

Effects of Probiotics in Shortening the Duration of Acute Diarrhea; a randomized control study

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ABSTRACT

Aims: To compare the effectiveness of probiotics and ORS combination with conventional ORS therapy alone in shortening the duration of acute diarrhea in children.

Methods:

This is prospective comparative study done at Avicenna hospital Lahore in six months duration from March to September 2015.

Results: Two hundred and thirty patients were enrolled in this study. They were divided into two groups. One hundred and thirteen were included in probiotics group and 117 were in control group. Earliest improvement in condition was seen in probiotics group 83(73%) patients shows improvement in 72 hours compared to 46 (39%) patients.

Similarly stay in hospital was short in probiotics group within 72 hours (87 patients; 76%) as compared to control (17patients; 14.52% patients).

Conclusion: Treatment with probiotics in addition to conventional ORS therapy resulted in shortening the duration of diarrhea and also shortened the hospital stay.

Keywords: Probiotics, diarrhea, ORS Therapy.

INTRODUCTION

Diarrhea is a Greek word which means flowing through. Diarrhea 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 diarrhea as, "3 or more watery Stools on 2 or more consecutive days"¹.

Diarrhea is one of major health problem responsible for morbidity and mortality in children in developing countries. In healthy children diarrhea with rapid onset is mostly due to viral than to bacterial agents. Although mostly this illness is free of severe complications but still it is the major contributor of childhood mortality in developing countries. This justifies the need for treatment. The principal treatment in infants and young children is the use of oral rehydration solutions but this does not shorten the duration of the illness. In paediatric population,

Antibiotics are unnecessary except few cases where specific bacterial pathogens are identified, but their empirical use is not recommended in non-specific diarrhea, contrarily unnecessary use of antibiotics may prolong the carrier state and contribute to emerging drug resistance². So Probiotics role in diarrheal diseases have been extensively studied in the prevention and treatment of diarrheal diseases in pediatric populations over the past several years³.

A century ago, a Russian scientist, Elie Metchnikoff postulated that lactic acid bacteria (LAB) offered health benefits capable of promoting longevity. In 1965, Lilly and Stillwell first introduced the term "Probiotics"; in contrast to antibiotics, Probiotics were defined as microbially derived factors that stimulate the growth of other organisms. The requirement of viability for Probiotics and the idea that they

have a beneficial effect on the host was emphasized by Roy Fuller in 1989^{4,5}.

A consensus definition of the term "Probiotics", based on the available information and scientific evidence, was adopted after a joint Food and Agricultural Organization of the United Nations and World Health Organization expert consultation. In October 2001, this expert consultation defined Probiotics as: "live micro-organisms which, when administered in adequate amounts, confer a health benefit on the host"⁶.

Probiotics are live microbes that can be formulated into many different types of products, including foods, drugs, and dietary supplements^{2,7}. Species of *Lactobacillus* and *Bifidobacterium* are most commonly used as probiotics, but the yeast *Saccharomyces cerevisiae* and some *E. coli* and *Bacillus* species are also used as probiotics. Lactic acid bacteria, including *Lactobacillus* species, which have been used for preservation of food by fermentation for thousands of years, can serve a dual function by acting as agents for food fermentation and, in addition, potentially imparting health benefits. Strictly speaking, however, the term "probiotics" should be reserved for live microbes that have been shown in controlled human studies to impart a health benefit⁷.

Some of the best evidence of Probiotics efficacy has been in the treatment of diarrheal illnesses. The mechanisms by which Probiotics prevent or ameliorate diarrhea are stimulation of the immune system, competition for binding sites on intestinal epithelial cells and elaboration of bacteriocins.

The objective of the study was to compare the effectiveness of probiotics and ORS combination with conventional ORS therapy alone in shortening the duration of acute diarrhea in children.

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MATERIALS AND METHOD

Setting and Populations: Study was conducted in Avicenna medical college and hospital; it is 550 beds a tertiary care teaching hospital with established maternity and neonatal care units.

Study design, sample selection and data collection: This a prospective comparative study targeting all the children admitted to paediatric ward in age group of two months to 2 years with the provisional diagnosis of diarrhea. This study was completed in six months duration from first of March to 30th of September 2015.

Children presented with loose motions of less than 14 days duration, passing more than 3 stool whose character was loose than normal were labeled as suffering from acute diarrhea. Children who have diarrhea for more than 14 days, blood in stools and who developed serious illness that required antibiotics were excluded from study.

