Type of the Paper (Article)

Role of Bovine Colostrum in Treatment of Gastroenteritis in Infant and Children

Esam Eldeen G. Ahmed[1], Hanaa H. Mahmoud1, Remon M. Yousef[1], Sammar F. Abdullah[1*]

1 Department of Pediatric, Faculty of Medicine, Fayoum University, Fayoum, Egypt.

* Correspondence: Sammar F. Abdullah, sf1332@fayoum.edu.eg; Tel: (002) 01019124226.

Abstract

Introduction: Gastroenteritis is a major global problem that affects infants and children in developing and developed countries. Bovine Colostrum (BC) is a rich source of nutrients and biologically active molecules essential for several specific functions such as defensive action, the modulation of the immune response, and the growth and repair of several tissues. The components of colostrum might intervene in various pathogenesis phases of several diseases, thus contributing to an improvement of clinical symptoms.

Aim of the study: The study aimed to determine the role of bovine colostrum in acute gastroenteritis treatment in infants and children.

Subjects and Methods: In the current study, 100 infants and children were recruited. Participants were divided into two groups according to the treatment with/without BC. The effect of treatment on the motion of diarrhea, consistency of diarrhea, frequency of other symptoms, occurrence of dehydration, and need for hospitalization were observed for seven days.

Results: The study revealed statistically significant differences between the two groups regarding the motion of diarrhea, improvement of vomiting, dehydration, and need for hospitalization ($P<0.05$)

Conclusions: The early use of BC in children with acute gastroenteritis might decrease the duration of hospitalization, vomiting, diarrhea, dehydration, electrolyte disturbance, and associated complications.

Keywords: Acute gastroenteritis; Bovine Colostrum; Children; Diarrhea; Vomiting; Hospitalization.

1. Introduction

Gastroenteritis is a medical condition characterized by inflammation of the gastrointestinal tract that involves the stomach and \ or the small intestine [1]. Signs and symptoms include diarrhea, with or without vomiting, abdominal pain [2], fever, lack of energy, and dehydration may also occur [3]. Colostrum is the first milk secreted at parturition and lasts two to four days. Colostrum contains higher levels of proteins, lactalbumin, lactoglobulins (such as the immunoglobulins of IgG1, IgG2, IgM, and IgA), peptides (Lactoferrin, transferrin), hormones, growth factors (insulin-like growth factor), prostaglandins, enzymes, cytokines, minerals, and vitamins [4]. Lactoferrin (LF) is a naturally occurring iron-binding protein in the milk of many mammals, such as in humans and cows' colostrum. The high amount of LF in colostrum, about seven times the amount in milk, was known to exert a broad-spectrum primary defense activity against bacteria (both gram-positive and gram-negative), fungi, protozoa, and viruses. LF's iron-binding activity is the basis of its

bacteriostatic effect. Its ability to bind to surficial components on the bacterial cells is responsible for its bactericidal properties [5].

Bovine colostrum (BC) is a rich source of nutrients and biologically active molecules essential for several specific functions, such as defensive action, the modulation of the immune response, and the growth and repair of several tissues [6]. The components of colostrum might intervene in various pathogenesis phases of several diseases, thus contributing to an improvement of clinical symptoms [7].

In Rotavirus infection, LF inhibits the cytopathic effect [6]. That results in amelioration of the severity of rotaviral gastroenteritis and a decrease in the volume of diarrhea [7].

The current study aimed to determine the role of bovine colostrum in acute gastroenteritis treatment in infants and children.

2. Subjects and methods

2.1.Subjects

The study was conducted on 100 infants and children who attended Fayoum University Hospital with acute gastroenteritis from May 2017 to November 2017. The ages of the studied patients ranged from six months to three years. The children were classified into two groups. The first group included 50 patients treated with oral rehydration solution plus BC and specific treatment if needed. The second group included 50 patients who received oral rehydration solution plus specific treatment. The groups were matched, before treatment, in fundamental descriptive data and initial clinical presentation.

2.2.Statistical analysis

The statistical analysis was performed to investigate the significance level of $P<0.05$. The Statistical Packages for the Social Sciences (SPSS, Inc., Chicago, IL, USA) was used.

3. Results

The mean ages were 15.6 ± 8.8 and 14.3 ± 7.7 months in groups (1) and (2), respectively. Males constituted 56% and 58% of patients in both groups. Regarding the residency, 70% of patients were from rural areas (Table 1). The mean frequency of diarrhea was 7.2 ± 2.3 attacks (5-10) in the group (1), while it was 6.7 ±2.2 attacks (5-8) in the group (2). The character of diarrhea was watery in all cases of the group (1) and 98% of the group (2).

12% of cases in group (1) and 20% in the group (2) had mucous in the stool (by the naked eye), while 2% had bloody diarrhea.

Group (1) was treated with BC plus ORS, while group (2) was treated with other specific treatments according to the case plus ORS. All cases were followed for seven days according to a number of motions of diarrhea, consistency of diarrhea, frequency of other symptoms, the occurrence of

dehydration, and the need for hospitalization.

