

Management of Diarrhea newer aspects

Kiran B Bhaisare¹, Sunil Holikar^{2*}

^{1,2}Associate Professor, Department of Paediatrics, Vilasrao Deshmukh Government Medical College, Latur, Maharashtra, INDIA.

Email: sunilholikar@gmail.com

Abstract

Background: To study the effects of zinc and probiotics in management of acute diarrhea. **Materials and methods:** Patients of age 6 month to 12 years admitted to the ward with acute gastro enteritis from a time period of April 2018 to November 2020 [18 months] are selected. Three group were done, Group A given zinc syrup 20 mg/day + ORS, Group B given probiotic -prebiotic sachets 1/2 tds + ORS, Group C given plain ORS. **Study type:** Randomized control trial. **Results and conclusions:** In our study the stool frequency in the 3 groups after 24, 24-48, 48-72, 72-96, >96 hours was not statistically significant. The change in the number of watery stools after 24 hours, 24- 48 hours, 48- 72 hours after intervention in all the three groups was not statistically significant. The average duration of admission days in 3 groups were not statistically significant [p -0.584]. The number of days of admission in the group A,B and C was 1.76,1.86,1.92 days respectively. **Statistical Analysis:** The tabulated data of groups were compared by chi-square tests. **Key Words:** Zinc, Probiotics, Acute Diarrhea.

*Address for Correspondence:

Dr Sunil Holikar, Associate Professor, Department of Paediatrics, Vilasrao Deshmukh Government Medical College, Latur, Maharashtra, INDIA.

Email: sunilholikar@gmail.com

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INTRODUCTION

Diarrhea remains a major cause of morbidity and mortality in developing countries and is often the commonest cause of death in the first few years of life accounting for 10-20% of childhood deaths.¹ In recent years, the major advance in the treatment of acute gastroenteritis in children was the introduction of oral rehydration solution (ORS) in the early stages of illness. Significant proportions of children who suffer from diarrhea are malnourished with depleted micronutrient stores. Diarrhea also leads to excess loss of micronutrients such as zinc and copper. Therefore children with marginal nutritional status are also at the greatest risk of developing zinc and copper depletion with an episode of diarrhea.² Zinc has a direct effect on intestinal villous, brush border disaccharides activity and intestinal transport

of water and electrolytes. Zinc also has a marked effect on T cell function and its supplementation improves immunity. Thus it may also reduce the severity of diarrhea.¹ This study was done to test the hypothesis that daily supplementation of zinc has effect on frequency and amount of stool and shortens the duration of acute diarrhea in children of 6 months to 12 years of age while treating acute diarrhea. Probiotics are defined by Fuller as a live microbial food supplement that beneficially affects the host animal by improving its intestinal microbial balance. Prebiotics are defined by Fuller as short chain polysaccharides, not completely digested by human intestinal tract, that serve as a food supply for the friendly bacteria of the large bowel, enhancing their growth and cell division rate.³

MATERIAL AND METHODS

Type of study- It is a stratified randomized control trial.

Description of the intervention: This study was conducted in Department of pediatrics, MIMSER Medical college, Latur. In this study, Patients of age 6 month to 12 years admitted to the ward who presented to the hospital with more than three unformed stools in 24 hours from a time period of November 2018 to April 2020 [18 months] were selected.

Inclusion criteria: Patients aged 6 months to 12 years. Three groups are formed, 6 - 12 months, 1 - 5 years. 6 - 12

years. Having > 3 stools per day for > 1 day. Admitted to ward with s/o some dehydration.

Exclusion criteria: Deysentry. Cholera. Severe dehydration with poor general condition. Intractable vomiting not controlled within 24 hours of admission. Toxic encephalopathy. Acidosis /acute renal failure. A child could be enrolled only once. Any child receiving systemic or oral antibiotics, multivitamins, iron, antimotility drugs, pre- and probiotics and other drugs before or after admission were also excluded.

Patients are randomly allocated into 3 groups by stratified random sampling: Group a - zinc +ORS. Group b- Probiotics +ORS. Group c- plain ORS.

Parameters like stool frequency, consistency. Duration of stay in hospital were studied. Patients are discharged when they have been controlled of the loose stools, that is having < 3 stools/day and non-watery stool.

Blinding: Double blinding technique was used in present study. All study participants and personnel including care providers, evaluators and monitors were blinded to treatment assignment for the whole duration of the study to avoid any type of bias.

