

Original Research Article

Role of yogurt in children having diarrhea and severe acute malnutrition at Nutrition Stabilization Center Hyderabad

Abstract:

Aim: The aim of conducting this study is to evaluate the role of yogurt in the dietary management of diarrhea in the severe malnourished children.

Study Design: Observational prospective study

Place and duration: Nutrition Stabilization Center, Department of Pediatrics
Civil Hospital Hyderabad from 1st July 2018 to 31st December 2018

Methodology: A total of 100 children with severe acute malnutrition and Diarrhea, age 6 months to 5 years were enrolled. After admitting children were treated with yogurt instead of fluids, f-75 and ORS. Within 7 days of admission we observed and recorded that children tolerated the breast milk and yogurt, clinically improvement, General condition, Edema, Sunken eyes, Thirst, Skin pinch, Weight gain and Social response of baby. Chi-square test was also applied to observe the difference efficacy of yogurt in diarrhea in

children suffering from malnutrition. P-value ≤ 0.05 was considered as significant.

Results: Most of the children were 13 to 48 months of age. The average age and weight of the children was 32.04 ± 13.53 months and 5.23 ± 1.39 kg respectively. Average number of stool was significantly reduced at day 1 and day 5. Overall it was observed that efficacy of yogurt in diarrhea in children suffering from malnutrition was 69%

Conclusion: This study suggest that yogurt-based diet is effective in treating diarrhea in severely acute malnourished children. It should be granted priority in the nutritional management of severe malnutriated children affected by diarrhea.

Keywords: Malnutrition, Yogurt, Children, Diarrhea

Introduction

Diarrhea in severely malnourished children is a life threatening and is difficult to manage. Diarrhea causes malnutrition by slowing or lessen nutrient absorption or making children to take less food, which causes more demand or wastage of nutrients. Main cause of diarrhea in developing countries is absence of sanitation and hygiene. Globally diarrhea is a leading cause of mortality in children.

Diarrhea kills 760,000 children every year.¹ Diarrhea mostly results from contaminated food and water sources.² Malnourished children are most at risk of lethal diarrhea.³

About 50% children in South Asia (Pakistan, India, and Bangladesh) are malnourished.⁴ Pakistan, has the second highest child mortality rate in South Asia.⁵ In most cases malnutrition is the cause of high infant and under five child mortality.⁶ “As per the National Health Survey of Pakistan, one out of every three children is malnourished”⁷.

Yogurt has been used traditionally in children as it is good source of energy rich protein and other nutrients than do other foods. Yogurt is healthy food made by fermentation of bacteria in milk. Yogurt is easily palatable for children. Yogurt contains probiotics which enhances its actions in maintenance of bacteria necessary for healthy digestive system. It provides depleted good bacteria in the gut that helps to firm bowel movement.

F-75 is milk commonly given in the management of severe acute malnutrition having diarrhea but is not commonly available and is not economic. Easily available and economic thing is Yogurt. Yogurt is often easier to tolerate than milk and other feed and is a good source of complete or high-quality zinc and calcium⁸

Previous studies conducted on role of Low osmolar ORS, F-75, Low lactose milk, Lactose free diet in diarrhea has been done. The aim of conducting this

study is to evaluate the role of yogurt in the dietary management of diarrhea in the severe malnourished children.

OPERATIONAL DEFINITION

Severe Acute malnutrition is defined as wasting and/or edematous condition in which MUAC < 11.5 mm or presence of bilateral pitting edema or Z score < -3SD

Diarrhea is defined as 'the passage of three or more loose or liquid stools per day

MATERIALS & METHODS

This Observational prospective study was conducted with Non-probability convenience sampling technique at the indoor NSC Department of Pediatrics Civil Hospital Hyderabad from 1st July 2018 to 31st December 2018. A sample size of 100 patient required calculated by the exact 95% confidence interval. Children with severe acute malnutrition and Diarrhea, age 6 months to 5 years were enrolled.

Children having severe acute malnutrition and Diarrhea with other serious complications like meningitis, cerebral palsy, coeliac disease and parenteral infections were excluded from the study. Permission was taken from the ethical review committee of university.

Children suffering from Malnutrition along with diarrhea attending the pediatrics OPD and ward fulfilling the inclusion criteria were registered after taking informed verbal consent from the mothers. Variables included demographic details like name, age, sex and address, symptomatology like general physical examination, weight for height, dehydration status. After admitting children were treated with yogurt instead of fluids, f-75 and ORS. Within 7 days of admission we observed and recorded that children tolerated the breast milk and yogurt, clinically improvement, General condition, Edema, Sunken eyes, Thirst, Skin pinch, Weight gain and Social response of baby.

