

Comparison between zinc-probiotic combination therapy and zinc therapy alone in acute gastroenteritis in a tertiary care hospital in Pakistan

Mariam Khan Qamar¹ Armaghana Qamar Khan² Muhammad Amir Saleem³ Maryum Hameed⁴ and Paras⁵

¹Department of Pathology, Fauji Foundation Hospital Islamabad ^{2,4,5}Department of Pathology, Pakistan Institute of Medical Sciences ³ District Health Office Islamabad⁴

ABSTRACT

Background: Despite all the efforts, acute watery diarrhea remains a major public health issue worldwide. There is still a high mortality rate in children under 5. Therefore, accurate, timely, and extensive management is crucial in reducing mortality and morbidity. This study is done to assess the use of a combination of Zinc therapy with probiotics and Zinc therapy alone in acute episodes of gastroenteritis.

Methods: This was a single-centered, comparative analytical study. With a sample size of 150 children. Aged 6 months to 10 years with acute gastroenteritis for 24 hours which were divided into three (A, B, and C) groups. It was done in Fauji Foundation Hospital, Pediatrics ward from 7-02-2022 till 10-08-2022 (6 months duration). Group A received zinc for 5 days only with ORS, group B received probiotics along with ORS / IV fluids and Group C received a combination of both.

Results: Demographic data between the 3 groups showed insignificant differences. The comparison of the three groups regarding feeding history was also insignificant. Mean frequency, duration of diarrhea, and length of hospital stay before and after therapy in different groups were statistically significant.

Conclusion: It was concluded that in children with noninfectious acute gastroenteritis, the use of a combination of probiotic and zinc therapy is more effective in reducing the severity of acute diarrhea than zinc therapy alone.

Keywords: Gastritis; probiotic; zinc; Outcome.

Introduction

Diarrhea is the second most common cause of death among children <5 years of age. ¹ WHO recommendations include continued breastfeeding along with ORS (oral rehydration salts) for prevention of dehydration. ² It also suggests zinc to shorten the severity and duration of the episodes of diarrhea. Although, probiotics are being increasingly used in some countries, WHO does not recommend them for the treatment of an acute episode of community-acquired gastroenteritis. ² Probiotics are live organism that is non-living. They can live in the small bowel and gut when ingested. The pathogens enhance the acidity of the intestines and synthesize compounds that can inhibit or destroy pathogens. ³

The advantage of using probiotics on children with diarrhea may be caused or specific to the bacterial stain. Diarrhea is relatively more common in children who have a pre-existing Zinc deficiency and respond early to zinc supplements. Zinc supplements directly act on intestinal villus and help in the intestinal transportation of water and electrolytes. It has an additional effect on the function of T cells and improves immunity, helping reduce the severity of diarrhea. ^{4,5}

A study has shown a reduction of mortality by 46% and hospital admissions by 23% by use of zinc supplements in acute diarrhea. ⁶ Another comparative study conducted in Bangladesh on children with cholera showed that more patients recovered in the zinc group than in the control group in 2 days (49% vs 32% p 0.032). ⁷ It was noted that patients on zinc supplements have a 12% shorter duration of diarrhea than control patients. Zinc supplements in acute diarrhea are generally recommended by the WHO and UNICEF. ⁷ Based on the above context, we anticipate

CORRESPONDENCE AUTHOR

Dr. Armaghana Qamar Khan

Pakistan Institute of Medical Sciences Islamabad

Email: armaghanakhan@gmail.com

Mobile: 03325300710

that the utilization of zinc and probiotics in combination therapy will yield greater efficacy compared to zinc therapy alone.

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Methods

This was a single-centered, comparative analytical study. With a sample size of 150 children. Aged 6 months to 10 years with acute gastroenteritis for 24 hours which were divided into three (A, B, and C)

groups. It was done in Fauji Foundation Hospital, Pediatrics ward from 7-02-2022 till 10-08-2022 (6 months duration). Study was approved by Ethical review board of Fauji foundation Hospital Ref: 671/RC/FFH/RWP Dated: 07 Feb 2022. Group A received zinc for 5 days only with ORS, group B received probiotics along with ORS / IV fluids and Group C received a combination of both. The following children were excluded from the study: Severely dehydrated, with bloody diarrhea, malnourished students, and diarrhea of more than 2 weeks along with chronic diarrhea cases. All the data was entered and analyzed in SPSS version 20. P<0.05 was taken as the level of significance. We used the chi-square test for categorical data to compare between 3 groups. Whereas, the student T-test was used for normally distributed quantitative variables and the Mann-Whitney test for abnormally distributed quantitative variables.

Results

Table 1 shows a comparison of the demographic data between the 3 groups. It shows insignificant differences in the three groups. Table 2. shows the comparison of the three groups regarding feeding history which was also insignificant. Table 3. Shows a comparison of mean frequency, duration of diarrhea, and length of hospital stay before and after therapy in different groups. This difference as shown in the table was statistically significant.

