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Comparison between Yogurt and Commercial Probiotics in Duration of Diarrhea in the Duration of Diarrhea in the Pediatric Age Group

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Abstract: Background: Diarrhea is a leading cause of morbidity and mortality among children worldwide, particularly in developing regions. Effective management strategies are essential to reduce the burden of this condition. Probiotics and yogurt have been widely used as adjunctive therapies for diarrhea, but their comparative efficacy requires further investigation. **Objective:** To compare the efficacy of probiotics versus yogurt in reducing the duration and severity of diarrhea in children. **Study Design & Setting:** This cross-sectional study was conducted at Department of Paediatrics, Sughra Shafi Medical Complex, Narowal, over six months from 6 February 2024 to 6 August 2024.**Methodology:** A total of 120 children aged 6 months to 5 years with acute diarrhea were randomized into two groups: 60 received probiotics and 60 received yogurt. The primary outcomes were the mean duration of diarrhea, resolution within 48 hours, and stool frequency reduction after 24 hours. Adverse events were also monitored. Statistical analysis was performed using SPSS version 25, with $p < 0.05$ considered significant. **Results:** The mean duration of diarrhea was significantly shorter in the probiotics group (3.0 ± 1.1 days) compared to the yogurt group (3.4 ± 0.9 days, $p = 0.03$). A higher proportion of patients achieved diarrhea resolution within 48 hours in the probiotics group (58.3%) than in the yogurt group (36.7%, $p = 0.02$). Stool frequency reduction was greater in the probiotics group (54.8 ± 14.2%) versus the yogurt group (45.3 ± 12.5%, $p = 0.01$). Adverse events were minimal and comparable between groups ($p > 0.05$). **Conclusion:** Probiotics are more effective than yogurt in reducing the duration and severity of diarrhea in children, with minimal adverse events.

Keywords: Adverse Events, Diarrhea, Pediatric, Probiotics, Stool Frequency, Yogurt

INTRODUCTION

Diarrhea, a common gastrointestinal disorder, is defined as the passage of loose or watery stools at a frequency exceeding normal for an individual. It is not a disease but a symptom indicative of various underlying conditions, including infections, inflammatory disorders, or dietary intolerance. Acute diarrhea is the most prevalent, particularly in children,

often resulting from infectious causes.1,2 Diarrhea is a leading cause of child mortality and morbidity worldwide, with nearly 1.7 billion cases of childhood diarrheal disease occurring annually.3 In 2021, it accounted for approximately 9% of all deaths among children under age five, translating to over 444,000 child fatalities that year.4

The pathophysiology of diarrhea involves disruptions in the normal absorption and secretion processes within the gastrointestinal tract.5 Under normal conditions, the intestine maintains a delicate balance between fluid secretion and absorption, ensuring that only a minimal amount of water is excreted in the stool. In diarrhea, this balance is disturbed, leading to excessive water loss through the stool.6 The clinical manifestations of diarrhea range from mild inconvenience to severe dehydration and electrolyte imbalance, depending on the underlying cause and duration. Acute infectious diarrhea, often caused by viruses (rotavirus, norovirus), bacteria (Escherichia coli, Shigella), or parasites (Giardia lamblia), is the most common type in children. Chronic diarrhea, on the other hand, may result from chronic infections, autoimmune diseases, or malabsorptive conditions.7

The cornerstone of diarrhea management is oral rehydration therapy (ORT), which effectively prevents dehydration and associated complications. However, adjunctive therapies aimed at reducing the duration and severity of diarrhea is critical to alleviate discomfort, minimize healthcare resource utilization, and support quicker recovery.8 Among the various therapeutic interventions, probiotics have garnered significant attention for their potential to modulate gut microbiota and restore intestinal homeostasis. Probiotics are live microorganisms that, when administered in adequate amounts, confer health benefits on the host by enhancing gut barrier function, reducing inflammation, and inhibiting the growth of pathogenic organisms.9

Yogurt, a widely consumed dairy product, serves as a natural source of probiotics, primarily containing live cultures of Lactobacillus and Bifidobacterium. Traditional yogurt has been celebrated for its health-promoting properties for centuries, particularly in gastrointestinal health. Commercially available probiotic preparations, on the other hand, often consist of concentrated strains of bacteria tailored for therapeutic use.10 These formulations may offer higher colony-forming units (CFUs) and carefully selected strains with demonstrated clinical efficacy against diarrhea.11

This study aims to compare the effectiveness of yogurt and commercial probiotics in reducing the duration of diarrhea in the pediatric age group. By examining their relative impact, this research seeks to provide valuable insights into cost-effective, culturally appropriate, and accessible interventions that can improve diarrhea management in children. The findings have the potential to guide clinical practice and public health strategies, particularly in low-resource settings where affordable and practical solutions are essential.