RESULTS AND CONCLUSIONS

Table 1: Age

Groups	Age
Zinc	50 members Average -3.91 years
Probiotics	50 members Average -3.07 years
Control	50 members Average -3.84 years

Table 2: Sex

Groups	Total patients= 50
Zinc	Males-30 [60 %] Females-20 [40 %]
Probiotics	Males-30 [60%] Females-20 [40%]
Control	Males -23 [46 %] Females -27 [54%]

Table 3: Weight

Group	6 months to 12 years Avg. weight
Zinc	12.46kg
Probiotics	12.64kg
Control	12.20kg

Table 4: Average No. of stools in 6 months to 12 years age group from day 0 --day 4

Groups	TILL 24 HOURS	24 -48 HOURS	48- 72 HOURS	72- 96 HOURS	> 96 HOURS
Zinc	8.16	4.32	1.76	0.41	0.00
Probiotics	8	4.66	1.82	0.50	0.00
Control	7.91	4.66	1.97	0.41	0.06

Table 5: Fluidity of stools on days 0- 4 in the 3 groups

Groups	TILL 24 HOURS	24-48 HOURS	48-72 HOURS	72-96 HOURS	>96 HOURS
Zinc	S- nil	S- 2 %	S-18 %	S-2 %	S---
	SS-57 %	SS- 74 %	SS-36 %	SS-12 %	SS ---
	W-43 %	W- 24 %	W-10 %	W-NIL	W---
Probiotics	S-NIL	S- 4 %	S-6 %	S- 10 %	S----
	SS-56 %	SS-70 %	SS-44 %	SS-14 %	SS ----
	W-44 %	W-26 %	W- 6 %	W-NIL	W-----
Control	S-NIL	S-2 %	S- 4 %	S- 2 %	S-----
	SS-56.2 %	SS-64 %	SS-50 %	SS-16 %	SS-6 %
	W-43.8 %	W-32 %	W-10 %	W- NIL	W----

[KEY- S-solid, SS-semisolid, W-watery]

Table 6: Average number of days of hospital admission

Group	Total avg.
Zinc	1.76 days
Probiotics	1.86 days
Control	1.92 days

In our study the stool frequency in the 3 groups after 24, 24-48, 48-72, 72-96, > 96 hours was not statistically significant. The change in the number of watery stools after 24 hours, 24- 48 hours, 48- 72 hours after intervention in all the three groups was not statistically significant. The

groups were compared by chi-square tests. (p value-0.610). The average duration of admission days I the 3 groups values were not statistically significant [p -0.584].

DISCUSSION

Our intent was to evaluate the therapeutic effects of trace mineral by replenishing the immediate losses during the diarrheal episode, rather than restoring body stores, study by Archana B. Patel *et al.* showed a statistically insignificant effect on reduction of duration of diarrhea but a 19% reduction in the risk of diarrhea >4 days. The

therapeutic effect of zinc in reducing duration of acute diarrhea has been documented in a pooled analysis of randomized controlled trials¹ Mohammad Karamyyar, *et al.* 2013 Concluded beneficial result on consistency and mean duration of hospitalization was significantly lower in the patients receiving zinc supplements⁴ Muhammad Hatta *et al.* 2011, conclude that a combination of zinc and probiotic therapy is more effective than zinc therapy alone in reducing the severity of acute diarrhea in children under five years.⁶ Sazawal S, Black, Bhan MK *et al.* 1995 and Nagla'a Al-Sonboli, Ricardo Q. Gurgel, Alan Shenkin, *et al.*, The results obtained in their study are different as compared to our study. There was a marked reduction in the duration of the diarrhoea (1.1 or 2.6 days) and of watery stools in the zinc-supplemented group ($p < 0.001$). Number of stools after 48 hours are 4.1 in the zinc group and 10 in the control group [$p < 0.001$]. Patel, Dhande, Rawat *et al.* From IGMC Nagpur conducted similar studies.

Table 7

	ZINC GROUP	CONTROL	p value
Patel <i>et al.</i>	4.34	4.48	0.713
Our study	1.76	1.92	0.584

The results in this study are similar to the results obtained in our study.

CONCLUSION

Evidence from these trials on effectiveness of zinc in acute diarrhea is compelling. Failure to see a significant difference in duration of diarrhea in our study could be due to a number of reasons. Therefore, it is unclear from the study whether zinc would be effective despite the severity of diarrhea. Most of our study population are hospital referrals. Perhaps the trace mineral supplementation is more useful in children with a less severe illness. Secondly, we did not measure the plasma zinc and its response to the supplementation. Although plasma zinc may not reflect the

zinc stores, it is known to increase with supplementation⁵ This study was not powered for mortality or the number of complications so larger trials are also needed to detect a significant difference in diarrheal duration and its morbidity in different types and severity of acute diarrhea.

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