ACUTE DIARRHEAL MANAGEMENT

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INTRODUCTION

Acute watery diarrhea is usually resolved by itself but still it is connected with considerable healthcare costs & its treatment remains a frequent concern for health care.¹

Major causes are related to gastrointestinal infections (viral or bacterial) but rarely it may occur due to alimentary intoxications or due to other factors.

Since the main complications of acute diarrhea are dehydration and negative nutritive balance but it is evident that immediate replacement of lost body fluids and tolerable diet are the mainstay of management.²

Every year 25 Million cases of acute gastroenteritis are reported in children who are below 5 years of age, and approximately over one thousand die due to acute diarrhea.³ Escherichia coli (EAEC) and rotavirus are the main causative organisms causing acute gastroenteritis in children. 9.4% infants need admission in intensive care unit, while 4.9% infants die due to severe dehydration.⁴

About 20% of infants in Pakistan reported with acute diarrhea.⁵ In different study it is observed that Rotavirus is the major culprit of acute diarrhea. About 30.5% of the children presenting
with acute diarrhea are infected with rotavirus and 61% of these infected children are under the age of 1 year.\textsuperscript{6}

Saneian et al. Conducted a study in 2011 in infants suffering from acute diarrhea and found that infants who took lactose-free formula showed significant reduction in mean time of diarrhea relief when compared to those taking lactose-containing formula (1.7±0.7 vs. 2.6±0.7 days, \textit{T} < 0.001) respectively.\textsuperscript{6}

The results of this randomized controlled trial are promising and lactose-free formula can thus reduce the duration of diarrhea in infants. However, no local published data is available on this topic. The frequency of acute diarrhea is high in Pakistan due to the poor education of mothers regarding use of hygienic methods and also because 60% of the population of Pakistan lives in rural areas. Therefore the purpose of the current study is to repeat this trial and confirm the role of lactose-free formula in infants with acute diarrhea in local population. If its use is associated with early recovery from acute diarrhea, this study will enable routine use of lactose-free formula in future which will enable us to decrease morbidity and mortality associated with acute diarrhea.

MATERIAL & METHODS
Infants of both sex groups with ages in the range of 1-12 months and suffering from acute diarrhea were included in our study. Infants who had blood in stool, had taken antibiotics in last 8 weeks, had 2 or more episodes of vomiting, had renal failure (serum creatinine ≥1.2mg/dl as per investigations) or liver failure (serum bilirubin ≥1.2mg/dl as per investigations) at the time of presentation and whose body weight was ≤60 percentile of their age were expelled from our study. After endorsement from ERC, 60 infants (30 in each group) who presented in the emergency department of Pediatrics, DHQ Sargodha Hospital, Sargodha and who fulfilled the above criteria were consider in the study. Parents of these infants were counseled and explained about the details of the study. Detailed history and written informed consent was taken from each parent. These infants were separated into following two groups randomly.

- Group A: Infants using lactose-free formula
- Group-B: Infants using lactose-containing formula

Infants in both the groups received same antibiotics, and intravenous fluid replacement according to the Department protocol. Duration of acute diarrhea was calculated starting from the day of admission. These patients were rehydrated orally or intravenously according to the severity of dehydration. Mean duration of acute diarrhea was noted and recorded by the candidate into the attached proforma along with demographic details of the patient. The history, physical examination and naked eye examination of the stool consistency and frequency of stools upon presentation at the time of settlement of acute diarrhea were recorded by the candidate to eliminate bias and confounding variables were controlled by exclusion. Entire collected data was analyzed through SPSS version 20.0. Quantitative variables; age, weight & duration of acute diarrhea have been presented by mean ±SD. Independent sample t-test has been applied for comparison of mean duration of acute diarrhea between the two groups taking p≤0.05 as significant. Categorical variables; gender has been presented by frequency and percentage. Data has been stratified for age, gender and weight to address the effect modifiers. Post stratification independent sample t-test has been applied taking p value of ≤0.05 as statistically significant.

