



EFFECTIVENESS OF PROBIOTICS IN REDUCING THE DURATION OF ACUTE DIARRHEA IN PEDIATRIC PATIENTS

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ABSTRACT

Background: Acute diarrhea is a public health issue in children below five years, particularly in lower and middle socio-economic countries. Though oral rehydration therapy is routinely administered to prevent dehydration and relieve one's thirst, it does not manage the duration of the ailment an individual suffers from. In particular, probiotics supplements have been proposed as an adjunct therapy due to their ability to enhance gut flora and recovery processes. The main objective of this study was to analyze the role of probiotics in ameliorating the duration of acute diarrhea in children managed at a tertiary hospital.

Methods: An observational study was conducted between January 2023 and January 2024 at the Northwest School of Medicine with the Northwest Hospital and affiliated clinics. In this study, 89 children aged from 6 months to 5 years and having acute diarrhea were enrolled. Participants were segregated into two groups i.e., those who received probiotics along with standard treatment and those who underwent standard treatment only. Clinical data was collected at the onset, and results were evaluated through measuring the duration of diarrhea, time to the first formed stool, length of hospital stay, and requirement of intravenous fluid. Data were analyzed using SPSS version 25, with p values under 0.05 regarded as statistically significant.

Results: Children who received probiotics had a significantly shorter duration of diarrhea (mean: 2.4 days) compared to the control group (mean: 3.3 days; $p < 0.001$). They also passed their first formed stool earlier than the control group. Although there was a trend toward shorter hospital stays and reduced need for intravenous fluids in the probiotic group, these differences were not statistically significant. No serious adverse events were reported.

Conclusion: Probiotic therapy reduced the duration and improved recovery in pediatric patients with acute diarrhea. It was safe and well tolerated, thus providing value in addition to the conventional treatment strategies.

Keywords: Acute diarrhea, probiotics, pediatric patients, *Lactobacillus rhamnosus* GG, treatment outcomes, children, diarrhea management

INTRODUCTION

Acute diarrhea continues to be one of the widespread health complications affecting children across the globe, particularly in developing regions with insufficient sanitation, lack of hygiene, and clean water facilities. Its prevalence among children below five years is marked by significant illness primarily contributing to dehydration, malnourishment, and in critical phases requires hospitalization. Mortality rates in developing regions as result of diarrheal problems have seen a declining trend due to introduction of Oral Rehydration Therapy (ORT), however, it does not alleviate symptoms or aid in quicker recovery[1-3].

Over the last few years, probiotics have been identified as quite useful as a complementary intervention alongside standard treatment. Probiotics are live microorganisms that, when given in sufficient quantities, aid in restoring the gut flora balance and improving gut health. Many strains of probiotics have been studied for their capability to decrease the intensity and duration of diarrhea among children, two of the most commonly used being *Lactobacillus rhamnosus* GG and *Saccharomyces boulardii*. The therapeutic effects of these probiotics are thought to come from their ability to stop pathogen proliferation, reinforce the intestinal barrier, and alter immunity[4, 5].

Even with positive findings in numerous clinical trials, the implementation of probiotics into routine pediatric practice continues to differ on a broader level. Disparities in population studies, the probiotics utilized, the prescription amounts, and the time of administration have exacerbated the issue across different area [6-8]. Furthermore, the therapeutic effects of probiotics have not often been studied in the context of local health systems where sociocultural, nutritional, and ecological considerations could affect results[9-11].

Given this context, the present study was conducted to assess the effectiveness of probiotics in reducing the duration of acute diarrhea among pediatric patients in a tertiary care hospital. By evaluating recovery time and clinical improvement with probiotic use, this study aims to contribute meaningful data that can help inform local clinical practices and treatment protocols.

METHODOLOGY

From January 2023 to January 2024, this observational study was conducted at the Northwest School of Medicine and its teaching hospital. Its main goal was to evaluate the impact of probiotic therapy on shortening the period of acute diarrhea in children. 89 children with clinical features of acute diarrhea were registered through a non-probability consecutive sampling technique. The sample population comprised children between 6 months and 5 years with non-formed stools lasting less than 14 days. The ethical approval for conducting the study was granted by the Ethics Committee of Northwest School of Medicine for the IRB dated November 2023, well before the collection of data commenced.

Children with chronic gastrointestinal illness, severe malnutrition, or recent antibiotic use within the previous week were excluded to avoid confounding effects. Once eligibility was confirmed, participants were allocated into two groups based on the attending physician's treatment plan: those receiving probiotics alongside standard oral rehydration therapy and those receiving standard treatment alone. The specific probiotic used in the intervention group was '*Lactobacillus rhamnosus* GG, administered in age-appropriate doses twice daily for five days'.

