhood deaths, making it the second most common cause of child deaths worldwide. Probiotics have preventive as well as curative effects on several types of diarrhoea of different etiologies. The objectives of the study were to determine the role of probiotics in the management of acute watery diarrhoea in children aged less than 5 years.

Materials and methods: This prospective comparative study was carried out in the pediatrics department in TMSS (Thengamara Mohila Sabuj Sangha) Medical College and Rafatullah Community Hospital, Bogura for one year from January to December 2024. Study population was 100 children with acute diarrhoea aged 1 month to 5 years. They were divided into two groups. Fifty (50) children were included in probiotics group (Group A) and the rest fifty (50) were in without probiotics group (Group B). All the cases were assessed daily for decrease in frequency of stool and total duration of illness at discharge.

Results: Mean age at the time of admission was 17.72 ± 4.89 months for the group A and 10.37 ± 15.68 months for the group B. Frequency of stools per day at admission was 2.58 ± 0.64 with the range of 2-4 stools/day for the group A and 2.08 ± 15.68 with the range of 1-4 stools/day for the group B. Most of the cases of this study had some sign of dehydration followed by severe sign of dehydration. The mean duration of hospital stay of group A was 2.7 days and in group B 3.4 days. The mean duration of hospital stay was significantly less in group A (Probiotics group).

Conclusion: Treatment with probioticsalongside conventional therapy led to a reduction in the duration of diarrhea and a shorter hospital stay.

KEY WORDS

Acute diarrhoea; Probiotics; Hospital stay.

INTRODUCTION

Diarrhoea is a Greek word which means flowing through. Diarrhoea means the stools with increased liquidity and decreased consistency and is associated with an increased frequency of stools and an increased fecal weight. The WHO defines diarrhoea as, "3 or more watery stools on 2 or more consecutive days".[1] Diarrhoeal diseases are a major cause of morbidity and mortality around the world, especially in developing countries where children suffer the greatest brunt of infectious diarrhoea, malnutrition and death. Annually, approximately 5 million children and infants die worldwide due to diarrhoeal diseases.[2] Symptoms lasting less than 14 days represent acute diarrhoea, whereas persistent diarrhoea lasts more than 14 days but less than 4 weeks, and chronic diarrhoea is defined by a duration of symptoms greater than 4 weeks.[2]

In children, acute diarrhoea is the second most common disease after respiratory tract infection. It is caused by a variety of factors and a variety of pathogens.[3] Viruses (Mainly rotavirus) and bacteria (Pathogenic *E. coli, Salmonella, Staphylococcus aureus,* etc.) are the most common triggering factors for acute diarrhoea and are related to poor local environmental sanitation, poor personal hygiene and unsafe water supplies, other causative factors are the overuse of antibiotics resulting in bacterial intestinal disorders, allergy, inappropriate diet, poor air quality and climatic factors.[4] The disease is prevalent worldwide, especially in developing countries.[5] If acute diarrhoea in children is not treated promptly and effectively, it can lead to severe dehydration and serious sequelae, such as hemolytic uremic syndrome, Guillain-Barre syndrome, malnutrition,

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dysplasia and ultimately can be life-threatening.[4] Antibiotics are unnecessary except few cases where specific bacterial pathogens are identified, but their empirical use is not recommended in non-specific diarrhoea, contrarily unnecessary use of antibiotics may prolong the carrier state and contribute to emerging drug resistance.[6] So, probiotics role in diarrhoeal diseases have been extensively studied in the prevention and treatment of diarrhoeal diseases in pediatric populations over the past several years.[7] Normal intestinal bacteria in the human body regulate immunity and promote nutrient absorption, play an essential role in protecting the ordinary function of the intestinal barrier, but the intestinal bacteria in children with diarrhoea are in a state of imbalance and disorders of the composition of gut flora can be observed.[8]

Probiotics are a kind of active microorganisms beneficial to the host by colonizing in the human body and changing the composition of flora in specific parts of the host (such as intestine), which could promote the reproduction and growth of beneficial intestinal flora, enhancing the ability to resist external pathogenic bacteria, improving the intestinal microenvironment, and promoting increased immunity and resistance.[9] The objectives of the study were to determine the role of probiotic in the management of acute watery diarrhoea in children at TMSS Medical College and Rafatullah Community Hospital, Bogura, Bangladesh.