RESULTS
Infant’s age ranged from 1 month to 1 year with a mean of 7.2±3.1 months. Majority (n=41, 68.3%) of the infants were aged 6 months and above followed by 19 (31.7%) patients aged between 1-5 months. There were 29 (48.3%) male and 31 (51.7%) female patients with a female to male ratio of 1.1:1. The weight of infants ranged from 2.6 Kg to 11.9 Kg with a mean of 8.1±2.2 Kg. Both the study groups were then compared in terms of mean age (p-value=0.741), mean weight (p-value=0.932) and age (p-value=0.781), gender...
(p-value=0.438) and weight (p-value=0.573) groups distribution. The mean period of diarrhea was notably shorter in infants receiving lactose-free milk (1.7±0.8 vs. 2.7±0.8 days; p<0.001) as compared to those taking lactose-containing milk as shown in Table 9.3. Similar significant difference was observed across various subgroups based on patient’s age, gender and weight.

| Characteristics | Participants N=60 |
|-----------------|------------------|
| Age (months)    | 7.2±3.1          |
| ≤5 months       | 19 (31.7%)       |
| 6-12 months     | 41 (68.3%)       |

**Gender**

|               | Lactose-Free Milk N=30 | Lactose-Containing Milk N=30 | p-Value |
|---------------|------------------------|------------------------------|---------|
| Male          | 29 (48.3%)             | 21 (70.0%)                   | 0.438   |
| Female        | 31 (51.7%)             | 20 (66.7%)                   |         |

**Weight (Kg)**

|               | Lactose-Free Milk N=30 | Lactose-Containing Milk N=30 | p-Value |
|---------------|------------------------|------------------------------|---------|
| <7 Kg         | 10 (33.3%)             | 8 (26.7%)                    | 0.573   |
| ≥7 Kg         | 20 (66.7%)             | 22 (73.3%)                   |         |

**DISCUSSION**

In Developing countries major cause of mortality and morbidity in children is Diarrhea.8,10 The objective of this research was to compare mean duration of acute diarrhea in infants taking lactose free formula versus infants taking lactose-containing formula milk along with standard treatment. In this study, the average ages of the infants were between 7.2±3.1 months. A similar mean age of 8.6±4.3 months has been reported by Begum et al. Among infants presenting with diarrhea in Bangladesh.11 Allen et al. reported similar mean age of 7.5±2.5 months among Canadian infants with diarrhea.12 A similar mean age of 7.8±2.4 months has been reported in Chinese such infants by Wan et al.13

We observed that there were 29 (48.3%) male and 31 (51.7%) female infants with a female to male ratio of 1:1:1. A similar female predominance among diarrhea patients has been reported by Allen et al. Who reported male to female ratio of 1:1.3 in Canada.12 Bener et al. Reported similar female predominance with male to female ratio of 1:1.2 in such infants in Qatar.14 Begum et al. However reported a male predominance with male to female ratio of 2.1:1 in Bangladesh.11

In the present study, the weight of infants ranged from 2.6 Kg to 11.9 Kg with a mean of 8.1±2.2 Kg. Our study coincides with that of Wan et al. Whose results were similar to our study results with mean weight of 8.3±1.1 Kg among Chinese infants presenting with diarrhea while Allen et al. Reported it to be 7.9±1.3 Kg in Canada.12,13

In the present study, the mean duration of diarrhea was significantly shorter in infants receiving lactose-free milk (1.7±0.8 vs. 2.7±0.8 days; p<0.001) as compared to those receiving lactose-containing milk. Similar significant difference was observed across various subgroups based on patient’s age, gender and weight. Our observation is in line with the previously published report from Saneian et al. Who reported similar significant difference in the mean duration of diarrhea (1.7±0.7 vs. 2.6±0.7 days; p<0.001) in infants who received lactose-free formula as compared to those taking lactose-containing formula respectively.7
Our study is unique in our local population and has shown that lactose-free formula milk was associated with significant reduction in the mean duration of diarrhea as compared to lactose-containing formula milk regardless of patient’s age, gender and weight which advocates its preferred use in future practice in infants presenting with acute diarrhea.

A very strong limitation to the present study was that we only considered the duration of diarrhea, but some other important aspects like weight loss during diarrhea and mortality were not considered which are equally important and should be considered in future before adopting it in routine practice. Such a study is highly recommended in future research.

CONCLUSION
Lactose-free formula milk reduces the mean duration of diarrhea significant when compared to lactose-containing formula milk regardless of patient’s age, gender and weight which advocate its preferred use in future practice in infants presenting with acute diarrhea.

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| 1     | Muhammad Arshad             | Abstract, Literature review & methodology.                                                 |                     |
| 2     | Ahmad Hassan Khan           | Performed experiments & Methodology.                                                       |                     |
| 3     | Masood Mazhar               | Performed experiments, Compile & analyze results.                                          |                     |
| 4     | Nadir Ali Rana              | Typographical error & brief review.                                                         |                     |
| 5     | Shoaib Ahmed                | Typographical error & brief review.                                                         |                     |
| 6     | Amna Mubeen                 | Literature review helped in finding results.                                               |                     |
| 7     | Faiqa Chaudhury             | Helped in performing experiments.                                                          |                     |
| 8     | Farah Naz Akbar             | Helped in performing experiments.                                                          |                     |