

Lactose Free-Milk for Young Children with Acute Diarrhea, Western of Iraq

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ABSTRACT

Background: Secondary lactose intolerance occurs commonly from intestinal inflammation following infection recommending avoidance of milk contains lactose.

Objectives: To identify the role of lactose-free milk (LFM) in the treatment of acute diarrhea in children ≤ 2 years in Al-Ramadi Maternity and Childhood Teaching Hospital in Ramadi city, Iraq.

Materials and methods: This A single-blind randomized controlled trial study was done on babies \leq two years old who presented with acute diarrhea. Two hundred cases were chosen randomly, 100 of them were received LFM added to the regime of management of diarrhea (group A), and the other 100 cases were received ordinary formula milk (OFM) (group B). Babies who were breastfeeding, those with chronic or bloody diarrhea, and those who received antibiotics were excluded from this study. Data about age, gender, the response (stopping diarrhea), and its duration within 3 days were recorded.

Results: The response of stopping diarrhea after 3 days among group A was 89%, while group B was 67%. There was a highly statistically significant difference between the 2 groups (P-value = 0.001). Out of 44 babies in the age group 0-6 months in group A, there were 42 (95.4%) who respond to therapy, and it was the highest age group affected. There was a high statistically significant difference (P-value = 0.003) between the rate of response and the age group in group A. However, there was no significant difference (P-value > 0.05) between the gender and the response rate. Moreover, there was no significant difference (P-value > 0.05) between the rate of response and the age and gender of the babies in group B. There was a statistically significant difference (P-value < 0.05) between group A and B concerning the mean duration of response (55.06 hours \pm 11.304 in group A, and 63.58 hours \pm 8.727 in group B).

Conclusion: There were a high response rate and rapid response among young children with acute diarrhea after giving LFM in comparison with OFM.

Keywords: Lactose-free milk; Acute diarrhea; Young children; Ordinary milk formula.

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INTRODUCTION

Diarrhea is responsible for a big proportion of diseases in children and remains a leading cause of childhood death worldwide [1]. It kills around 760,000 children under five years every year. Diarrheal death and morbidity are a worldwide issue, however, it is particularly common in developing countries [2]. The main cause of acute diarrhea disease in the pediatric age group is intestinal tract infection which is caused by viral, bacterial,

or parasitic microorganisms [3]. The best way to treatment of acute diarrhea in children is by fluid and electrolyte replacement therapy, choice of appropriate antibiotics besides adequate nutrition [4, 5]. Lactose is a disaccharide that presents in the milk of many mammals, including human and cow's milk. It is the primary sugar of dairy products such as cheese and yogurt. It is the sugar found in breast milk and standard infant formulas. Therefore, almost all babies can digest and absorb this sugar and it serves as their primary dietary sugar [6].

Avoidance of lactose is considered as one method in the treatment of diarrhea and got importance over time. Owing to the increased deterioration of diarrhea because of the development of secondary lactose intolerance, withdrawal of lactose

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from the food is necessary for babies with diarrhea. [7]. The lactase enzyme, which is responsible for breaking down lactose, is found at the tips of the intestinal villi. Destruction of these villi during diarrheal episodes will predispose the child to temporal lactose intolerance because of the disruption of epithelial cells that secrete lactase enzyme [8]. The undigested lactose draws fluid into the intestine by osmotic mechanism causing prolong diarrhea [9]. However, the secondary lactose intolerance is frequently not lasting more than 6-8 weeks [10], and that lactase enzyme activity will return to the normal activity after the repairing of intestinal injury [11].

The lactose-free milk (LFM) formula is usually manufactured from cow's milk after removing the lactose and replace it with another form of sugar. The benefits of using LFM in acute diarrhea are to shorten the duration of the disease, gaining weight, and improving dehydration by decreasing the need for intravenous fluid therapy [12, 13]. Few controlled studies have been reported in this regard, therefore, this study aims to find the benefit of using LFM in acute diarrhea in children \leq two years in Ramadi city.

MATERIALS AND METHODS

This single-blind randomized controlled trial study was done on children \leq 2 years-old who visited the Pediatric outpatient clinic or emergency department in Al-Ramadi Maternity and Childhood Teaching Hospital in Ramadi city, Iraq. Those children were presented with acute diarrhea (the passage of three or more loose or liquid stools per day less than two weeks duration) [14]. The study was covered for 6 months from the first of January 2020 to the first of July 2020.

