

LOW FAT MILK V/S LOW LACTOSE MILK FOR PATIENTS WITH DIFFERENT NUTRITIONAL STATUS WHO SUFFERED FROM ACUTE DIARRHEA

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ABSTRACT

Background. Malnourished has a great impact in decreasing the production and maturation of enterocytes, intestinal enzymes and nutrient transport. It also decreases villous length and the amount of microvillies, which causes intolerance and malabsorption. **Objective.** To compare low fat milk v/s low lactose milk in the recovery of acute diarrhea children with different nutritional status. **Methods.** Prospective, randomized sampling, group I: low fat milk was compared to group II: low lactose milk and length of diarrhea recovery was evaluated. **Result.** During January – February 2002: 40 patients with acute diarrhea, age between 4 months old – 7 years old, 62.5% of the patients with good nutritional status, 22.5% under nourished and 15% with severe under nourished. 50% of the patients were given low fat milk and the other 50% were given low lactose milk. Length of recovery: severe under nourished in group I: mean 3 days, $SD \pm 1.41$ was compared to group II: mean 2.5 days, $SD \pm 0.71$ ($p: 0.830$); under nourished in group I: mean 2.4 days, $SD \pm 0.55$ compared to group II: mean 2.5 days, $SD \pm 0.58$ ($p: 0.777$); good nourished in group I: mean 3.18 days, $SD \pm 0.98$ compared to group II: mean 2.79 days, $SD \pm 1.12$ ($p: 0.201$). **Conclusion.** There were no significant differences in length of recovery in diarrhea patients given low fat milk compared to those receiving low lactose milk with different nutritional status.

Keywords: low lactose milk, low fat milk, acute diarrhea, malnutrition

INTRODUCTION

Malnutrition remains one of the most common causes of morbidity and mortality among children throughout the world. Approximately 9% of children below 5 years of age suffer from wasting (weight-for-height < -2 SD of the NCHS) and are at risk of death or severe impairment of growth and psychological development (World Health Organization, 1999). In Indonesia, economic crisis that has been lasting since 1997 causes decreasing in ability to buy and consume food, thus it gives an impact in the nutritional status, kwashiorkor and marasmus stated to re-emerge which hardly been found before (Departemen Kesehatan RI, 2000). Incidence of diarrhea among children below 5-years in Indonesia exceed 40 millions each year, about 1-2% suffered from dehydration and 50-60% died without proper management (Soeparto P, 1999). Diarrhea-malnutrition-infection circle can be one of the causes in children mortality (Mata L, 1992). The gastrointestinal tract is extremely susceptible to the effects of malnutrition. Malnutrition results in a damaged mucosal barrier, thereby increasing susceptibility to infection and impairs the production and maturation of new enterocytes, thus altering intestinal morphology (Brewster DR, 2000). It causes the decrease of villous

length and the amount of microvillies, inhibits the process of restoration of gastrointestinal function, resulting in decreased levels of digestive enzymes and impaired nutrient transport, which causes intolerance and malabsorption (Soeparto P, 1999; Brewster DR, 2000; Vanderhoof JA, 1988). The objective of this study was to compare low fat milk v/s low lactose milk in the recovery of acute diarrhea children with different nutritional status.

SUBJECT AND METHOD

Study Design

A prospective study, with randomized sample taken at the Department of Child Health Dr. Soetomo Hospital, was undertaken from January to February 2002. Children aged ≥ 1 months – 13 years with different nutritional status (weight for height) were included in this study, with the inclusion criteria were mild or moderate dehydration and without concomitant disease. Group 1 receiving low fat milk (modisco $\frac{1}{2}$) was compared to group 2 with low lactose milk (modisco $\frac{1}{2}$ LLM). Recovery time from diarrhea was evaluated.

Statistical methods

Statistical test by using Fisher's exact test or Mann-Whitney U - test was used for comparisons for characteristic subject (sex, age, nutritional status,

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clinical test and floating test). Student t - test was used for comparisons of duration of diarrhea (days) before admission, and Mann-Whitney U - test was used for

comparisons of length (days) of diarrhea recovery between two groups, with significance level of ≤ 0.05 .

