



# Lactose versus Lactose Free Regimen in Children with Acute Diarrhea

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## Abstract

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**BACKGROUND:** Acute diarrhea (AD) is the most frequent gastroenterological disorder, and the main cause of dehydration in childhood, and it is one of the most important causes of morbidity and mortality in children.

**AIM:** Assessment of lactose-free formula effect in nutritional treatment in formula-fed children with acute diarrhea.

**PATIENTS AND METHODS:** A cross-section interventional study carried out on 60 formula-fed children, under two years, referring with acute diarrhea, 30 children obtain lactose-free formulation and 30 children with no lactose-containing formula. According to the period of diarrheal stop and weight, changes comparing two groups.

**RESULTS:** Thirty-two males and 28 females children (7.25 ± 5.1 months) included. Children with lactose-free formula had a significantly slighter dated to diarrhea relief compared with control group children ( $p < 0.01$ ). No variance between two groups in weight change ( $6.9 \pm 3.03$  vs.  $7.05 \pm 3.07$  kg,  $p = 0.2$ ). (46.6%) of patients on Lactose free formula were discharged on the third post admission day, lactose-free formula has more effective recovery to those on cow milk formula ( $4.1 \pm 1.2$  vs.  $6 \pm 1.3$  days,  $p < 0.01$  significant).

**CONCLUSION:** Quick giving of lactose-free formulation to children on formula feeding show rapid relief of acute diarrhea.

## Introduction

Worldwide diarrheal diseases are responsible for a significant proportion of morbidity in children under 2 years of age and remain as a leading cause childhood death [1]. The global mortality may be declining but the overall incidence of diarrhea declined from 3.4 to 2.9 episodes per child-year in the past 2 decades [2]. This decline is a result of preventive Rotavirus vaccine; improve case of management of diarrhea, improved nutrition of the infants and children, and the use of home and hospital oral rehydration therapy [3]. Diarrheal illness, especially early and repeated episodes among young children can be associated with malnutrition, micronutrient deficiency, and a significant deficit in psychomotor and cognitive development [4]. Gastroenteritis occurs through infection come from feco oral way, by consumption of the dirty food or water [5]. The pathogenesis and harshness of the illness depend on the microorganisms yield toxin or not or invasive and multiply inside food. Rotavirus has multiple infectious agents which goal the microvilli tips of the enterocytes and go inside cell by direct invasive resulting in villus shortening and loss of enterocytes and loss absorptive surface [6]. The risk of gastroenteritis is higher in malnourished children with zinc and Vitamin A deficiency [7]. Most of the clinical signs of diarrhea

determine according to the infecting pathogen, dose of inoculum, and the development of complications [8]. Most of the complications relate to the delay of treatment without early use of oral rehydration therapy, patient may develop dehydration and its complications [9]. In developing countries, bacteremia is a recognized complication in malnourished children with diarrhea. The suitable managing of acute diarrhea is fluid and electrolytes disturbance improvement, appropriate antibiotics, sufficient nutritional maintenance which is chiefly significant in developing countries where a significant association between diarrhea and growth of children [10]. Therefore, when rehydration is finished food restored while oral rehydration treatment is stay to replace any loss from vomiting or stool [11]. The use of zinc supplements in developing countries leads to reduce duration and severity of diarrhea and decrease mortality and hospital admission [12]. In addition, the use of antibiotics in selected cases of bacterial diarrhea reduces the duration and severity. Lactose intolerance can occur among infants and young children with acute diarrheal disease due to deficiency of lactase enzyme, resulting in bloating, diarrhea, abdominal pain, and distention [13]. The importance of lactose in growth and development is often unrecognized so the use of low lactose diet in-patient with diarrhea may be one of the methods for balance between the benefit and adverse effects of lactose [14]. Still, there is debate in the use

of lactose-free formula and usual use for children with acute diarrhea [15]. The aim of study assessment of lactose-free formula effect in nutritional treatment in formula-fed children with acute diarrhea.