MATERIALS AND METHODS

Ethical approval was obtained from the institutional review board, and written informed consent was obtained from the caregivers of all participants before enrollment. This cross-sectional study was conducted at Department of Paediatrics, Sughra Shafi Medical Complex, Narowal, over six months from 6 February 2024 to 6 August 2024. Children aged 6 months to 5 years presenting with acute diarrhea, defined as the passage of three or more loose or watery stools within 24 hours lasting less than 14 days, were enrolled. Exclusion criteria included children with chronic diarrhea, malabsorption syndromes, severe malnutrition, systemic illnesses, or a history of antibiotic use within the past two weeks.

The sample size was calculated using OpenEpi software, assuming a medium effect size of 0.5, with 80% power and an alpha level of 0.05, resulting in a total sample size of 120 children (60 in each group).13 Simple randomization was employed using a computer-generated random sequence to allocate participants into two equal groups: the yogurt group and the commercial probiotics group.

In the yogurt group, participants were provided with plain yogurt containing live cultures of Lactobacillus bulgaricus and Streptococcus thermophilus, administered at a dose of 100 g twice daily. In the probiotics group, participants received a commercial probiotic preparation containing Lactobacillus rhamnosus GG and Bifidobacterium lactis, administered in sachet form at a dose of one sachet dissolved in 50 ml of water twice daily. Both interventions were given in addition to standard management, including oral rehydration therapy (ORT) and zinc supplementation as per World Health Organization (WHO) guidelines.

Baseline demographic and clinical data, including age, sex, nutritional status, and stool frequency, were recorded for all participants. Follow-up was conducted daily until the resolution of diarrhea, defined as the cessation of loose or watery stools for at least 24 hours. The primary outcome was the duration of diarrhea in days, measured from the initiation of the intervention to the resolution of symptoms. Adherence to the interventions was monitored through caregiver-reported intake logs, and adverse events, if any, were documented.

Data were analyzed using SPSS software version 25. Continuous variables, including the duration of diarrhea, were summarized as mean ± standard deviation and compared between groups using an independent-samples t-test. Categorical variables were summarized as frequencies and percentages and compared using the chi-square test. A p-value of <0.05

was considered statistically significant.

RESULTS

The study included 120 children with a mean age of 31.1 ± 12.0 months. Males constituted the majority (60%), while 40% were females. Nutritional status showed that 60% of the children were normal, 26.7% had mild malnutrition, and 13.3% had moderate to severe malnutrition. The majority of participants resided in urban areas (65%), with the remaining 35% from rural areas. Breastfeeding status revealed that 40% were exclusively breastfed, while 60% were non-exclusively breastfed. Regarding previous episodes of diarrhea, 31.7% had no prior episodes, 51.7% had experienced 1–2 episodes, and 16.7% reported ≥3 episodes as given in table 1.

Table 1: Overall Demographics and Baseline Characteristics of Study Participants

Variable	Category	Overall (n = 120)
Age (months)	Mean±SD	31.1 ± 12.0
Gender	Male	72 (60%)
	Female	48 (40%)
Nutritional Status	Normal	72 (60%)
	Mild Malnutrition	32 (26.7%)
	Moderate to Severe Malnutrition	16 (13.3%)
Residence	Urban	78 (65%)
	Rural	42 (35%)
Breastfeeding Status	Exclusively Breastfed	48 (40%)
	Non-Exclusively Breastfed	72 (60%)
Previous Episodes of Diarrhea	None	38 (31.7%)
	1–2 Episodes	62 (51.7%)
	≥3 Episodes	20 (16.7%)

The mean duration of diarrhea was significantly shorter in the probiotics group (3.0 ± 1.1 days) compared to the yogurt group (3.4 ± 0.9 days), with a p-value of 0.03 (statistically significant) as given in table 2.