Baseline data such as age, gender, weight, feeding type, and immunization status were recorded, along with clinical indicators like the number of stools per day, presence of vomiting or fever, and degree of dehydration as per WHO guidelines. The primary outcomes measured were the total duration of diarrhea after initiation of treatment and the time to passage of the first formed stool. Secondary outcomes included length of hospital stay, volume of oral rehydration solution (ORS) consumed, need for intravenous fluids, and any adverse events related to treatment. Measures were taken to ensure the reliability of clinical assessment, and data entry was double-checked to maintain accuracy.

Data were collected using a structured proforma by trained medical staff and entered into SPSS version 25 for analysis. For quantitative variables, mean and standard deviation were calculated, and for categorical variables, frequencies and percentages were reported. Chi-square and Mann-Whitney

U tests were applied to compare outcomes between groups, with a p-value of less than 0.05 considered statistically significant.

RESULT

The demographic comparison between the probiotic and control groups revealed no significant differences, indicating that both groups were comparable at baseline. The average age in the probiotic group was around 31.8 months, which was similar to the control group's average of 33.6 months. Gender distribution was almost equal, with males comprising just over half of each group. Likewise, the average weight of children in both groups showed no meaningful variation. Nutritional status was predominantly normal in both sets of patients, although nearly one-third of each group was undernourished. The proportion of breastfed children and those who had received complete immunization was also similar across both groups, with p-values for all comparisons being statistically non-significant. These findings affirm that any differences in treatment outcomes are unlikely to be influenced by demographic disparities.

Table 1: Demographic Characteristics of Pediatric Patients (n = 89)

Variable	Probiotic Group (n=45)	Control Group (n=44)	p-value
Mean Age (months)	31.8 ± 15.2	33.6 ± 14.7	0.514
Gender (Male)	24 (53.3%)	23 (52.3%)	0.920
Mean Weight (kg)	12.7 ± 2.9	12.9 ± 3.2	0.710
Undernourished	14 (31.1%)	13 (29.5%)	0.861
Breastfed	20 (44.4%)	19 (43.2%)	0.910
Immunized (Complete)	32 (71.1%)	30 (68.2%)	0.752

An evaluation of the baseline clinical features of both groups suggests they were clinically similar prior to treatment. The average duration of diarrhea before starting treatment was just under two days in both groups, and the severity of diarrhea, whether moderate or severe, was almost evenly distributed. Other symptoms commonly associated with diarrhea, such as vomiting and fever, showed no statistical difference in their frequency between the two groups. Additionally, hydration status, classified according to WHO standards, was comparable. These similarities are crucial as they provide a reliable foundation for comparing outcomes after the intervention and help rule out confounding clinical factors.

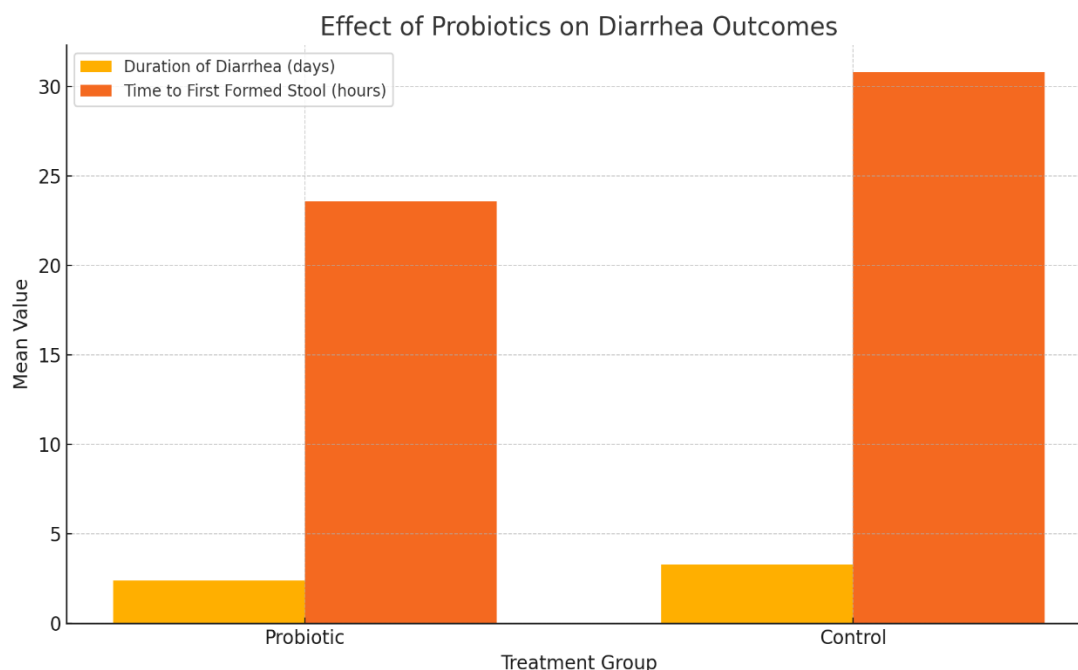
Table 2: Baseline Clinical Characteristics

