

A comparison between traditional yoghurt and probiotic yoghurt in non-inflammatory acute gastroenteritis

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ABSTRACT

الأهداف: مقارنة الزبادي التقليدي، و الزبادي المعزز بالبروبيوتيك في تحسن التهاب الأمعاء و المعدة الحاد.

الطريقة: أجريت دراسة مجموعة الحالة العشوائية، ومجموعة التحكم السريرية على 100 مريض تتراوح أعمارهم من شهر حتى 12 عام خلال الفترة من أكتوبر 2008 حتى سبتمبر 2009م في مستشفيات قهيم، ود.شيخ - مشهد - إيران. و تلقت مجموعة التحكم الزبادي التقليدي، بينما تلقت مجموعة الحالة الزبادي المعزز بالبروبيوتيك.

النتائج: ظهرت نتائج إحصائية مهمة بين مجموعة التحكم ومجموعة الحالة في التقليل من تكرار الإسهال في المعالجة الأولى $p=0.000$ ، و الثانية $p=0.013$ ، و الثالثة $p=0.028$ ، و الرابعة $p=0.022$. كما ظهرت اختلافات إحصائية في عدم استمرار الإسهال بين مجموعة الحالة، و مجموعة التحكم $p=0.000$.

خاتمة: يرتبط تحسن التهاب الأمعاء و المعدة الحاد بتناول الزبادي المعزز بالبروبيوتيك.

Objectives: To compare the traditional yoghurt and probiotic yoghurt in improving acute non-inflammatory gastroenteritis.

Methods: A double blinded case-control clinical trial, performed in 100 patients aged 6 months to 12 years of age from October 2008 to September 2009 in Ghaem and Dr. Sheikh Hospitals in Mashhad, Iran. The patients were assigned to the following groups: the case group received a probiotic yoghurt and the control group received the ordinary yoghurt.

Results: There were statistically significant differences between the case and control groups in reducing frequency of diarrhea in the first ($p=0.000$), second ($p=0.013$), third ($p=0.028$), and fourth ($p=0.022$), therapy. Also, there was a significant difference ($p=0.000$) in discontinuation of diarrhea between the case and control groups.

Conclusion: Acute non-inflammatory gastroenteritis improvement is accelerated by probiotic yoghurt consumption.

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Acute gastroenteritis is a common disease in infants and children. It can cause dehydration, and in some cases can cause death especially in infants.^{1,2} Probiotics are those helpful microorganisms that have a protective and therapeutic effects on intestine and contribute a healthy intestinal flora.³ To reduce the morbidity and mortality of acute diarrhea, some available measures including probiotic administration may be of great benefit. In some studies, it was detected that yoghurt can reduce the number of bowel movements in acute watery diarrhea.^{4,5} It was detected in another report that yoghurt consumption can decrease severity and duration of diarrhea in acute gastroenteritis.⁶ In other studies, those patients who had taken yoghurt had lower duration of diarrhea.^{7,8} But in Costa-Ribeiro et al² study, there were no significant differences was detected on the duration of acute diarrhea between oral rehydration solution (ORS) group and probiotic with ORS group.² To clear the role of probiotic yoghurt in comparison with the standard yoghurt and to accelerate the recovery of acute non-inflammatory gastroenteritis, we arranged this study.

Methods. This is a double-blinded clinical trial, which was performed in 100 patients, aged 6 months to 12 years. The study was carried out between October 2008 to September 2009 in Ghaem and Dr. Sheikh hospitals in Mashhad, Iran. The patients were divided into 2 groups: case and control groups. One of the authors (who has knowledge on probiotic yogurt and traditional yogurt) used a random number table. Patients' parents and pediatricians were blinded to their group assignment. The case group received 100 cc/day for 5 days probiotic yogurt consisted of 10^9 CFU/dose *Lactobacillus bulgaricus*, *Lactobacillus acidophilus*, *Bifid bacterium* and *Streptococcus thermophilus* and the control group who received the traditional yogurt 100 cc/day for 5 days. To confirm the live bacteria in probiotic yogurts, samples of probiotic yogurts were controlled and cultured by reference laboratory in Mashhad University of Medical Sciences, Mashhad, Iran. The probiotic and ordinary yogurt produced in the same factory were matched for size, shape, taste, volume, and other general characters and there were no any significant differences. The inclusion criteria were gastroenteritis in recent 48 hours from admission, which defined as an acute non-bloody watery diarrhea with stool exam contained no white blood cells or red blood cells, age 6 months to 12 years of age, and well general condition. Exclusion criteria were age less than 6 months or more than 12 years of age, dysentery, ill condition, severe dehydration, incorporation, and severe malnutrition. Written informed consents were taken from parents. The Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran approved this study.

With regard to $\alpha=0.05$ and power of 80%, the sample size was 50 for each group. Data were collected in questionnaire contains items that concern some general personal data, such as age, gender, weight, nutritional and hydration states at admission as well as stool numbers and duration of diarrhea from the onset of gastroenteritis, which reported by parents and collected by pediatrician and analyzed using SPSS version 11.5. We also used Chi-square, t-test and Mann Whitney test. P value <0.05 was considered significant.