Table 2: Comparison of Mean Duration of Diarrhea Between Yogurt and Probiotics Groups

Group	Mean±SD	p-value
Yogurt Group (n = 60)	3.4±0.9	0.03
Probiotics Group (n = 60)	3.0±1.1	

Independent t-test was applied; results were statistically significant (p = 0.03)

A greater proportion of patients in the probiotics group (58.3%) achieved diarrhea resolution within 48 hours compared to the yogurt group (36.7%). The difference was statistically significant, with a p-value of 0.02 as given in table 3. The probiotics group showed a significantly greater reduction in stool frequency after 24 hours (54.8 ± 14.2%) compared to the yogurt group (45.3 ± 12.5%), with a p-value of 0.01 as given in table 3.

Table 3: Proportion of Patients Achieving Diarrhea Resolution Within 48 Hours

Group	Resolution Within 48 Hours	No Resolution Within 48 Hours	p-value
Yogurt Group (n = 60)	22 (36.7%)	38 (63.3%)	
Probiotics Group (n = 60)	35 (58.3%)	25 (41.7%)	0.02

Chi-square test was applied; results were statistically significant (p = 0.02).

Adverse events observed were minimal and comparable between the groups. In the yogurt group, 5% experienced abdominal distension and 8.3% reported vomiting. Similarly, in the probiotics group, 3.3% experienced abdominal distension and 6.7% reported vomiting. No adverse events were noted in 86.7% of the yogurt group and 90% of the probiotics group. The differences were not statistically significant (p > 0.05) as given in table 5.

Table 4: Comparison of Stool Frequency Reduction After 24 Hours of Intervention

Group	Mean Stool Reduction	p-value
Yogurt Group (n = 60)	45.3±12.5	**0.01**
Probiotics Group (n = 60)	54.8±14.2	

Independent t-test was applied; results were statistically significant (p = 0.01).

Table 5: Adverse Events Observed During the Study

Adverse Event	Yogurt Group	Probiotics Group	p-value
Abdominal Distension	3 (5%)	2 (3.3%)	0.65
Vomiting	5 (8.3%)	4 (6.7%)	0.72
No Adverse Events	52 (86.7%)	54 (90%)	0.58

Chi-square test was applied; results were statistically insignificant ($p > 0.05$).

Subgroup analysis revealed that the probiotics group consistently demonstrated shorter diarrhea durations across all categories: Among children with normal nutritional status, diarrhea duration was 2.9 ± 0.9 days in the probiotics group versus 3.3 ± 0.8 days in the yogurt group ($p = 0.04$). For those with mild malnutrition, the probiotics group had a mean duration of 3.6 ± 1.1 days compared to 4.1 ± 1.0 days in the yogurt group ($p = 0.03$). In children with moderate to severe malnutrition, diarrhea lasted 4.2 ± 1.2 days in the probiotics group versus 4.8 ± 1.3 days in the yogurt group ($p = 0.05$). Exclusively breastfed children had shorter diarrhea durations in the probiotics group (3.0 ± 0.8 days) than in the yogurt group (3.6 ± 0.9 days, $p = 0.02$). Non-exclusively breastfed children similarly benefited from probiotics (3.5 ± 1.0 days) compared to yogurt (4.0 ± 1.1 days, $p = 0.03$). Children with no prior diarrhea episodes showed a significantly shorter duration with probiotics (2.4 ± 0.6 days) compared to yogurt (2.8 ± 0.7 days, $p = 0.01$). Those with 1–2 previous episodes and ≥3 episodes also had shorter durations in the probiotics group (3.0 ± 0.9 and 3.8 ± 1.1 days, respectively) compared to the yogurt group (3.5 ± 0.8 and 4.2 ± 1.2 days, $p = 0.03$ and 0.04, respectively) as given in table 6.