The results showed statistically significant differences between the two groups regarding the motion of diarrhea. The attacks were 4.1 ± 2.3 versus 6.4 ± 1.9 on the first day, 2.9 ± 2.7 versus 6.1 ± 2.1 on the second day, and 0.2 ± 1.2 versus 3.8 ± 3.0 on the third day for the group (1) and (2), respectively (*P<0.0001*) (Table 1).

Table 1: Baseline characteristics with details of the Cesarean section preceding entry to the study.

Variable	Group 1 (n = 50)	Group 2 (n = 50)	*P- value*
After 1 day	4.1 ± 2.3 3 (2-6)	6.4 ± 1.9 6 (5-8)	<0.0001*
After 2 days	2.9 ± 2.7 2 (1-4)	6.1 ± 2.1 5.5 (4.75-7)	<0.0001*
After 3 days	1.4 ± 2.5 0 (0-3)	5.3 ± 2.2 5 (4-6.25)	<0.0001*
After 4 days	0.7 ± 1.9 0 (0-0)	4.5 ± 2.8 4 (3-6)	<0.0001*
After 5 days	0.2 ± 1.2 0 (0-0)	3.8 ±3.0 3 (2-6)	<0.0001*
After 6 days	0.2 ± 1.1 0 (0-0)	3.2 ± 3.9 2 (0-6)	<0.0001*
After 7 days	0.1 ± 0.8 0 (0-0)	2.7 ± 3.9 0 (0-6.25)	<0.0001*

n: number. Values are presented as mean ± SD, * statistically significant.

Furthermore, the results showed a statistically significant difference between the two groups regarding the consistency of diarrhea. On the first day, diarrhea became mainly semifluid in 62% of cases in the group (1) versus 12% in group (2) (*P<0.0001*). On the second day, the consistency of diarrhea became normal in 12% of cases in the group (1) versus 0% in the group (2) (*P<0.0001*). On the third day, it became normal in 96% of cases in the group (1) versus 22% in group (2) (*P< 0.0001*), as shown in **Figure 1.**

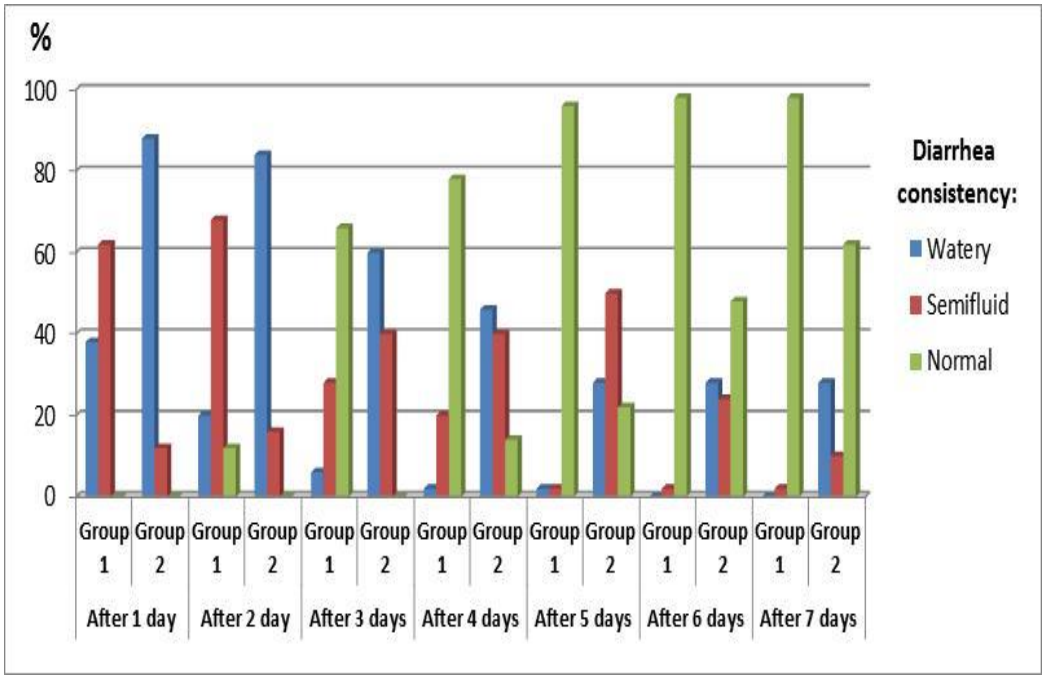

Figure 1: Effect of treatment on the change in consistency between the two groups.

The frequencies of the other symptoms of gastroenteritis (vomiting and fever) were followed for 48 hours. Regarding the improvement of vomiting, the results showed significant differences between the two groups (*P<0.0001*). On the first 24 hours of follow-up, vomiting improved in 98% of cases in the group (1) versus 68% in the group (2) (*P<0.0001*), as shown in **Table 2.**

Table 2: Uterine bleeding pattern and urological symptoms of women in the study group.