## Methods

A cross-section interventional study carried out on 60 formula-fed children under 2 years who's admitted to the pediatric ward in AI-IMMAMIAN AL-KADYMIAN MEDICAL CITY, BAGHDAD, IRAQ with acute diarrhea from 1<sup>st</sup> of October 2019 to 1<sup>st</sup> February 2020. The data of the study was collected that include: socio-demographic characteristics of children which include age, sex, residence, weight, type of feeding, number of bowel motion, stool consistency, date of admission, state of dehydration according to clinical bases, and days of hospitalization. Children who are included in the study: healthy before the attack of acute diarrhea and not suffering from a chronic illness or severely malnourished child. The sample was divided into two groups: 1<sup>st</sup> group which consists of (30) children on Lactose-free formula, 2<sup>nd</sup> group which consists (30) children on cow milk formula. At admission, take the demographic data and medical history then dehydration evaluated and give oral rehydration solution according to the World Health Organization (WHO) recommendation. Investigation done; blood test and stool culture. After that maintenance treatment done, children alternately owed to obtain either lactose-free or lactose-containing formula. The body weight, Hydration status, stool frequency, consistency, and duration were recorded daily until the children discharged, Diarrheal duration was defined from the time of admission to the time of the first formed stool if followed by two consecutive non watery stools or by 12 hours without further evacuations. The consent was got from all parents after complete description of the study goal and procedure. Statistical analysis done by using SPSS 13 pack for windows (version 16.0) and Chi-square test used for comparing groups. In addition, Microsoft excel 2010 for table layout. The level of signification was (0.05) for comparison, descriptive, and analytic statistics carried out.

## Results

The result of this research showed that from (60) children aged under two years who were involved in this research there were 30 children (50%) on cow-milk formula and 30 children (50%) were on lactose-free milk. Analysis of the residency revealed that

43 (71%) of children are from rural area (22 male 52% and 21 female 48%), Patients from urban is 17 (29%) (10 male 59% and 7 female 41%) as shown in Figure 1.

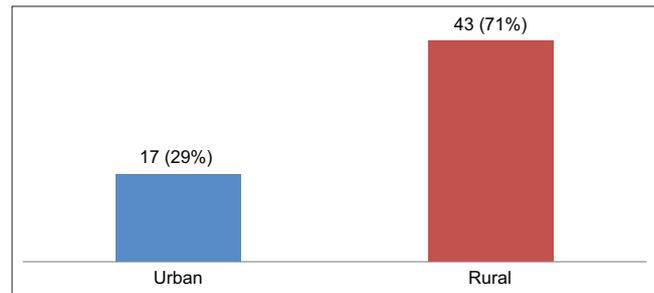


Figure 1: The percentage of residency among the cases

After treatment, children received lactose-free formula had a significantly further fast diarrheal release compared with children had cow milk formula ( $2.9 \pm 0.9$  vs.  $4.3 \pm 0.8$ ) as shown in Table 1, p-value (0.008) and its significant.

Table 1: Duration of improvement in both groups

Days of diarrheal relief	Lactose free formula		Cow milk formula		Total	
	n	%	n	%	n	%
≤3	22	36.5	5	8.5	27	45
>3	8	13.5	25	41.5	46	55
Total	30	50	30	50	60	100

p < 0.05 (significant).

Weight significantly increased in both groups, mean weight for children on cow milk formula ( $6.9 \pm 3.03$  to  $7.05 \pm 3.07$  kg), And the mean weight for lactose-free formula ( $7.6 \pm 2.3$  to  $7.7 \pm 2.2$  kg), but there was no difference between in weight change as shown in Figure 2, The p-value is (0.2) which is not significant.