RESULTS

Table 1. Subject characteristics

Characteristics		Low Lactose Milk (n=20)	Low Fat Milk (n=20)	p value
Sex	Female	12 (60%)	12 (60%)	1.000
	Male	8 (40%)	8 (40%)	
Nutritional Status	Well-nourished	14 (70%)	11 (55%)	0.300
	Under-nourished	4 (20%)	5 (25%)	
	Severe Malnourished	2 (10%)	4 (20%)	
Age (month) 0 – 12 months		13 (65%)	8 (40%)	0,205
≥ 12 months		7 (35%)	12 (60%)	
Duration of diarrhea before admission (days), <i>mean</i>		2.90	3.60	0.276

Tabel 2. Laboratory finding

Laboratory examination		Low Lactose Milk (n=18)	Low Fat Milk (n=18)	p value
Clini Test	Negative	12 (66.7%)	13 (72.2%)	0.726
	Positive ¼	3 (16.7%)	2 (11.1%)	
	Positive 1	1 (5.6%)	2 (11.1%)	
	Positive 2	2 (11.1%)	1 (5.6%)	
		Low Lactose Milk (n=18)	Low Fat Milk (n=16)	
Floating Test	Negative	4 (22.5%)	5 (31.3%)	0.448
	Positive< 20%	5 (27.8%)	5 (31.3%)	
	Positive≥ 20%	9 (50%)	6 (37.5%)	

Table 3. Clinical course (length of diarrhea) after intervention

Nutritional Age Status (months)		Length of diarrhea (days)						p value
		Low Lactose Milk (n=20)			Low Fat Milk (n=20)			
		N	Mean	SD	N	Mean	SD	
Good Nutrition	0 – 12	11	3.00	1.18	7	3.57	0.98	0.155
	≥ 12	3	2.00	0.00	4	2.50	0.58	0.180
Poor Nutrition	0 – 12	2	2.00	0.00	1	2.00	-	1.000
	≥ 12	2	3.00	0.00	4	2.50	0.58	0.264
Under Nutrition	0 – 12	-	-	-	-	-	-	-
	≥ 12	2	2.50	0.71	4	3.00	1.41	0.803

DISCUSSION

There is controversy about the magnitude of the histological damage in severe malnutrition, although most investigators have reported villous atrophy, decreased villous-crypt ratio and increased cellularity of the lamina propria with kwashiorkor. The activity of brush border enzymes is generally depressed with acute malnutrition. Children with kwashiorkor are particularly prone to lactose intolerance, and the recovery in lactase activity with treatment is often slow (Brewster DR, 2000). A Zairian study of 57 children with kwashiorkor or marasmic-kwashiorkor documented severe atrophic changes of the mucosa in 70%. In contrast, a Kenyan study of kwashiorkor found relatively minor changes of ridged or leaf shaped villi with an increased cellular infiltrate of the submucosa propria, but no mucosal atrophy (Brewster DR, 2000).

Shortened cellular life and regeneration with villus atrophy and crypt hyperplasia caused by infection, causes changing in absorptive cell with mature differentiation become immature epithelial cell, with disaccharidase activity relatively depressed compared to the normal mucosa (Soeparto P, 1999). The most disturbed enzymes by acute diarrhea are lactase and sucrase, which is only temporary (2-3 days) and more commonly found in babies aged less than 3 months. The site of lactase enzyme is on the edge of mature microvilli enterocyte and it is easily broken by proteolytic enzyme. Recovery of lactase enzyme deficiency depends on epithelial regeneration, accelerated by high calories intake, accompanied with lack of or reduction of lactose content in milk to avoid more severe damage (Soeparto P, 1999).

Low lactose or lactose free food/drink in recovery period of acute diarrhea may shorten the episode of diarrhea (Soeparto P, 1999). Soeharyono (1994) stated that low lactose milk formula is good for mild and moderate lactose malabsorption, while free lactose milk formula is good for severe lactose malabsorption case (Suharyono, 1994). Other authors give free lactose formula or soy formula for patient with lactose intolerance caused by gastroenteritis, malnutrition and other cause of mucosal destruction (Soeparto P, 1999).

Intestinal mucosal destruction also causes lack of secreting enzymes and CCK pancreosimine enzyme which causes pancreatic insufficiency and lack of bile acid which further cause carbohydrate, protein and fat malabsorption and bacterial overgrowth. Fat intolerance caused by gastroenteritis is temporary and may last longer than the episode of diarrhea itself (Soeparto P, 1999). In cases of malnutrition, survival may be limited not only by the disturbances in electrolyte and water balance but significantly by caloric deficit (Roy CC, 1995).

