THE ROLE OF PROBIOTIC CONTAINING FORMULA TO THE COURSE OF DIARRHEA

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ABSTRACT

Background: *Current evidence support the concept that oral administration of probiotic may be therapeutic and in reestablishing normal flora in acute diarrhea in children. Probiotics are traditionally defined as viable microorganisms that have a beneficial effect in the prevention and treatment of viral or bacteria when they are ingested.* ***Objective:*** *The efficacy of probiotic containing formula to the course of acute diarrhea in children.* ***Method:*** *Experimental study in patients with acute diarrhea for 3 days using randomized controlled clinical trial. One hundred patients were allocated into two groups balanced for age, sex, and nutritional status. The test group was administered* Bifidobacteria bifida *containing formula and the control group did not receive probiotic until the end of the experiment. The degree of subsequent diarrhea disease and the recovery were monitored in both groups. Statistical test by using Chi2 test or Fisher exact test was performed to compare between two groups with significant level of (α) 0,05.* ***Result:*** *The average lengths of hospital stay were 2.6 days for probiotic group compared to 4 days in the control group. Statistical analysis, there was no significant difference in the length of hospital stay between probiotic and control group (p <0,05) found.* ***Conclusion:*** *The administration of probiotic containing formula with* Bifidobacteria bifida *will decrease the length of hospital stay in acute diarrhea patient.*

Keywords: *probiotic, formula, diarrhea,* Bifidobacteria bifida

Diarrhea disease continues to be a major cause of hospital admission in children in South-East Asia. Indeed, it is the second largest cause of death in the under-fives. Substantial success has been achieved with oral rehydration therapy, but nearly 1 million deaths still occur each year (Bhan.MK, et al, 2000). Probiotics, microorganisms that have a favorable influence on physiologic and pathological processes of the host by their effect on the intestinal flora, may play a role in improving human health (Kent L et al, 2000) This effect of the probiotic on the intestinal ecosystem, it is proposed, impacts in some beneficial way on the consumer. A number of potential benefits arising from changes to the intestinal milieu through the agency of probiotics have been proposed, including: increased resistance to infectious diseases, particularly of the intestine; decreased duration of diarrhea, reduction in blood pressure, reduction in serum cholesterol concentration, reduction in allergy, stimulation of phagocytosis by peripheral blood leucocytes, modulation of cytokine gene expression· adjuvant effect, regression of tumors· reduction in carcinogen or co-carcinogen production (Tannock GW). Current evidence support the concept that oral administration of probiotics may be therapeutic and in reestablishing normal flora in acute diarrhea in children. The objective of this study was to find the efficacy of using probiotic containing formula in acute diarrhea in children.

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SUBJECT AND METHOD

Study Design

This study was conducted at Department of Child Heath Soetomo Hospital – Surabaya. One hundred patients were allocated into two groups balanced for age, sex, and nutritional status. Children with a history of probiotics use within 7 days before admission, acute gastroenteritis more than 3 days before admission, patients with symptoms other than diarrhea (e.g., severe malnutrition, septicemia, CNS infections, bronchopnemonia and others severe infections) were excluded. The test group *Bifidobacteria bifida* was administered in a dose 10^8 colony forming unit (cfu) per gram containing formula and no probiotics to the control group until the end of the experiment. The stool cultures were obtained from all patients on the first day admission. The degree of subsequent diarrhea disease and the recovery were monitored in both groups.

Specimens and Analyses

Statistical Methods

Statistical test by using Chi-square test or Fisher exact test was to compare the characteristic subjects (dehydration status, breastfeeding, stool culture and recovery state). Student t test was used to compare feeding status, sex, stool frequency, and duration of

diarrhea between two groups with significant level of (α) 0.05.

Ethical Considerations

For this study an approval was given by The Ethical Committee Dr Soetomo Hospital Surabaya. The parents received oral and written information about the study and were informed that there were no predictable risks to the patient, that blood sampling or other treatment could be associated with some discomfort, that all records were confidential, and that they could at any time withdrawn from the study. Informed consent was obtained.