Samples of 200 kids were included in this study, 100 patients of them have received LFM formula (group A) and another 100 patients were remained on ordinary formula (group B), in addition to the regime treatment of those patients in the hospital. The LFM formula (type Celia LF) is made by the company of Turkish dairy producer. The study was approved by the scientific committee of the hospital. Informed consent was taken from the parents or care-giver of the participants after giving them a full explanation about the purpose of the study.

Excluding criteria include:

1. Babies on breastfeeding.
2. Babies with chronic diarrhea.
3. Babies with bloody diarrhea.
4. Babies who received antibiotics.

A questionnaire data form including:

1. Age which was classified into 3 groups, 0- 6 months, 7 to 12 months, and 13 to 24 months.
2. Gender.
3. Response to therapy and its duration within 3 days. This was achieved by history taking from admitted children and by calling the family from telephone number for outpatients treated patients.

Statistical analysis of the data was carried out by using IBM SPSS Statistics version 22. The results were presented in tables. Chi-square test was done for qualitative data to compare the results. Independent-Samples T-Test was used for the comparison of the means. P-value level <0.05 was considered a statistically significant difference.

RESULTS

The age of group A patients was ranged from 1-24 months with a mean duration of $7.79 \text{ months} \pm 5.813$. While the age of group B was ranged from 1-24 months with a mean age of $8.54 \text{ months} \pm 5.842$. Of the total of 100 patients given the LFM formula, 89 (89%) of them responded to therapy within three days. While from 100 patients given OFM 67 (67%) of them were responsive to therapy within three days as shown in Figure 1. There was a highly statistically significant difference between the 2 groups (P-value = 0.001).

Regarding the age distribution of patients, 44 of the patients who received LFM (group A) were in the age group 0-6 months, and that 42 (95.4%) of them responded to therapy within 3 days. There was a highly statistically significant difference between the response rate and the age of the patients (P-value = 0.003). Out of 100 patients, there were 57 boys, and that 52 (91.2%) of them responded to therapy within three days. While another 43 patients were girls and that 37 (86%) of them responded within three days. The difference was non-significant (P-value = 0.412) as shown in Table 1.

Regarding the age distribution, 41 of the patients who received OMF (group B) were in the age group 0-6 months, and that 29 (70.5%) of them responded to therapy within 3 days. There was no statistically significant difference between the response rate and the age of the patients (P-value = 0.373). Out of 51 boys, 36 (70.5%) patients responded to therapy within three days. While another 49 girls patients, 31 (63.3%) of them responded within three days. The difference was non-significant (P-value = 0.436) as shown in Table 2.

The duration of the response (stopping of diarrhea) in group A was ranged from 40-72 hours with a mean duration of $55.06 \text{ hours} \pm 11.304$. While the duration of the response in group B was ranged from 44-72 hours with a mean duration of $63.58 \text{ hours} \pm 8.727$. There was a statistically significant difference between the two groups (P-value <0.05).

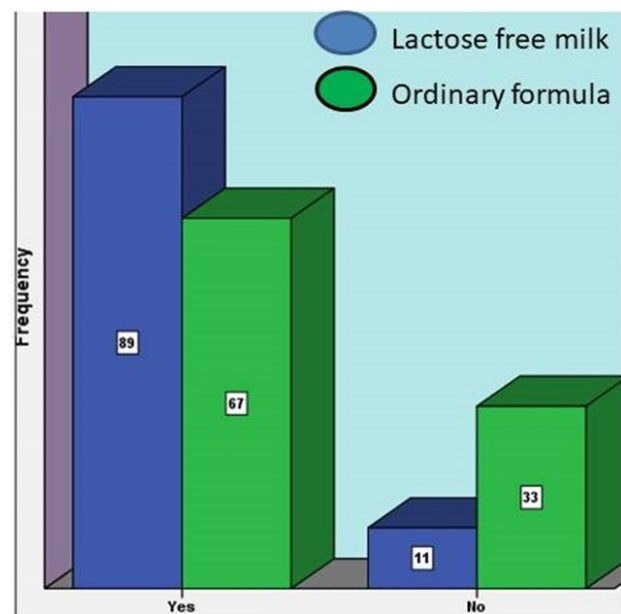


Figure 1. The distribution of patients in group A (LFM) and group B (OFM) according to the response (stopping of diarrhea).