MATERIALS AND METHODS

This prospective comparative study was carried out in the Pediatrics Department at TMSS Medical College and Rafatullah Community Hospital, Bogura for one year from January to December 2024. Study population was 100 children with acute diarrhoea aged 1 month to 5 years during the study period. They were divided into two groups. Fifty (50) children were included in probiotics group (Group A) and the rest fifty (50) were in without probiotics group (Group B). Permission for the study was taken from the hospital director. Fully informed and voluntarily signed consents were obtained from the parents or legal guardians. Parents or guardians were given information sheets detailing the study's purpose. All the children were examined for signs of dehydration along with complete systemic examination. Rehydration and adequate nutrition were provided to both groups. Group A patients were given probiotics combination Bifidobacterium + Lactobacillus (4 billion units once daily for five days) diluted in water. Group B patients were treated without probiotics. All the cases were assessed daily for decrease in frequency of stool and total duration of illness at discharge.

The exclusion criteria were cases of diarrhoea who have received antibiotics in the last 48 hours, cases of diarrhoea having serious co-morbid conditions like cardiac, renal or respiratory disease, critically ill, intake of antidiarrhoeal drugs, bloody stool, diarrhoea more than 14 days duration and whose parents/guardians refused to give their informed consent. All the records of the study population were entered into a data collection sheet and were analyzed using SPSS v 25. Significance was calculated using independent sample t-test. Data were expressed in mean and frequency. p-value of <0.05 was considered as significant.

RESULTS

Hundred (100) children with acute diarrhoea aged 1 month to 5 years were included in the study. They were divided into two groups. Fifty (50) children were included in probiotics group (Group A) and rest fifty (50) were in without probiotics group (Group B). Mean age at the time of admission was 17.72 ± 4.89 months for the group A and 10.37 ± 15.68 months for the group B. The age distribution was not significant between the two groups (Table I). Frequency of stools per day at admission was 2.58 ± 0.64 with the range of 2-4 stools/day for the group A and 2.08 ± 15.68 with the range of 1-4 stools/day for the group B. The difference was statistically significant between the two groups (Table II).

Table I Age distribution of the study participants (n=100)
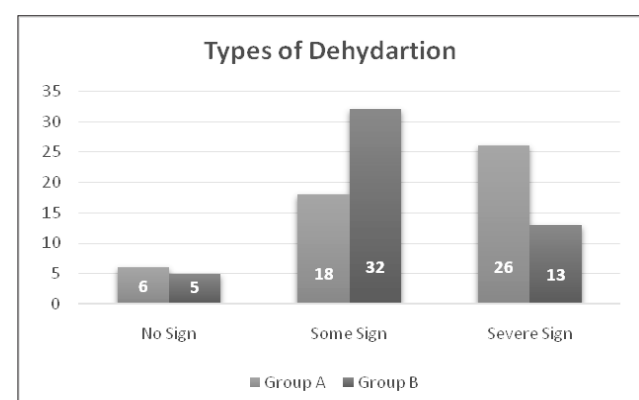
Characteristics	Group A (n=50)	Group B (n=50)	p-value
Age (Months) (Range)	17.72 ± 4.89 (4-50)	10.37 ± 15.68 (4-44)	0.383^{ns}

p-value obtained from χ^2 test. ns= non-significant.

Table II Frequency of stools per day at admission (n=100)

Characteristics	Group A (n=50)	Group B (n=50)	p-value
Frequency of stools/day	2.58 ± 0.64 (2-4)	2.08 ± 15.68 (1-4)	0.0005s

p-value obtained from χ^2 test. s= significant.

Figure 1 Types of dehydration

In this study most of the cases had some sign of dehydration. Group A comprises 18 cases and group B comprises 32 cases followed by severe sign of dehydration (Figure 1).

Table III Duration of hospital stay (n=100)

Characteristics	Group A (n=50)	Group B (n=50)	p-value
Frequency of stools/day	2.7 ± 0.67 (2-4)	3.4 ± 0.57 (2-5)	<0.00001s

p-value obtained from χ^2 test. s= significant.