RESULTS

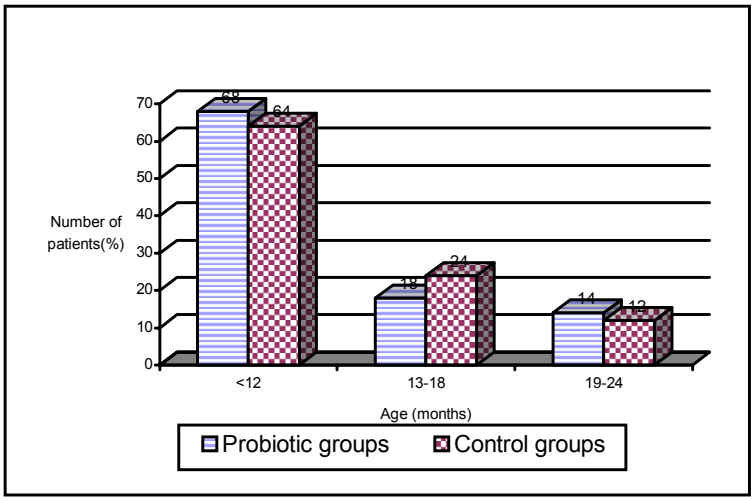

Figure 1. Distribution of age for probiotic group and control group. Statistical analysis was found that there was no significant difference in age distribution.

Table 1. Admission Characteristics of study subjects

Characteristict	Probiotic group (n=50)	Control group (n=50)
Mean age(mo) [a]	11.5	11.7
Sex(M/F)[b]		
Male	27(54%)	28(56%)
Female	23(46%)	22(44%)
Nutrition status[c]		
Underweight	18(36%)	20(40%)
Well-nourished	31(62%)	29(58%)
Overweight	1(2%)	1(2%)
Feeding[d]		
Breastfeeding	26(52%)	30(60%)
Non breastfeeding	24(48%)	20(40%)
Duration of Diarrhea (days) before admission (mean)[e]	1.9	2.1

a : Student t test ; t = -0.127;df=98;p=0.899 (not significant)
b : Chi-square test ; X^2 =0.040;df=1;p=0.841 (not significant)
c : Chi-square test ; X^2 =0.172;df=2;p=0.841 (not significant)
d : Chi-square test ; X^2 =0.649;df=1;p=0.420 (not significant)
e : Student t test ; t = -0.1248;df=98;p=0.215 (not significant)

Table 2. The result of stool cultures of Probiotic and control groups

Results	Probiotic	Control	Total
Aerob Bacterial [a]			
Negative	29(58%)	29(58%)	58(58%)
E.coli	18(36%)	18(36%)	36(36%)
Klebsiella	2(4%)	1(2%)	3(3%)
Shigella flexneri	0(0%)	2(4%)	2(2%)
E.coli – Klebsiella	1(2%)	0(0%)	1(1%)
Anaerob Bacterial [b]			
Negative	37 (74%)	33 (66%)	70 (70%)
Positive *	13 (26%)	17 (34%)	30 (30%)
Rotavirus			
Negative	24(48%)	21(42%)	45(45%)
Positive	26(52%)	29(58%)	55(55%)

a. Chi-square ; X^2 =3,333; df = 4; p = 0,504 (not significant)
b. Chi-square;X^2 = 0,762; df = 1; p = 0,383 (not significant) * *Bifidobacteria*
c. Chi-square; X^2 = 0,364; df = 1; p = 0,546 (not significant)

Table 3. Distribution of mean of stool frequency per-day

Day	Probiotic group			Control group			t	df	P
	N	mean	SD	N	mean	SD			
0	50	9.62	4.12	50	9.84	4.04	-0.270	98	0.788*
1	50	5.78	3.64	50	8.14	3.26	-3.414	98	0.001**
2	50	3.46	2.42	50	6.22	3.05	-5.019	98	0.001**
3	24	2.96	1.37	50	4.06	2.84	-2.254	72	0.027**
4	8	2.50	0.76	29	3.52	2.23	-2.064	33	0.047**
5	1	2.00	-	17	3.00	2.09	-	-	-***
6	0	-	-	6	2.33	1.86	-	-	-***
7	0	-	-	1	2.00	-	-	-	-***