Table 1. The distribution of the response (stopping diarrhea) of group A according to age and gender.

Variable	Response		Total	P-value
	Yes Number(%)	No Number(%)		
Age group (months)				
0-6	42 (95.4%)	2 (4.6%)	44 (100%)	0.003
7-12	35 (92.1%)	3 (7.9%)	38 (100%)	
13-24	12 (66.7%)	6 (33.3%)	18 (100%)	
Total	89 (89%)	11 (11%)	100 (100%)	
Gender				
Boys	52 (91.2%)	5 (8.8%)	57 (57%)	0.412
Girls	37 (86%)	6 (14%)	43 (43%)	
Total	89 (89%)	11 (11%)	100 (100%)	

Table 2. The distribution of the response (stopping diarrhea) of group B according to age and gender.

Variable	Response		Total	P-value
	Yes Number(%)	No Number(%)		
Age group (months)				
0-6	29 (70.7%)	12 (29.3%)	41 (100%)	0.373
7-12	23 (59%)	16 (41%)	39 (100%)	
13-24	15 (75%)	5 (25%)	20 (100%)	
Total	67 (67%)	33 (33%)	100 (100%)	
Gender				
Boys	36 (70.5%)	15 (29.5%)	51 (100%)	0.436
Girls	31 (63.3%)	18 (36.7%)	49 (100%)	
Total	67 (67%)	33 (33%)	100 (100%)	

DISCUSSION

Infants and toddlers, typically with acute infectious diarrhea, might transiently stop producing lactase, the intestinal enzyme that digests lactose, the main sugar in milk. This means a prolongation and worsening of diarrhea [7]. Avoidance of lactose is one of the methods that have to gate importance with the time in diarrheal protocol therapy. This is due to the risk of diarrheal worsening and the development of secondary lactose intolerance, lactose is often removed from the milk of babies with acute diarrhea [10]. The treatment of acute diarrhea in young children must achieve 2 goals, stopping diarrhea and reducing its duration, hence shorten the period of admission in the hospital. The golden initial treatment is an oral rehydration solution (ORS) which replaces the fluid and electrolyte losses. However, it doesn't reduce the duration of diarrhea. Therefore, other therapeutic mea-

asures, adding to the ORS are widely assessed [14].

The current study was aimed to show the effectiveness of the early introduction of LFM formula in the treatment of acute diarrhea in babies formula-fed. This study was showed a significant improvement among children taken LFM compared to those taken OMF. These results are consistent with the study has done in Tikrit [15] which has shown a significant decrease in the frequency of bowel motions on LFM. Also, our result was similar to that have been reported in Lebanon [16], Iran [17], and China [12] studies.

It was found in this study a statistically significant difference in the duration of diarrhea in babies with acute gastroenteritis who received LFM as compared with the OMF. Similar results have been obtained in many other studies [12, 18]. All these studies have found that the median duration of diarrhea was significantly shortened in the LFM groups in comparison with the control groups. However, many other studies are against restricting lactose intake completely in infants as it interferes with growth and development, and they have not recommended the routine use of LFM in the outpatient setting for children with acute gastroenteritis and they emphasize the use of low-lactose diets instead. However, for babies with persistent diarrhea, lactose restriction is recommended [19-21].

In this study, there was a statistically non-significant difference in response cases among boys and girls, no other previous study has proved a significant difference. However, a significant difference was reported among response cases in different age groups in group A (the lower age groups reported a high percentage of response more than the upper age group), this might due to the emergence of lactose intolerance which increases with age [22] or might due to added food which contains milk.

The limitations of the present study were the small sample size and we only considered the response of diarrhea. However, some other important aspects like weight loss during diarrhea and mortality were not considered. Such a study is highly recommended in future researches.

We conclude that using LFM in acute diarrhea in young children has a significant benefit concerning the response rate and duration of response. Besides, the response rate was more in lower age children. We recommend adding LFM in acute diarrhea regime management in young children with acute diarrhea.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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