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ORIGINAL ARTICLE

Comparison of the effectiveness of zinc supplementation in tablets form with that of the suspension form in the treatment of acute diarrhoea

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Abstract

Objective: To compare the effectiveness of zinc supplementation in tablet form with that of the suspension form in the treatment of acute diarrhoea.

Methods: A comparative study was carried out at the Liaquat University Hospital, Hyderabad, Pakistan from October 2008 to April 2009, and comprised children aged6-24 months suffering from acute diarrhoea. The patients were divided into two groups on the basis of even and odd numbers. Group A (even numbers) received dispersible zinc tablets, and group B (odd numbers) received zinc suspension. The patients were admitted for 3 days and improvement was checked at the end of 3rd day in terms of decrease in the frequency of stools/day. SPSS 15 was used for data analysis.

Results: The 88 patients were divided into two groups of 44(50%) each. Overall, 49(55.7%) patients were male and 39(44.3%) were female. At the end of the 3rd day 51(58%) patients improved, while 37(42%) did not. In the zinc tablet group, improvement was in 32(72%) patients compared to 19(43%) in the zinc suspension group ($p<0.05$).diarrhoea

Conclusion: The results of tablets preparation were clinically significant in reducing the duration and severity of diarrhoea.

Keywords: Diarrhoea, Zinc tablets, Zinc suspension, ORS. (JPMA 67: 156; 2017)

Introduction

Acute diarrhoea remains a leading cause of childhood deaths despite the undeniable success of oral rehydration therapy (ORT). Worldwide, diarrhoeal diseases are the leading cause of paediatric morbidity and mortality, with 1.5 billion episodes and 1.5-2.5 million deaths estimated annually among children below five years of age.[1]

Much of the success achieved in the control of diarrhoeal morbidity and mortality has been conventionally attributed to two therapeutic interventions: the oral rehydration solution (ORS) and zinc supplementation.[2] In 1992, the Centre for Disease Control (CDC) reported the first national guideline, emphasising the emergency of the treatment of childhood diarrhoea and the importance of zinc supplementation. Since then, a variety of trials have been done, especially in developing countries, to assess the effect of zinc supplementation on the duration and severity of diarrhoea.[3]

Despite these improvements, mortality due to diarrhoea in developing countries remains too high. Zinc is used in tablet or suspension forms, both preparations have the same zinc sulphate monohydrate formulation, but different efficacy, which was first observed in 2005 after an earthquake in northern areas of Pakistan. After the earthquake a massive number of children developed diarrhoea due to poor hygiene in camps, and zinc was available there in both forms for diarrhoea management. There was the improvement with the treatment of zinc, but there was difference in the efficacy level between zinc tablet and suspension.[4]

The current study was planned to evaluate the difference in children below 5 years of age.

Patients and Methods

The comparative study was carried out at the Liaquat University Hospital, Hyderabad, Pakistan from October 2008 to April 2009, and comprised children aged 6-24 months suffering from acute diarrhoea. The sample size was calculated by taking level of significance 5%, power of study 80%, P1 39%,[5] P2 13%.[6] The sample was picked using non probability purposive sampling.

Acute diarrhoea was defined as passage of three or more semi-liquid stools in the preceding 24 hours, and not containing blood and mucus. Those excluded were cases of parental diarrhoea, diarrhoea with sepsis, severely malnourished child, acute dysentery, failure to produce consent.

All the paediatric patients who were admitted with

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history of acute diarrhoea were enrolled in the study after taking informed consent from the parents/caregivers. A questionnaire was developed for data collection. The questionnaire was first pre-tested and then implemented. Detailed history and examination were recorded on a proforma.

The patients were divided into two groups on the basis of even and odd numbers. Group A (even numbers) received dispersible zinc tablets, and group B (odd numbers) received zinc suspension with a dose of 20mg/day as per the World Health Organisation (WHO) protocol for diarrhoea.[4] The patients were admitted for 3 days and improvement was checked at the end of the 3rd day in terms of decrease in frequency of stools (<3 stools/day).

Data analysis was done using SPSS 15. Qualitative and quantitative variables were presented as mean ± standard deviation (SD), while qualitative variables like gender and effectiveness were presented as frequencies and percentages. Chi square test was used to compare the effectiveness of the two zinc formulations between the groups. P<0.05 was considered significant.

Results

The 88 patients were divided into two groups of 44(50%) each. Overall, 49(55.7%) patients were male and 39(44.3%) were female. Of the total, 39(44.3%) patients were 6-12 months of age, and of them 18(46%) were on tablets and 21(54%) were on suspension form. Besides, 49(55.7%) patients were aged 13-24 months, and of them 26(53%) were on tablets and 23(47%) were on suspension form.

At the end of the 3rd day 51(58%) patients improved, while 37(42%) did not (Table-1).

Table-1: Decreased frequency of diarrhoea within 24 hour.

	Frequency	Percent
<3 Stools Per Day	51	58.0
3 Or More Stools Per Day	37	42.0

Table-2: Comparison of effectiveness of zinc at the end of 3rd day between the treatment groups.

	Comparison of Effectiveness of the Zinc at the end of 3rd day between the Treatment Group		p-value
Treatment group	Effective	Not effective	1.1.1
Tablets	32 (72%)	12 (27%)	1.1.2
Suspension	19 (43%)	25 (56.8%)	1.1.3
Total	51 (57%)	37 (42%)	< 0.005

In the zinc tablet group, improvement was in 32(72%) patients compared to 19(43%) in the zinc suspension group (p<0.05) (Table-2).

Discussion

Zinc is one of the most important micronutrients in the human diet, and it is crucial for many cell functions, such as protein synthesis and cell growth and differentiation.[7] Zinc's mechanism of action for the treatment of diarrhoea caused by different pathogens is not fully understood, but studies conducted in this field reveal that zinc plays different roles in the intestine, such as regulation of intestinal fluid transport and mucosal integrity and modulation of expression of genes encoding important zinc-dependent enzymes like cytokines, which play important roles in the immune system and in modulation of oxidative stress (OS).[8] These different roles might explain the positive effect of zinc intake during acute diarrhoea in children.

The current study was conducted to document the better effectiveness of zinc supplementation in tablets or suspension form as an adjunct to ORT and early continued feeding among pre-school children with acute diarrhoea. It shows clinically important and statistically significant overall reduction of 72% in the risk of continued diarrhoea with zinc tablets compared to 43% with zinc suspension with 95% confidence interval (CI) for tablets group (0.326-1.762) and for suspension group (0.757-1.736). Another longitudinal cohort study was conducted[4] among children to measure the impact of daily zinc administration in different formulations. About 90% of the patients recovered from diarrhoea within 3 days of presentation; 82% from tablet group and 96% from the suspension (p= 0.001).

Therefore, a considerable effect of zinc on the duration and frequency of diarrhoea was found in both groups, but more favourably in the suspension group.

Zinc tablets, however, are cheaper and dose measurement is more accurate than in suspension form, and there is no need for teaching the mother about having to shake the suspension before use or proper measurement by spoon. Only 10-day course of zinc tablets are sufficient for decreasing the frequency of diarrhoea and diarrhoea-related morbidity and mortality. Our results suggest tablet form of zinc is more effective in the treatment of acute diarrhoea. But more controlled studies are needed to establish better evidence in favour of zinc tablets.

Conclusion

Zinc tablets resulted in clinically significant reduction in

the duration and severity of diarrhoea than the zinc suspension form.

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