Student t test; * = not significant; ** = significant (p<0.005) ; *** = not analyzed

Table 4. Duration of diarrhea (days) Probiotic and control group

Groups	N	Mean (days)	SD
Probiotic	50	1.1	1.0
Control	50	2.6	1.0
Total	100	1.9	1.3

Student t test; t = -7.78;df=98;p=0.001 (significant)

The average of duration of diarrhea of 1.1 days for probiotic group compared to 2.6 days in the control group. Statistical analysis was found that there was significant difference in duration of diarrhea between probiotic group and control group ($p < 0{,}005$).

Table 5. Duration of hospitalization Probiotic and control group

Groups	N	Mean (days)	SD
Probiotic	50	2.6	0.8
Control	50	4.0	1.1
Total	100	3.3	3.0

Student t test ; t = -7.33;df = 98;p = 0.001 (significant)

DISCUSSION

Probiotics can prevent or ameliorate diarrhea through their effects on immune system. Moreover, probiotics might prevent infection because they compete with pathogenic viruses or bacteria for binding sites on epithelial cells. Probiotics might also inhibit the growth of pathogenic bacteria by producing bacteriocins such as nisin (Sandholm TM et al, 1999; Collins MD et al, 1999; de Roos Nicole M et al, 2000).

The use of probiotics to enhance intestinal health has been proposed for many years. Probiotics are traditionally defined as viable microorganisms that have a beneficial effect in the prevention and treatment of specific pathologic conditions when they are ingested (Sandholm TM et al., 1999; Szajewska H et al, 2001). There is a relatively large volume of literature that supports the use of probiotics to prevent or treat intestinal disorders. However, the scientific basis of probiotic use has been firmly established only recently, and sound clinical studies have begun to be published. Currently, the best-studied probiotics are the lactic acid bacteria, particularly *Lactobacillus sp.* and *Bifidobacterium sp.* Probiotics have been examined for their effectiveness in the prevention and treatment of a diverse spectrum of gastrointestinal disorders such as antibiotic-associated diarrhea (including Clostridium difficile-associated intestinal disease), infectious bacterial and viral diarrhea (including diarrhea caused by rotavirus, *Shigella, Salmonella*, enterotoxigenic *E. coli, Vibrio cholerae* and human immunodeficiency virus/acquired immunodeficiency disorder, enteral feeding diarrhea, *Helicobacter pylori* gastroenteritis, sucrase maltase deficiency, inflammatory bowel disease, irritable bowel syndrome, small bowel bacterial overgrowth and lactose intolerance (Kent L et al, 2000; Szajewska et al, 2001; Salminen et al, 1998; Gibson et al, 2000).

Table 1 there were not significant differences in sex, age, nutrition status and duration of hospitalization between probiotic and control group. Table 2 showed, there were not significant differences in stool culture between probiotic and control group. Table 3 showed reduced the stool frequency per day significantly for probiotic group than control group. Guarino et al (1994) also reported that probiotic can reduce the duration and severity of Rotavirus infection. Serum concentration of IgA antibodies against Rotavirus increased significantly more in children treated with probiotics than in untreated children, which might explain the effect on recovery. Reduce of stool frequency (Table 3) will be reduced the duration of diarrhea significantly for

probiotic group and control group ($p < 0.005$) (Table 4). The average length of hospital stay of 2.6 days for probiotic group compared to 4 days in the control group. Statistical analysis was found that there was significant difference in the length of hospital stay between probiotic and control group ($p < 0.05$) (Table 5)

CONCLUSION

The data in this study demonstrate clearly that the administration of probiotic containing formula with *Bifidobacteria bifida* will decrease the length of hospital stay in acute diarrhea patient.

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