All the information was collected into predesigned proforma which was filled by the investigator herself.

A statistical package for social science (SPSS-22) was used to analyze data. Frequency and percentages were calculated for categorical variables like gender, anemia, assessment of diarrhea, feeding history, diarrhea with dehydration status and categorical outcome. Mean and standard deviation were computed for quantitative variables like age, weight, clinical examination and numeric outcomes. Paired sample t test was applied to observe mean difference in number of stool among three different time (1,3 and 5 days), similarly McNemar and marginal homogeneity test was used to compare the difference in categorical outcome like vomiting, consistency, dehydration status among three different time point. Chi-square test was also applied to

observe the difference efficacy of yogurt in diarrhea in children suffering from malnutrition. P-value ≤ 0.05 was considered as significant.

RESULTS

A total of 100 children with severe acute malnutrition and diarrhea were included in this study. Most of the children were 13 to 48 months of age as shown in table 1. The average age and weight of the children was 32.04 ± 13.53 months and 5.23 ± 1.39 kg respectively. There were 52% male and 48% female as shown in table 2. About 20% children had anemia as shown in table 1. Assessment of diarrhea was also done in term of number of stool per day, consistency, blood in stool and duration of diarrhea as presented in table 2. Regarding the history of feeding of children, breast feeding was observed in 40% children and average feeding per day was 5.83 ± 2.14 days.

Role of yogurt in dietary management of diarrhea in severe malnutrition children in term of average number of stools, frequency of vomiting status, consistency and dehydration status as well as feeding status according to day1, day-2 and day-5 were observed and shown in table 3, table 4 and 5 respectively. Average number of stool was significantly reduced at day 1 and day 5 as shown in figure 1. Overall it was observed that efficacy of yogurt in diarrhea in children suffering from malnutrition was 69% as shown table 1. At the end of the treatment, Number of stools, Vomiting, Consistency, and Dehydration were observed low.

TABLE 1
 DESCRIPTIVE STATISTICS OF DEMOGRAPHIC AND CLINICAL
 EXAMINATION OF CHILDREN n=100

Variables	Mean	Std. Deviation
Age (Months)	32.04	13.53
Weight (kg)	5.23	1.39
Gender	number	percentage
Male	52	52
Female	48	48
Anemia present	20	20

Anemia absent	80	80
Yogurt was effective	69	69*
Yogurt was not effective	31	31

* P-Value = 0.0005

UNDER PEER REVIEW

Table 2:- Assessment of Diarrhea

Number of stools per days	
Mean \pm SD	12.76 \pm 1.77
Max-Min	16-8
Consistency	
Watery	73%
Semi Solid	26%
Mucoid	1%
Blood in stool	27%
Duration of diarrhea (days)	
Mean \pm SD	4.62 \pm 1.57
Max-Min	10-3

TABLE 3

ROLE OF YOGURT IN DIETARY MANAGEMENT OF DIARRHEA IN SEVERE
MALNUTRITION CHILDREN IN TERM OF VOMITING
STATUS ACCORDING TO FOLLOW-UP

n=100

Vomiting	Day-I	Day-III	Day-V
Zero	61%	71%	90%
1-2	30%	24%	8%
3-5	9%	5%	2%

McNemar test applied

Day -I vs. Day-III p=0.450;

Day- I vs. Day-V p=0.0008

Day-III vs. Day-V p=0.002

TABLE 4

ROLE OF YOGURT IN DIETARY MANAGEMENT OF DIARRHEA IN SEVERE
MALNUTRITION CHILDREN IN TERM OF CONSISTENCY ACCORDING TO FOLLOW-
UP

n=100

Consistency	Day-I	Day-III	Day-V
Watery	76%	71%	53%
Semisolid	20%	23%	31%
Mucoids /Bloody	4%	4%	4%
Normal	0%	2%	12%

Marginal Homogeneity Test

Day -I vs. Day-III $p=0.204$;

Day- I vs. Day-V $p=0.0005$

Day-III vs. Day-V $p=0.0005$

TABLE 5

ROLE OF YOGURT IN DIETARY MANAGEMENT OF DIARRHEA IN SEVERE
MALNUTRITION CHILDREN IN TERM OF DEHYDRATION STATUS ACCORDING TO
FOLLOW-UP

n=100

Dehydration status after treatment	Day-I	Day-III	Day-V
No	0%	65%	89%
Some	41%	25%	9%
Severe	59%	10%	02%

Marginal Homogeneity Test

Day -I vs. Day-III p=0.680;