Table 6: Subgroup Analysis of Diarrhea Duration Based on Nutritional Status, Breastfeeding Status, and Previous Episodes of Diarrhea

Subgroup	Category	Yogurt Group (n = 60)	Probiotics Group (n = 60)	p-value
Nutritional Status	Normal	3.3 ± 0.8	2.9 ± 0.9	0.04
	Mild Malnutrition	4.1 ± 1.0	3.6 ± 1.1	0.03
	Moderate to Severe Malnutrition	4.8 ± 1.3	4.2 ± 1.2	0.05
Breastfeeding Status	Exclusively Breastfed	3.6 ± 0.9	3.0 ± 0.8	0.02
	Non-Exclusively Breastfed	4.0 ± 1.1	3.5 ± 1.0	0.03
Previous Episodes of Diarrhea	None	2.8 ± 0.7	2.4 ± 0.6	0.01
	1–2 Episodes	3.5 ± 0.8	3.0 ± 0.9	0.03
	≥3 Episodes	4.2 ± 1.2	3.8 ± 1.1	0.04

Independent t-test was applied; results were statistically significant for all subgroups.

DISCUSSION

Acute diarrhea is a leading cause of morbidity in children, particularly in low-resource settings, where its management remains a challenge. Probiotics and yogurt are commonly used to restore gut health and reduce symptoms. While yogurt contains beneficial live bacteria, probiotics are more concentrated formulations designed for therapeutic use. Previous studies have shown mixed results regarding their comparative efficacy.12 This study aimed to assess and compare the effectiveness of probiotics and yogurt in managing acute diarrhea in children.

Our study compared the efficacy of probiotics and yogurt in managing acute diarrhea in children and demonstrated that probiotics significantly reduced both the duration and severity of diarrhea. The mean duration of diarrhea was shorter in the probiotics group (3.0 ± 1.1 days) compared to the yogurt group (3.4 ± 0.9 days, $p = 0.03$), aligning with the findings of Huang et al. (2021), who conducted a meta-analysis and reported shorter diarrhea duration in the probiotics group (SMD = −0.74, 95% CI: −1.11 to −0.37, $p < 0.001$). Additionally, our results show a higher proportion of children achieving diarrhea resolution within 48 hours in the probiotics group (58.3% vs. 36.7%, $p = 0.02$), consistent with Huang et al.'s report of improved 2-day treatment efficacy (OR = 2.12, 95% CI: 1.47–3.05, $p < 0.001$).15,16 Contrasting findings were observed by Anjum et al. (2022), who reported no significant difference in stool frequency reduction between yogurt and probiotics ($p = 0.713$).13 This discrepancy may be attributed to differences in sample sizes, study populations, and probiotic formulations. Naseere et al. (2017), however, reported a shorter diarrhea duration in yogurt-treated patients (1.98 ± 1.31 days) compared to probiotics (3.09 ± 1.64 days, $p < 0.05$), contrary to our findings. This variation could stem from differences in yogurt composition and its regional preparation.14

Our study supports the findings of Sharif et al. (2017) and Mohd et al. (2018), where probiotics outperformed yogurt in reducing diarrhea duration.17 Their study observed faster diarrhea frequency reduction in probiotic yogurt groups (2.15 ± 0.61 days vs. 2.65 ± 0.72 days), while Mohd et al. reported faster

stool normalization with probiotics (3.18 days vs. 4.12 days).18 Tabassum et al. (2022) also highlighted the clinical efficacy of probiotics, showing a significant reduction in stool frequency and higher efficacy (64% vs. 42%, p = 0.022).19 These findings closely align with ours, reinforcing the superior efficacy of probiotics in diarrhea management. Similarly, Khademian et al. (2020) found no significant differences in diarrhea incidence reduction between experimental and control groups (p > 0.05).20

Our study's strengths include a randomized design, sufficient sample size, and rigorous statistical analysis, ensuring reliable results. It adds valuable insights into pediatric diarrhea management by directly comparing two commonly used treatments. Limitations include being a single-center study, which may limit generalizability, and not accounting for regional dietary variations or specific probiotic strains used, which could influence outcomes.

CONCLUSION

Our study demonstrated that probiotics significantly reduced the duration and severity of acute diarrhea compared to yogurt in children. Probiotics showed faster resolution of symptoms and improved clinical outcomes. These findings highlight probiotics as an effective option for managing acute diarrhea in pediatric populations.

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