Table 1 shows that there were no significant differences in sex, age, nutrition status, and duration of diarrhea before admission, between low fat diet and low lactose diet group. Table 2 shows in 36 subjects with clini test, 25 (69.4 %) with negative clini test and 11 (30.6 %) with positive result, which 5 of them (27,8 %) from low fat diet group (n=18) and 6 (30.6 %) from low lactose diet group (n=18). Among 34 subjects with floating test shows 9 (26.5 %) with negative result and 25 (73.5 %) with positive result, which 11 of them (68.8 %) from low fat diet group (n=16) and 14 (77.8 %) from low lactose diet group (n=18). In our study there are more subjects with fat intolerance (73.5 %) compared to lactose intolerance (30.6 %), despite there is no

significant difference between low fat diet group and low lactose diet group. The incidents of lactose-intolerance in patient with diarrhea according to Sadikin D.(1972) is 39.5%, Soeparto P.(1974) is 48.6%, Sutanto (1980) is 63.8% (Soeparto P, 1999).

Fat intolerance temporarily occurs in patient with diarrhea, usually mild but can be prolonged and often occurs in malnourished patient and young infants. Incidents of fat intolerance according to Rumondang (1979) is 1.41%, Sutanto (1980) is 5.1% and Soeparto P (1980) is 6.3% (Soeparto P, 1999). Table 3 shows there are no undernutrition in subjects less than 12 month of age and no significant differences in the length of recovery in diarrheal patients given low fat milk diet compared to those receiving low lactose milk diet with different nutritional status. Soeparto P (1987) stated that 4.2% lactose intolerance in acute diarrhea patient was improved with free lactose diet. (Soeparto P, 1999). Suharyono (1994) stated that low lactose milk diet is better for mild and moderate lactose intolerance patients, while free lactose milk diet is preferred for severe lactose intolerance (Suharyono, 1994). Some authors reported that diarrhea only occurs in short time, approximately 2-5 days, but the time needed to repair intestinal mucosa is still unclear, although it is estimated about 7-8 days (Soeparto P, 1999). During recovery phase, low fat diet even worsens malnutrition condition and causes chronic diarrhea (Lifshits, 1984).

CONCLUSION

There are no significant differences in the length of recovery in diarrheal patients given low fat milk compared to those receiving low lactose milk with different nutritional status. Further study on this matter is recommended.

REFERENCES

- Brewster DR, 2000. Intestinal permeability in Protein-Energy Malnutrition (PEM). In: Bhutta ZA, eds. *Contemporary Issues in Childhood Diarrhoea and Malnutrition*. Oxford University Press, pp. 137-9.
- Departemen Kesehatan RI, 2000. Pedoman Tatalaksana Kurang Energi Protein pada Anak di Rumah Sakit Kabupaten/Kotanya.
- Lifshits, 1984. Food intolerance and sensitivity. In: Lebenthal E ed. *Advances in Pediatric Gastroenterology and Nutrition*, Mead Johnson Symposium series I *Excerpta Medica*, pp. 131-140
- Mata L, 1992. Diarrheal disease as a cause of malnutrition. *Am J Trop Med Hyg* 47, pp. 16-27
- Roy CC, Silverman A, Alagille D, 1995. Diarrheal disorders. Malnutrition and diarrhea. In: *Pediatric Clinical Gastroenterology* 4th Ed. Mosby, p. 255
- Suharyono, 1994. Terapi nutrisi diare kronik. Pendidikan Kedokteran Berkelanjutan Ilmu Kesehatan Anak ke XXXI, Fakultas Kedokteran Universitas Indonesia.
- Soeparto P et al, 1999. Diare akut. In: Soeparto P, Djupri LS, Martosudarmo S, Ranuh RG eds. *Sindroma Diare. Gangguan Absorpsi-Sekresi*. Gramik FK UNAIR/RSUD.Dr.Soetomo Surabaya, pp. 37-142.
- Vanderhoof, Jon A, 1988. Physiologic effects of Protein-Calorie Malnutrition on the Gastrointestinal tract. In: Report of the 94th Ross Conference on Pediatric Research. Enteral Feeding: Scientific Basis and Clinical Applications. Ross Laboratories, Ohio, pp. 5-15.
- World Health Organization. Management of severe malnutrition: a manual for physicians and other senior health workers. WHO Geneva, 1999.