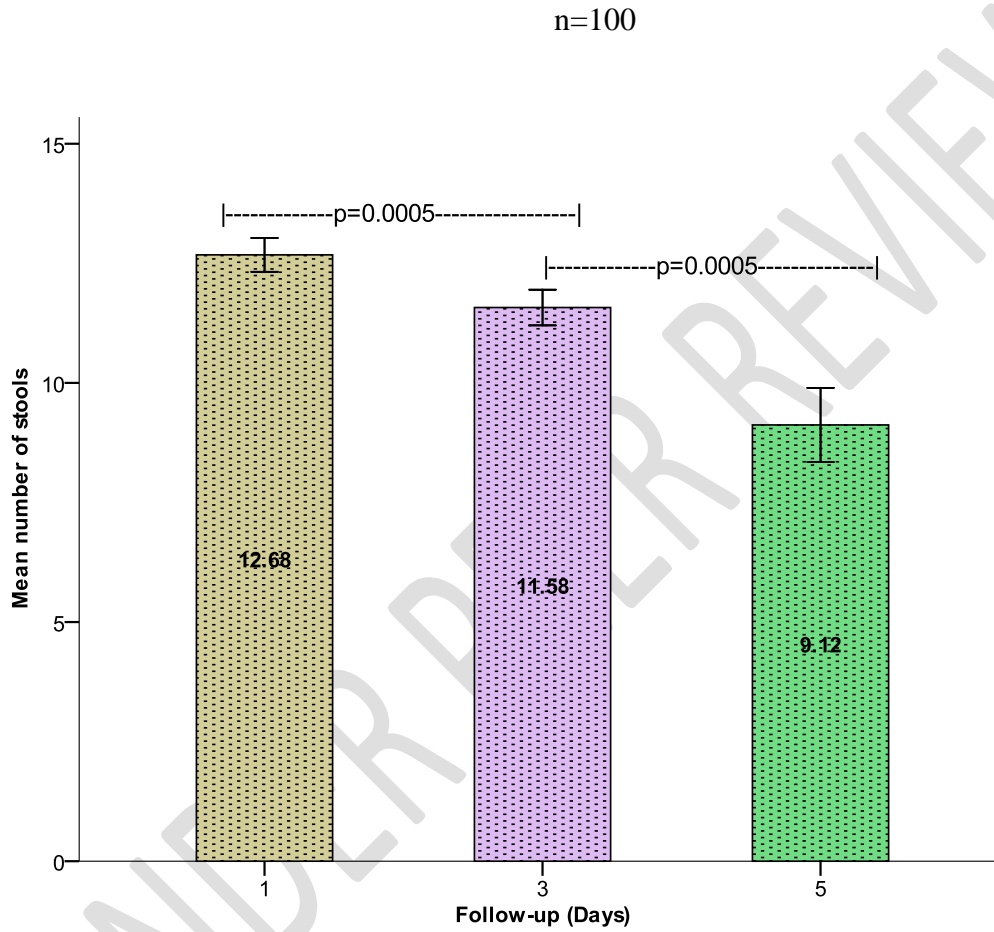
Day- I vs. Day-V p=0.0003

Day-III vs. Day-V p=0.0002

FIGURE 1

ROLE OF YOGURT IN DIETARY MANAGEMENT OF DIARRHEA IN SEVERE MALNUTRITION CHILDREN IN TERM OF AVERAGE NUMBER OF STOOLS

ACCORDING TO FOLLOW-UP



DISCUSSION

Severe acute malnutrition is associated with hypernatremia and hypokalemia that's why, the standard WHO oral rehydration salts (ORS) solution should not be given to malnourished children. As Rehydration salts solution for severely malnourished children (ReSoMal) contains less sodium and more potassium, so it is the ideal solution for malnourished children.⁹

In this study the average age and weight of the children was 32.04 ± 13.53 months and 5.23 ± 1.39 kg respectively. There were 52% male and 48% female. In this study male were 61%, and female were 39%, while 20% children had anemia.

Research has proved that yogurt can also be effective in reducing the duration of diarrheal episode.¹⁰ In this study Overall it was observed that efficacy of yogurt in diarrhea in children suffering from malnutrition was 69%. There are only a few studies that used yoghurt in acute diarrhoea. A study by Eren et al showed that yoghurt administration was associated with non-significantly shorter hospital stays compared to the children administered probiotic in earlier resolution of the diarrhea¹¹ Binnendijk and Rijkers have reported that yogurt and probiotics improved duration, frequency, and severity of diarrhea as well as hospital stay in malnourished children¹²

In an unsimilar study all children recovered from diarrhea within a maximum of six days,¹³ while in our study only 69% children were recovered. This difference may be due to severely malnourished children in our study.