TABLE 1: Comparison of demographic data of groups

	Group A(zinc) N=50		Group= B(probiotic) N=50		Group C(combined) N=50		Test of sig	P
	No	%	No	%	No	%		
Sex								
Male	24	49	30	60.0	30	60.0	χ ² =1.368	0.57
Female	26	51	20	40.0	20	40.0		
Age (months)								
Mean ± SD	20.83 ±10.02		20.90 ± 9.86		21.30 ± 9.28		U=1253	1.00
Mean wt. (kg)								
Mean ± SD	9.31 ± 1.69		9.62 ± 1.60		9.60 ± 1.59		t=0.95	0.368

χ²= chi square test, t= student t test ,U= man Whitney test, P=<0.05 significant

TABLE 2: Comparison of feeding history in different groups

Feeding history	Group A (zinc) N=50 (%)	Group B (probiotic) N=50	Group C (combined) N=50	χ ²	P-Value
Breastfeeding	30	40	30		
Formula	40	40	30		
Complimentary food	30	20	40		

χ²= chi square test, P=<0.05 significant

TABLE 3: Comparison of mean frequency, duration of diarrhea, and length of hospital stay before and after therapy in different groups

Mean frequency of diarrhea	Group A(zinc) N=50	Group B (probiotic) N=50	Group C(combined) N=50
Before therapy (times/day)	10.89 ± 1.78	11.15 ± 1.88	10.89 ± 1.568
After therapy (times/day)	4.72 ± 1.05	4.82 ± 0.806	4.34 ± 0.498
P value	<0.0006	<0.0001	<0.0001
Mean duration of diarrhea(hours)			
Before therapy (Mean ± SD)	21.11 ± 4.13	21.09 ± 4.378	20.72 ± 4.213
After therapy (Mean ± SD)	12.36 ± 1.8	12.34 ± 1.780	10.86 ± 0.938
P value	<0.0006	<0.0007	<0.0007
Discharge (hours)			
Min-max	21.0 – 65.01	21.0 – 64.8	20.1 – 40.2
Mean ± SD	42.39 ± 16.56	41.22 ± 15.78	31.68 ± 7.19
Median (IQR)	44.5 (24.0 – 61.0)	42.50 (24.0 – 57.0)	32.49 (24.0 – 41.0)
P-value	0.554		

Discussion

In this study, there was an insignificant difference in the three study groups in terms of demographic data. The mean age was 20.83 ± 10.02 months in zinc only group vs. 21.30 ± 9.28 months in the combined group, which was not significant (p=1.00) as shown in table 1. Also, no significant difference was noted in terms of gender and weight. Previously conducted studies showed an age of 2 to 12 months⁸. However, another study done by the same group showed a mean age of 19.18 ± 12.78 months in the case & 20.02 ± 14.02 months in the control group respectively.⁹ Another study showed more males than females with an incidence of acute diarrhea but the possible theory of cause was not discussed in the study.¹⁰ In our study it was found that there was an insignificant difference between groups in terms of mean frequency of diarrhea before treatment. Another study showed similar results in the frequency of diarrhea before giving zinc and probiotics.¹¹ A randomized controlled trial was conducted in India on infants with watery diarrhea and showed the duration and frequency of diarrhea after zinc combined therapy reduced significantly. The results of that study were consistent with our study.¹²

A study showed by the end of 3rd day almost all patients in the combined group showed a decrease in

the frequency of stool. Patients in group A continued to pass watery stool even after 72 hours of therapy. Group B with probiotics alone showed no signs of improvement.¹³ In our study we found that the duration of diarrhea after therapy was decreased in the combined therapy group in comparison to both groups of zinc and probiotics alone which showed no difference as shown in table 3. A study in India showed there was a marked difference in duration of diarrhea.¹⁴ Length of hospital stay and reduction in complications after treatment with zinc therapy alone. Another study showed similar results with zinc therapy alone.¹⁵ However, our study showed a decrease in the duration of hospital stay in the combined group in comparison to zinc and probiotic therapy but, the difference was not significant. In the current study, we found that there was lower hospital stay in the combined group versus the zinc and probiotic group but with insignificant differences (0.554).

Conclusion

We concluded that in children with noninfectious acute gastroenteritis, the use of a combination of probiotic and zinc therapy is more effective in reducing the severity of acute diarrhea than zinc therapy alone.

Conflicts of Interest: None declared.

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- Interpretation/ Analysis and Discussion

CONTRIBUTION OF AUTHORS	
AUTHOR	CONTRIBUTION
Mariam Khan Qamar	A,B,C
Armaghana Qamar Khan	B,C
Muhammad Amir Saleem	C
Maryum Hameed	C
Paras	C