Figure 1 demonstrated that most of the cases of this study had some sign of dehydration. Group A comprises 18 cases and group B comprises 32 cases followed by severe sign of dehydration (Group A-26 cases vs group B-13 cases). Table III showed that the mean duration of hospital stay of group A was 2.7 days and in group B 3.4 days. The mean duration of hospital stay was significantly less in group A (Probiotics group).

DISCUSSION

Diarrheal disease is a global burden. It is one of the most common childhood illnesses, in both developing and developed countries.[10] This disease accounts for a large proportion (18%) of childhood deaths, making it the second most common cause of child deaths worldwide.[11] Evidence shows that diarrhea diseases disproportionately affect locations with poor access to health care, safe water, and sanitation and low-income or marginalized countries.[12]

According to the guidelines of World Health Organization (WHO) antibacterial, antiamoebic and antidiarrhoeal agents have a little role in the management of diarrhoea. WHO incorporated Oral Rehydration Solution (ORS) and zinc in the diarrhoea management guidelines thereby decreasing deaths in children by a great proportion.[13] Treatment of diarrhoea by administering living or dried bacteria to restore a disturbed intestinal microflora has a long tradition. Therapeutics of probiotics has been studied in different trials in which the beneficial use in pediatric acute diarrhoea is prominent, so European Society for Paediatric Infectious Diseases has incorporated use of probiotics in the guidelines for management of gastroenteritis in children.[14]

This study provides evidence of a significant preventive effect of a probiotic on acute diarrhoea in children aged between 1 and 5 years in a tertiary care hospital in Bangladesh. The mean age of the study cases at the time of admission was 17.72 ± 4.89 months for group A and 10.37 ± 15.68 months for group B. In a study by Bhat, et al. showed that the mean age of the child was 15.40±7.00 months in control group and 14.98±6.98 months in probiotics group.[15] Another study showed the mean age at the time of admission was 17.6±7 months for the probiotics group and 14.6±7.4 months for controls groups.[16]

The frequency of stools per day at admission was 2.58 ± 0.64 with the range of 2-4 stools/day for the group A and 2.08 ± 15.68 with the range of 1-4 stools/day for the group B. The Frequency of stools per day was 6.30±2.77 stools/day in probiotics group and 6.90±2.15 stools/day in control group in another study, another study showed the frequency of stools on first day was 14.46±0.52 stools/day in probiotics group and 12.0 ± 0.44 stools/day in control group.[15-16] Among the 100 participants of this study most of the cases had some sign of dehydration. Group A comprises 18 cases and group B comprises 32 cases followed by severe sign of dehydration was in 26 cases in group A and 13 cases in group B. In a study results showed that no sinf of dehydration was 06 cases in group A and 05 cases in group B. Besides some dehydration was 22 cases in group A and 29 cases in group B.[15]

The mean duration of hospital stay of the study cases was 2.7 days and 3.4 days in group A and B respectively. The mean duration was significantly less in group A (Probiotics group). This was consistent with the results of a study done by Billoo, et al. from Pakistan which showed that duration of diarrhea was lesser by 1.3 days in children who were treated with probiotics.[17] Shornikova and colleagues showed that the average duration was 1.7 days with probiotics, compared with 2.9 days for controls.[18] Some well-controlled clinical studies have also shown that probiotics shorten the duration of hospitalization.[16,19-21] Furthermore, no adverse events were observed in the current study.

In this study we used combined probiotics. One study suggested that the use of single probiotics has limited efficacy, while the use of combined probiotics is more helpful for the recovery of the gut microbial environment.[22]

LIMITATIONS

This study was conducted in a single center with a small sample size.

CONCLUSION

In this study, incorporation of probiotics in the treatment of acute watery diarrhoea in children emerged as effective, safe and was associated with a shorter duration of diarrhoea, leading to a faster discharge from the hospital. Probiotics might be an alternative or a complementary treatment option for acute watery diarrhoea in the paediatric population.

RECOMMENDATIONS

Large sample size involving all age groups of children and multicenter study needs to be conducted to get better results.

DISCLOSURE

All the authors declared no conflict of interest.

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