An Indian study showed no significant differences in diarrhoea outcomes comparing a milk to yogurt regimen among malnourished boys with diarrhoea.¹⁴ A study done in India to evaluate the difference between F 100 milk and yogurt in malnourished children with diarrhea. Use of yogurt in malnourished children with acute diarrhea does not achieve any significant clinical benefit versus milk.¹⁵

In an international study duration of diarrhea and number of stools were significantly less in group who took yogurt compared with group who took milk. Forty-eight hours after admission, diarrhea was still present in 62% of milk group versus in 35% of yogurt group ($P < 0.002$).¹⁶

CONCLUSION

This study suggest that yogurt-based diet is effective in treating diarrhea in severely acute malnourished children. It should be granted priority in the nutritional management of severe malnutriated children affected by diarrhea. Nevertheless, large scale studies should be conducted prior to its generalized application.

References:

1. Melese B, Paulos W, Astawesegn FH, Gelgelu TB. Prevalence of diarrheal diseases and associated factors among under-five children in Dale District, Sidama zone, Southern Ethiopia: a cross-sectional study. BMC Public Health. 2019; 19(1):1-0.
2. Daud MK, Nafees M, Ali S, Rizwan M, Bajwa RA, Shakoor MB, Arshad MU, Chatha SA, Deebe F, Murad W, Malook I. Drinking water quality status and contamination in Pakistan. BioMed research international. 2017 ;14

3. Bhutta ZA, Berkley JA, Bandsma RH, Kerac M, Trehan I, Briend A. Severe childhood malnutrition. *Nature reviews Disease primers*. 2017; 3(1):1-8.
4. Asim M, Nawaz Y. Child malnutrition in Pakistan: evidence from literature. *Children*. 2018; 5(5):60.
5. Aziz A, Saleem S, Nolen TL, Pradhan NA, McClure EM, Jessani S, Garces AL, Hibberd PL, Moore JL, Goudar SS, Dhaded SM. Why are the Pakistani maternal, fetal and newborn outcomes so poor compared to other low and middle-income countries? *Reproductive Health*. 2020; 17(3):1-2.
6. Torlesse H, Le MT. South Asia and child wasting—unravelling the conundrum. *Field Exchange* 63. 2020; 10:7.
7. Ahsan S, Mansoori N, Mohiuddin SM, Mubeen SM, Saleem R, Irfanullah M. Frequency and determinants of malnutrition in children aged between 6 to 59 months in district Tharparkar, a rural area of Sindh. *J Pak Med Assoc*. 2017; 1; 67(9):1369-73.
8. Elliott BR. Impressive Health Benefits of Yogurt. Retrieved from. 7.
9. Mohanty N, Thapa BR, Mathai J, Pai U, Mohanty N, Biradar V, Jog P, Prabhu P. Low Osmolarity Oral Rehydration Salt Solution (LORS) in Management of Dehydration in Children. *Indian Pediatrics*. 2021; 58(3):266.
10. Rijkers GT, De Vos WM, Brummer RJ, Morelli L, Corthier G, Marteau P. Health benefits and health claims of probiotics: bridging science and marketing. *British Journal of Nutrition*. 2011; 106(9):1291-6.
11. Hirani SA. Child-rearing practices in Pakistan and associated challenges for health care professionals. *Global Unity for Neonatal Nurses*. (Online). 2008.

12. Binnendijk KH, Rijkers GT. What is a health benefit? An evaluation of EFSA opinions on health benefits with reference to probiotics. *Beneficial microbes*. 2013; 4(3):223-30.
13. Sharif A, Kheirkhah D, Esfandabadi P, Masoudi S, Ajorpaz N, Sharif MR. Comparison of regular and probiotic yogurts in treatment of acute watery diarrhea in children. *J Probiotics Health*. 2017; 5:2.
14. Bhatnagar S, Singh KD, Sazawal S, Saxena SK, Bhan MK. Efficacy of milk versus yogurt offered as part of a mixed diet in acute noncholera diarrhea among malnourished children. *The Journal of pediatrics*. 1998; 132(6):999-1003.
15. Bhatnagar S, Singh KD, Sazawal S, Saxena SK, Bhan MK. Efficacy of milk versus yogurt offered as part of a mixed diet in acute noncholera diarrhea among malnourished children. *The Journal of pediatrics*. 1998; 132(6):999-1003.
16. Boudraa G, Benbouabdellah M, Hachelaf W, Boisset M, Desjeux JF, Touhami M. Effect of feeding yogurt versus milk in children with acute diarrhea and carbohydrate malabsorption. *Journal of pediatric gastroenterology and nutrition*. 2001;33(3):307-13.