

## ORIGINAL ARTICLE

## COMPARISON OF EFFICACY OF YOGURT VERSUS PROBIOTICS FOR THE MANAGEMENT OF ACUTE DIARRHOEA

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**Background:** The advantages of probiotic administration for acute diarrhoea are mainly shorter duration of symptoms as well as reduced number of stools per day while use of traditional yogurt has similar results. So, this study was conducted to compare the efficacy of yogurt with probiotic in children with acute gastroenteritis. **Methods:** This randomized controlled trial was conducted at department of Paediatrics, Children Hospital, Pakistan Institute of Medical Sciences, Islamabad over 1 year. A total of nine hundred and thirty (930) children between 1–5 years of age presenting with acute diarrhoea were enrolled and equally randomized to Group-A (yogurt) and Group-B (lactobacillus rhamnosus) with ORS. The primary outcome was mean frequency of diarrhoea in first 24 hours after initiation of treatment in both the groups. **Results:** Gender distribution revealed that out of 930 patients, 643 (69.1%) were male and 287 (30.9%) were female while the mean age was 3.14±1.18 years. Mean duration of disease was 4.23±2.02 days. Mean no. of stools in first 24 hours after treatment in Group-A (yogurt) was 3.25±1.64 and 3.29±1.74 in Group-B (probiotics). Student *t*-test for independent samples was applied and no significant difference was found between the two groups ( $p=0.713$ ). **Conclusions:** Mean frequency of diarrhoea in first 24 hours after treatment with traditional yogurt and commercially available probiotics was not statistically significant in this study.

**Keywords:** Acute diarrhoea; Probiotics; Yogurt

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## INTRODUCTION

According to the WHO, every year estimated 829,000 deaths occur due to diarrhoea in low to middle income countries.<sup>1</sup> Management of acute diarrhoea in children primarily requires replacement of fluids, sugars and body minerals by employing oral rehydration solution which does not affect either severity or duration of diarrhoea.<sup>2</sup>

There have been continuous efforts aimed at the certain agents who could provide clinicians with safe and efficacious mode of reducing disease severity and its duration. Recently it has been established that probiotics can help promote faster recovery in patients with acute diarrhoea.<sup>3</sup>

Yogurt as defined by FDA is a product that is produced by fermentation of dairy products with lactic acid producing bacteria (LAB).<sup>4</sup> LAB act as probiotic and reduces the gastrointestinal invasion of pathogenic organisms enhancing the gastrointestinal innate and adaptive immune response.<sup>5</sup>

Probiotics are non-pathogenic microorganism capable of competing with enteric pathogens for nutrients and bacterial adhesion sites. They also synthesize various enzymes/chemical which inhibit the growth of harmful pathogens thus help the host to fight against these invading bacterial or viral pathogens.<sup>6,7</sup> These probiotics include

*Lactobacillus rhamnosus*, *Lactobacillus casei*, *Lactobacillus johnsonii* and the yeast *Saccharomyces boulardii* which are well known for their efficiency.<sup>8,9</sup>

Acute diarrhoea is highly prevalent in our settings and children are vulnerable to severe dehydration which may become fatal at times. The advantages of probiotic administration for acute diarrhoea are mainly shorter duration of symptoms as well as a reduced number of stools per day resulting in early recovery. Some authors reported use of traditional yogurt with similar advantage.<sup>10,11</sup> However, data on advantages of traditional yogurt is scarce and its role in routine clinical practice in comparison with probiotics is not yet established. If we could establish its role in reducing the frequency of diarrhoea, it will be beneficial for the patients as yogurt is easily available, cost effective and easy to take orally.

## MATERIAL AND METHODS

This randomized controlled trial was conducted at department of Paediatrics, Children Hospital, Pakistan Institute of Medical Sciences, Islamabad over one year. All the children 1–5 years of age who presented with acute diarrhoea, of either sex was enrolled in this study. Acute diarrhoea was defined as

presence of 3 or more watery stools in 24-hour period for  $\leq 14$  days. The duration of this study was one year from 15-11-2017 – to 15-11-2018. A total of 930 children having acute diarrhoea were recruited using non – probability purposive sampling technique. Sample size was calculated by using WHO sample size calculator keeping level of significance 5%, power of test 80% with pooled SD of 2.45 and population mean of 8.36<sup>12</sup> while the test value of population mean was 8.04. The sample size calculated came out to be 465 in each group making total samples size of 930.