Variable		Group 1 (n = 50)	Group 2 (n = 50)	*P-value*
After 24 hours	**Yes**	1 (2%)	16 (32%)	<0.0001*
	No	49 (98%)	34 (68%)	
After 48 hours	**Yes**	0 (0%)	1 (2%)	1
	No	50 (100%)	49 (98%)	

Regarding the occurrence of dehydration and the need for hospitalization, the study showed significant differences between the two groups. 2% and 30% of cases in groups (1) and (2), respectively, showed signs of dehydration and the need for hospitalization (**Figure 2**).

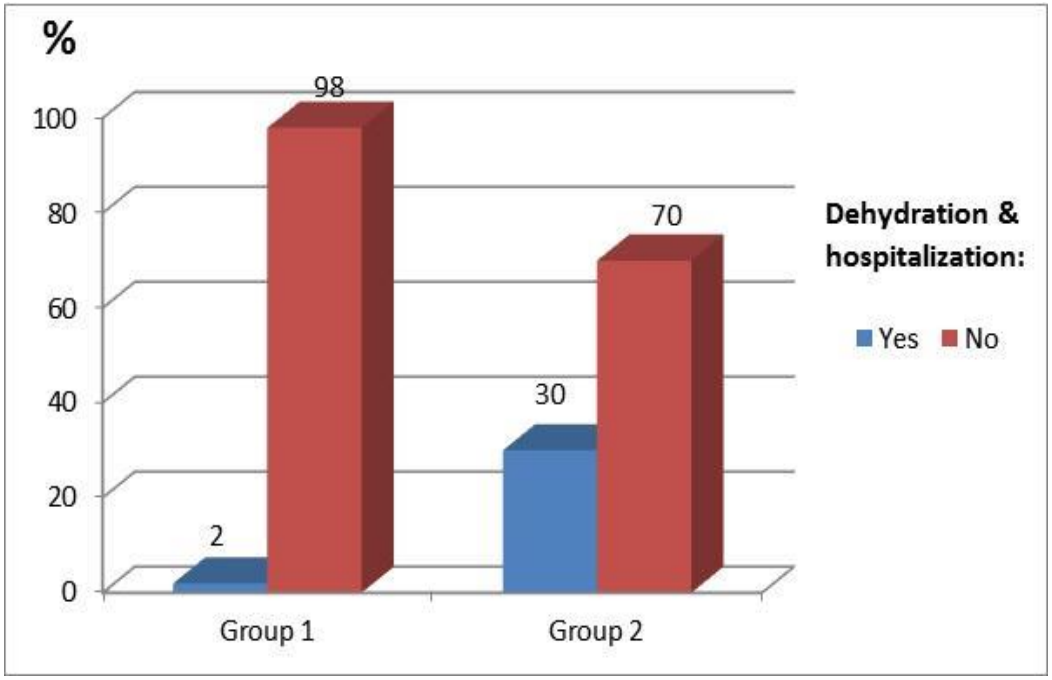

Figure 2: The effect of the occurrence of dehydration and the need for hospitalization in the two groups.

4. Discussion

In the current study, there was a significant difference between the two groups regarding the motion of diarrhea (on the 1st day (4.1 VS 6.4), on the 2nd day (2.9 VS 6.1), and on the 3rd day (0.2 VS 3.8); P<0.0001). That agreed with a study carried out at Menoufia University, in which 200 infants and children with acute gastroenteritis were conducted. That study revealed that the frequency of diarrheal attacks was reduced to one attack per day in patients treated with BC, and to three attacks per day in patients treated with traditional medications after five days post-treatment [8]. In the study conducted by Huppertz *et al*, (1999), 40 children suffered from diarrhea, which was caused by diarrheagenic Escherichia coli. They found that stool frequencies in the group treated with BC were significantly reduced compared with those in the placebo group [9].

The results were also consistent with other double-blind placebo-controlled trials carried out in Bangladesh on 80 children suffering from rotavirus diarrhea. They found that children who received immunized BC had significantly less daily and total stool output and stool frequency than placebo-treated cases (P<0.05) [10].

that was similar to the results of the open-labeled non-randomized study conducted by Claes-Henrik Florén *et al*, (2005) on thirty patients with HIV-associated diarrhea. The patients were treated with ColoPlusa's new product, based

on BC, for four weeks. The effects on the frequency of stool evacuations per day, body weight, fatigue, hemoglobin levels, and CD4+ counts before (week 1) and after treatment with Colo Plus (week 7) were measured. Results showed a dramatic decrease in stool evacuations per day from 7.0±2.7 to 1.3±0.5, a substantial decrease in self-estimated fatigue of 81%, an increase in body weight of 7.3 kg per patient, and an increase in CD4+ count by 125% (11).

Our study showed a statistically significant difference between the two groups regarding the frequency of vomiting according to 1st 24 hours of vomiting improved in 98% of cases in group (1) versus 68% in the group (2) (*P<0.0001*).

Conclusion

Early use of BC in children with acute gastroenteritis decreases the duration of hospital stay, the number of vomiting and diarrheal attacks, the degree of dehydration, electrolyte disturbance, associated complications, and the need for hospitalization.

Acknowledgments

The authors express their deep gratitude to all the participants and their parents.

Funding: No funding sources.

Conflict of interest: None declared.

Ethical approval:

The study was approved by the Institutional Ethics Committee

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