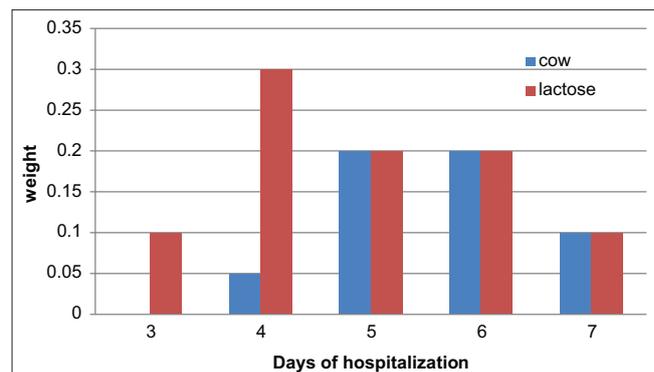


Figure 2: Weight gain in both groups

Concerning the effect of feeding types on duration of hospitalization. The results showed that from 30 children on lactose-free formula, there are 14 (23.3%) discharged after 3 days, 5 children (8.3%) discharged after 4 days and (6) children (10%) discharged after 5 days, 4 children (7%) after 6 days while the other remaining child discharged after more than 6 days. From (30) children on cow-milk formula, there is no one discharged in the first 3 days, 4 children (7%) discharged after 4 days, 7 children (11.6%) discharged after 5 days, 7 children (11.6%) after 6 days while the remaining children discharged after more than 6 days, so the mean duration hospital days for

lactose-free formula is ( $4.1 \pm 1.2$ ), male ( $4.2 \pm 1.3$ ) female ( $3.9 \pm 1.1$ ). In addition, for cow milk formula is ( $6 \pm 1.3$ ), male ( $5.8 \pm 1$ ) female ( $6.1 \pm 1.6$ ), as shown in Table 2, p-value ( $< 0.01$ ) which is significant.

**Table 2: Duration of hospitalization in both groups**

Days of hospitalization	Feeding types				Total	
	Lactose free formula		Cow milk formula			
	n	%	n	%	n	%
3	14	23.30	0	0	14	23.30
4	5	8.30	4	7	9	15.30
5	6	10	7	11.60	13	21.60
6	4	7	7	11.60	11	18.60
>6	1	1.60	12	20	13	21.60
Total	30	50	30	50	60	100

p < 0.05 (significant).

## Discussion

Current study aims to assess the efficiency of quick giving of lactose-free formulation to children on formula feeding show rapid relief of acute diarrhea, the entire number of patients is 60, under 2 years of age, 50% of them on lactose-free formula and 50% on lactose-containing formula, most of them from rural areas 71%, while 29% from urban areas. There is a significant decrease in the time of diarrhea in children who give lactose-free formulation compared with children on lactose-encompassing formula, p-value <0.01 significant. Studies done by Hossien saneian *et al.* also showed rapid diarrheal relief in-patient on lactose-free formula, which support our study [16]. Xu *et al.* also found shorter period of diarrhea remission in lactose free formula, which also support our study [17]. A study by Simakachorn *et al.* also found a significant shorter duration of diarrhea by 20.5 h in-patient on lactose-free formula [18]. In opposite to studies representative the advantage of lactose-free formula, Brown KH and colleagues study concluded that most patients with diarrhea can be successfully managed by early use of oral rehydration therapy and continuous feeding of undiluted milk formula, so the usage of lactose-free formula is not essential [19]. Our study showed that the weight increased in both groups, p value more than 0.2 which is not significant. The same result found in Hossien Saniean research [16]. Our study showed 23.3% of patients discharged at the third post admission days in patient on lactose-free formula as they have more rapid recovery, p < 0.01 significant. This result supported by research by BMJ group which showed patient on lactose-free milk have faster recovery (about 3 and half days) compared with patient on normal milk (about 5 days) [20]. Sadoon *et al.* study also support our results as 45.7% of patients on lactose-free formula discharged on the second-day postadmission while only 2% of patient on normal formula discharged on the second day [21].

## Conclusion

Quick giving of lactose-free formulation to children on formula feeding show rapid relief of acute diarrhea.

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