Children with severe malnutrition, dysentery, clinical evidence of co-existing acute systemic illnesses, clinical signs and symptoms of chronic gastrointestinal disease, chronic liver disease, chronic renal disease, nephrotic syndrome, previous history of probiotics use in the last three weeks, previous history of antibiotics use for current episode of diarrhoea and severe dehydration on clinical examination were excluded from our study. Patients were enrolled from the outdoor patient and emergency department of Children Hospital, PIMS, Islamabad. A written informed consent was taken from the parent/guardian of the patient. All the patients fulfilling the inclusion criteria were selected for the study and randomly allocated to two treatment groups by lottery method. Group-A was given ORS and yogurt 15g/kg body weight per day for 3 days. Group-B was treated with commercially available Probiotic lactobacillus rhamnosus in a single daily dose of  $5 \times 10^9$  CFU used for 3 days along with ORS. No antibiotics were prescribed to the patients in both the groups. The primary outcome was mean frequency of diarrhoea in first 24 hours, after onset of treatment in both the groups. Patients coming to outdoor department were asked to come after 24 hours for assessment and those who could not come were contacted through telephone to ask about the outcome of treatment advised. All the gathered data was entered on the predesigned proforma by the researcher himself to comply the study protocol. Data was entered on computer software SPSS 20. Frequencies and percentages were calculated for qualitative variable like gender. Quantitative variables like age, duration of diarrhoea in days, mean frequency of diarrhoea per 24 hours at presentation and mean frequency of diarrhoea in first 24 hours after initiation of treatment in both groups were presented as mean $\pm$ SD. Mean frequency of diarrhoea in first 24 hours after onset of treatment was compared in both groups by applying unpaired students *t*-test. *P*-value of  $\leq 0.05$  was considered as significant. Effect modifiers like age, gender and duration of diarrhoea were controlled by stratification. Post stratification independent sample

*t*-test was applied and *p*-value  $\leq 0.05$  was considered as significant.

## RESULTS

A total of nine hundred and thirty (n=930) children of both genders between age 1–5 years who presented with acute diarrhoea were enrolled and equally randomized to both treatment groups. The primary outcome was mean frequency of diarrhoea in first 24 hours after onset of treatment in both the groups. Gender distribution revealed that out of 930 patients, 643 (69.1%) were male and 287 (30.9%) were female with male to female ratio of 2.2:1. The mean age was  $3.14 \pm 1.18$  years (range 1–5 years).

Mean duration of disease was  $4.23 \pm 2.02$  days. Mean no. of stools before treatment in group-A was  $6.04 \pm 2.03$  while that group-B was  $6.11 \pm 2.10$ . Mean number of stools in first 24 hours after treatment in group-A (Yogurt) was  $3.25 \pm 1.64$  and in group-B (*Lactobacillus rhamnosus*) was  $3.29 \pm 1.74$  as shown in Table-1.

Student *t* test for independent samples was applied and difference came out to be non-significant between two groups (*p*=0.713). So, both yogurt and probiotic were found to be equally efficacious in treatment of acute diarrhoea.

**Table-1: Frequency of diarrhoea in both groups (post treatment)**

Group	Post Treatment Frequency (Mean no/24 hrs)	Std. Deviation	<i>p</i> -value <i>t</i> -test
Yogurt	3.25	1.64	0.713
Probiotics	3.29	1.74	

## DISCUSSION

Several studies have been done to ascertain the role of probiotics and intake of yogurt in patients with acute diarrhoea separately where it has been shown that both were effective in prevention and treatment of acute childhood diarrhoea. However, no such research report was available from Pakistan to document and compare effectiveness of probiotics and yogurt in this population subset of South Asia. As yogurt is easily available in our settings, it is also cost effective and easy to take, we compared probiotic and traditional yogurt in the present study in terms of mean frequency of diarrhoea in first 24 hours in children with acute diarrhoea.