Results. There were 43 females and 57 males with a mean age of 2.3 years (SD ± 2.1). The baseline data are shown in Table 1. Also, there were no significant differences between dehydration state in both groups before starting the therapy ($p>0.05$) and also the frequency of diarrhea before treatment ($p=0.127$). There were no significant differences between the 2 groups in the dehydration state in the first 2 days after starting therapy ($p>0.05$). In the case group, discontinuation

of diarrhea was 34% on the third day, 28% on the fourth day, and 20% on the fifth day after starting the therapy. While in the control group, 0% on the third day, 2% on the fourth day, and 48% on the fifth day after starting the therapy ($p=0.000$). There was a significant difference between the 2 groups concerning the frequency of diarrhea on the first 4 days after therapy ($p=0.000$, $p=0.013$, $p=0.028$, $p=0.022$) (Table 2). There was no difference in hospital stay between the 2 groups ($p=0.56$) (Table 2).

Discussion. We found that probiotic with yogurt can significantly reduce the frequency of diarrhea from the first day it was started and discontinued after 3 days therapy. In one study on children age 6-24 months who suffered from acute diarrhea: the case group received a 15 cc/kg a day yogurt while the control group was on the routine care. The rate of diarrhea decreased.⁴ In another study performed in patients 6 months to 5 years of age, detected that yogurt administration to the case group who received the yogurt decrease the hospital stay in comparison with the control group.⁷ In a previous study, the case group that received probiotic with ORS shortening the duration of diarrhea compared with the control group who received plain ORS.^{5,9} These similar findings may be due to some potential effects of probiotic strains, including stimulation of immune system and anti-inflammatory effect.¹⁰⁻¹³ Also, diarrhea may be improved due to mucosal integrity of the intestine and mucus secretion.¹⁴ Probiotic strains also may adhere to receptors of epithelial cells of intestinal wall and protect it from offending microorganisms.¹⁵ So, absorptive defects of fluids and electrolytes and glucose are prevented.¹⁶ Also, probiotics reinforce production of secretory IgA.¹⁵ The T cell activity may be enhanced by probiotics,^{12,17} and due to decrease in chloride secretion of epithelial cells, diarrhea cessation will be occurred.^{18,19} Probiotics may also exhibit some antimicrobial activity that can

Table 1 - Baseline data in case and control group.

Baseline data	Probiotic yogurt	Traditional yogurt	P-value
Age (years) (mean \pm SD)	2.5 \pm 2.3	2 \pm 2.1	0.47
Gender female (n)	25	18	0.22
Stool number at beginning	4.31	5.72	0.12
Dehydration (%)			0.38
Moderate	37	32	
Mild	63	68	
Malnutrition			0.43
Moderate	2	6	
Mild	32	38	
Weight (kg) (mean \pm SD)	11.7 \pm 5.5	11.2 \pm 5.4	0.64

Table 2 - Stool frequency before admission and during first 4 days of treatment.

Stool frequency	Mean ± SD	Mean difference	95% Confidence interval	
			Lower	Upper
<i>Hospital staying</i>		- 0.0200	- 0.23849	0.19849
Probiotic yogurt	1.2600 ± 0.48697			
Traditional yogurt	1.2800 ± 0.60744			
<i>Stool frequency before admission</i>		- 1.3514	- 3.09261	0.38986
Probiotic yogurt	4.3878 ± 3.39618			
Traditional yogurt	5.7391 ± 5.03955			
<i>Stool frequency at first day</i>		- 2.5608	- 3.62318	- 1.49849
Probiotic yogurt	3.9792 ± 2.08836			
Traditional yogurt	6.5400 ± 3.09186			
<i>Stool frequency at second day</i>		- 1.2339	- 2.19617	- 0.27171
Probiotic yogurt	3.6061 ± 2.22120			
Traditional yogurt	4.8400 ± 2.11274			
<i>Stool frequency at third day</i>		- 1.0489	- 1.98371	- 0.11407
Probiotic yogurt	2.6111 ± 1.03690			
Traditional yogurt	3.6600 ± 1.88019			
<i>Stool frequency At fourth day</i>		- 1.1974	- 2.20989	- 0.18485
Probiotic yogurt	1.7500 ± 0.70711			
Traditional yogurt	2.9474 ± 1.37443			

prevent from proliferating and destroy-offending organisms.^{15,20} Moreover, additional knowledge on different probiotic strains may play an important role in promoting or improving the effectiveness of probiotics in acute diarrhea. In another study on male children aged ≤ 2 years of age with acute diarrhea who received ORS with probiotics shows no significant shortening of the duration of diarrhea compared with children received standard ORS.² Also, according to another report, probiotic taken group (case group) had not show any significant differences in duration of diarrhea, but had decrement in episodes of diarrhea.²¹ It may be the result of the type of probiotic strains. Some strains may require few days to proliferate in order to reach the enough colonies to show their potential effects. After reaching the optimum colonization, they may reveal potential benefits consisting of stimulation of immune system including antibodies secretion and anti-inflammatory effects. Maybe the major role of these types of strains are their prophylactic benefits.

Our limitations are the exclusion of some cases that showed dysentery after primary watery diarrhea, consumption of yogurts, and uncooperative cases.

In conclusion, the stool frequency is reduced significantly by probiotic with yogurt in comparison with traditional yogurt. Also, discontinuation of diarrhea had a significant difference in probiotic yogurt group than the ordinary yogurt group.

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Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.