Variable	Probiotic Group (n=45)	Control Group (n=44)	p-value
Duration before treatment (days)	1.9 ± 0.7	2.0 ± 0.8	0.589
Moderate/Severe Diarrhea	22 (48.9%)	23 (52.3%)	0.745
Vomiting present	21 (46.7%)	22 (50.0%)	0.758
Fever present	18 (40.0%)	19 (43.2%)	0.779
Dehydration (Some/Severe)	19 (42.2%)	20 (45.4%)	0.766

The key outcomes of the study demonstrate a clear benefit of probiotic use in reducing the duration of diarrhea in pediatric patients. Children in the probiotic group experienced significantly shorter illness durations, averaging 2.4 days, compared to 3.3 days in the control group—a difference that was highly significant ($p < 0.001$). Additionally, the time taken to pass the first formed stool was notably faster in the probiotic group. Although a smaller proportion of probiotic patients required prolonged hospital stay or IV fluids, these differences did not reach statistical significance. Importantly, there were no serious adverse events reported in either group, highlighting the safety of the probiotic intervention. Overall, these results strongly support the effectiveness of probiotics in managing acute diarrhea in children.

Table 3: Outcomes in Probiotic vs Control Groups

Outcome Variable	Probiotic Group (n=45)	Control Group (n=44)	p-value
Mean duration of diarrhea (days)	2.4 ± 0.5	3.3 ± 0.6	< 0.001
Time to first formed stool (hours)	23.6 ± 5.4	30.8 ± 6.3	< 0.001
Hospital stay > 2 days	7 (15.6%)	13 (29.5%)	0.104
ORS volume consumed (ml)	745 ± 90	765 ± 110	0.381
IV fluid required	8 (17.8%)	10 (22.7%)	0.581
Adverse events reported	1 (2.2%)	1 (2.3%)	0.980

**Figure 1**

The bar graph illustrates how effective probiotics are in managing acute diarrhea in children. Probiotic administration in children was accompanied by a marked reduction in the average duration of diarrhea to 2.4 days, versus 3.3 days for children who did not receive probiotics. Similarly, the time to first stool was significantly lower in the probiotic group, averaging about 24 hours while the control group took over 30 hours. This comparison enhances the, already bolstered, statistical evidence claiming that probiotics help in decreasing the recovery time and clinical outcomes in children enduring diarrhea.

DISCUSSION

This study aimed to evaluate the effectiveness of probiotics in reducing the duration of acute diarrhea in pediatric patients. The results demonstrated a significant reduction in the average duration of diarrhea and the time to first formed stool among children who received probiotics compared to those who received standard treatment alone. These findings were consistent with a growing body of evidence supporting the role of probiotics as a beneficial adjunct in managing acute pediatric diarrhea [12-14].

A systematic review by Allen et al. (2010) and more recent studies have highlighted that certain probiotic strains, particularly *Lactobacillus rhamnosus* GG and *Saccharomyces boulardii*, are effective in shortening the duration of diarrhea, especially when administered early in the illness [15-17]. Our study supports this, with *Lactobacillus rhamnosus* GG leading to a mean reduction of nearly one full day in diarrhea duration a clinically meaningful improvement for caregivers and healthcare providers.

Additionally, the earlier passage of formed stool in the probiotic group underscores the rapid action of probiotics in restoring intestinal homeostasis. This may be attributed to mechanisms such as competitive inhibition of pathogenic bacteria, mucosal barrier reinforcement, and host immune response modulation, as described in previous studies, including one [18-21]

Although the need for hospitalization and intravenous fluids was lower in the probiotic group, the difference did not reach statistical significance in this sample. However, the trend aligns with findings from studies conducted in both high- and low-resource settings, where probiotics have shown potential to reduce the burden on healthcare services, particularly when diarrhea is viral in origin.

Importantly, no serious adverse events were reported, reaffirming the safety profile of probiotics in children. This aligns with global pediatric gastroenterology guidelines, such as those from the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), which recommend specific probiotic strains for use in acute diarrhea.

Despite these encouraging findings, some limitations should be acknowledged. The non-randomized allocation could introduce selection bias, and the lack of microbiological diagnosis means we could not assess whether probiotics were more effective against certain etiological agents. Future randomised controlled trials with larger sample sizes and pathogen-specific outcomes would provide more robust evidence.

CONCLUSION

This study concludes that probiotic therapy, specifically using *Lactobacillus rhamnosus* GG, effectively reduces the duration of acute diarrhea and hastening recovery in pediatric patients. Its use was safe, well-tolerated, and potentially beneficial in lessening the clinical burden of diarrheal illnesses. Incorporating probiotics into early treatment protocols for acute diarrhea in children could be a valuable step toward improving patient outcomes and reducing hospitalization durations.

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