Patients were divided into two groups' probiotics and control group. The patients in probiotics group were given probiotics, ORS/IV fluids and zinc supplements whereas control group was given ORS/IV fluids. Two criteria were established to see the response of therapy. One was improvement in condition and the other was duration of stay in hospital. Improvement in condition was considered as returned to normal frequency of stools i.e., no of stools 3 or less and consistency of grade 1 or 2. Patients were discharged after improvement. The duration in improvement was considered from the start of treatment till diarrhea was resolved

Table 1: Gender

Age in months	Probiotics Group (n=113)	% age	Control with ORS (n=117)	% age
Male	65	57.52	77	65.81
Female	48	42.48	40	34.19

Table 2: Age at admission

Age in months	Probiotics Group (n=113)	% age	Control with ORS (n=117)	% age
2 - 12	41	36.28	32	27.35
13 - 24	27	23.89	44	38.26
25 - 36	26	23.01	22	19.13
37 - 48	13	11.50	15	13.04
47 - 60	6	5.31	4	3.48

Table 3: Improvement in condition

	Probiotics Group (n=113)	% age	Control with ORS (n=117)	% age
Less than 24 hours	3	2.65	0	0.00
25 to 48 hours	19	16.81	10	8.55
49 to 72 hours	67	59.29	36	30.77
73 to 96 hours	16	14.16	58	49.57
More than 96 hours	8	7.08	13	11.11

Table 4: Stay in hospital

	Probiotics Group (n=113)	% age	Control with ORS (n=117)	% age
Less than 24 hours	3	2.65	0	0.00
25 to 48 hours	17	15.04	2	1.71
49 to 72 hours	67	59.29	15	12.82
73 to 96 hours	24	21.24	73	62.39
More than 96 hours	2	1.77	27	23.08

Table 5: Clinical Improvement at 72 hours of Treatment

Symptoms	Probiotics Group (n=115)	%age	Control (n=115)	% age
Frequency of stool (less than 3)	78	68	34	30
Grade of stool (grade 2)	78	68	34	30
Well hydrated	115	100	105	91
Afebrile	115	100	102	89
Vomiting	115	100	115	100
Oral Intake	101	88	95	83

RESULTS

Two hundred and thirty patients were enrolled in this study. Out of these 230 male patients were 142(61.7%) and females was 88 (38.2%) (Table 1).

Patients were divided in five age groups. In probiotics group 2-12 months were 41 (36.28 %) and control were 32 (27.35%) patients. Whereas 13-24months of age probiotics

27(23.87%) , control 44(38.26%), 25-36 months in probiotics 26(23.50%), 22(19.14%)in control group patients. Patients in age group of 37-48 months 13(11.51%) in probiotics against 15 (13.04%) and 6(5.3%) patients of 47-60 months and in control 4(3.48) as shown in table 2.

Out of these 230 patients 113 were included in probiotics group and 117 were in control group. Earliest

improvement in condition was seen in probiotics group 83(73%) patients shows improvement in 72 hours compared to 46 (39%) patients. In probiotics group 3 (2.65%) patients improved in 24 hours whereas no patient on control. In probiotics group 19 (16.81%), 67(59.29%), 16 (14.16%) and 8 (7.08%) patients in 48, 72 , 96 and more than 96 hours respectively in contrast to control 10 (8.55 %), 36(30.77%), 58(49.57 %) and 13 (11.11%) patients in 48, 72 , 96 and more than 96 hours respectively (table 3).

Similarly stay in hospital was short in probiotics group within 72 hours (87 patients;76%) as compared to control (17;14.52% patients). In probiotics group 3(2.65%) patients improved in 24 hours whereas no patient on control. In probiotics group 17 (15.04%), 67(59.29%), 24 (21.26%) and 2(1.77%) patients in 48, 72, 96 and more than 96 hours respectively in contrast to control 2 (1.71%), 15(12.82%), 73(62.39%) and 27(23.08%) patients in 48, 72 , 96 and more than 96 hours respectively shown in table 4.

In the improvement parameter it was seen that 68% of patients has less than three stools with a consistency of grade 2 in first 72 hours of stay in hospital compared to 30 present in control group. Although improvement in oral intake was only slightly different in both group but state of hydration and relieve of fever and vomiting as noticed mostly in probiotics than control.

DISCUSSION

In our case control study it as seen that significant improvement as seen in the patients treated with probiotics compared to conventional treatment of ORS/fluids and Zinc supplements. Improvement was seen in first 24 of starting treatment as seen 3 patients showed improvement compared to none in control group similarly in next 48 hours 86 patients showed improvement that was very good response than control. Most of control group patients showed improvement after 48 hours and mostly showed improvement till 96 hours and even after 96 hours. This long duration required for improvement in diarrhea also showed significant prolongation of hospital stay in control group. So use of probiotics reduces duration of illness and hospital stay so significant less psychological and financial burden of disease on family.

Similarly other studies showed significant that the duration of diarrhea was shortened in the patients treated with probiotics^{8,9}.

Our study also proved that consistency of Stools started to improve within 24 hours of starting the treatment and most of the patients was improved within 72 hours and other studies also support this finding.² it also showed that

the clinically hydration status and electrolyte disbalance was improved early in patients treated with probiotics and similar findings were noted in other studies.¹⁰ Similarly the vomiting and fever as improved early in the probiotics group. All these parameter were suggestive of early improvement in the patients and also this reduces the stay in hospital.¹¹

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