In our study mean frequency of diarrhoea in first 24 hours after treatment in Group-A was  $3.25 \pm 1.64$  and in Group-B was  $3.29 \pm 1.74$  (*p*=0.713). No significant difference observed between both groups after stratification with respect to gender, age and duration of diarrhoea (*p*>0.05 in all cases). Our results are similar to a study conducted by

Choudhary, *et al*<sup>12</sup> which reported that traditional yogurt was equally beneficial in the treatment of acute childhood diarrhoea when compared with commercially available probiotic (*Lactobacillus sporogenes*). They found that efficacy of yogurt was equally good to that of probiotics in terms of number of stools per day at 24 hours, 48 hours and 72 hours as well as amount of stool (in grams) passed per 24 hours. There was no significant difference in mean frequency of diarrhoea per 24 hours between traditional yogurt and probiotic {8.36±2.48 versus 8.04±2.43/24 hours respectively;  $p>0.05$ } group. They also did not find any significant difference of hydration status in both groups after one day of treatment, however hydration status was not checked in our study. Although time of appearance of first semi solid stool was found to be early in children treated with probiotics but this was not statistically significant. They concluded that yogurt can safely be given instead of probiotics with almost similar results.

In another study conducted by Eren M, *et al*<sup>13</sup> it was also observed that yogurt fluid efficacy was comparable to that of probiotic (*Saccharomyces boulardii*) as duration of diarrhoea was shorter in children treated with probiotics while mean duration of hospitalization was lower in yogurt treated patients with acute diarrhoea. Moreover, treatment cost was also lower in those children treated with yogurt at home, emphasizing cost – effectiveness of the treatment in poor population subsets like our country.

People have also studied combination of probiotics with yogurt. A study conducted at Australia<sup>14</sup> compared combination of probiotic with yogurt and yogurt alone and find significant difference with more efficacy of combination therapy than yogurt alone. While another study conducted by Sharif *et al*<sup>15</sup> found no difference in children with diarrhoea receiving yogurt alone and yogurt with probiotic.

There are very few studies conducted to compare the efficacy of probiotic and yogurt although the researchers have studied their efficacy individually. Schnadower *et al*<sup>16</sup> compared the efficacy of lactobacillus rhamnosus with placebo and found no difference in both groups after 5 days of treatment while a recent meta-analysis concluded that lactobacillus rhamnosus when given early in the diseases in high doses can reduce the duration and number of stools.<sup>17</sup>

There is conflicting evidence about the effectiveness of probiotics from different parts of world, some show probiotics are very effective in the treatment of acute diarrhoea in children<sup>18</sup> while according to other studies it has no effect on duration of diarrhoea<sup>19</sup>.

Present study results showed that traditional yogurt was equally efficacious to the commercially available probiotic in terms of stool frequencies at 24 hours. The traditional yogurt is cost effective and easily available and its reported health benefits are enormous.<sup>20</sup> Additionally use of yogurt is also culturally acceptable in our society as it is part of daily routine in majority of homes particularly in rural population where burden of acute diarrhoea in children is more common, so it may serve as effective alternative of probiotics in our settings.

## CONCLUSION

Mean frequency of diarrhoea after treatment with traditional yogurt and commercially available probiotics was not statistically significant in our study so children with acute diarrhoea can be given yogurt instead of probiotics as it is easily available, cost effective and easy to consume.

## AUTHORS' CONTRIBUTION

BAA: Helped in collection of data. Conception of the study and participated in its design. He also helped to draft the manuscript. NH: Helped in writing the discussion. Critically reviewed the manuscript, and approved the final manuscript as submitted. MBI: Participated in the design of the study and performed the statistical analysis along with drafting of manuscript. SZ: Design the questionnaire and helped in data collection. MH: Helped in data interpretation and final drafting of the manuscript. IN: helped in the literature search for the discussion and data collection.

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