Comparison Of Clinical Efficacy Of Combined Versus Monotherapy Of Oral Zinc And Probiotic In Pediatric Acute Diarrhoea At Benazir Bhutto Shaheed Teaching Hospital, Abbottabad

ABSTRACT:


Place of Study: The study was conducted from May-Dec 2017 at Benazir Bhutto Shaheed Teaching Hospital Abbottabad.

Methodology: Single centered, randomized controlled clinical trial was performed in 150 children of either sex (6 months -10 years) with acute diarrhoea having stool frequency of > 5semi liquid stools per day. Patients were divided into three groups with fifty children in each group on the basis of treatment modality given. Group A received zinc orally (1-2mg/kg/day for five days along ORS and/or IV fluids if required), Group B patients were given one to two sachets of probiotics /day (saccharomyces boulardii) according to age for five days + ORS and/or IV fluid while Group C was administered combination of zinc and probiotics for five days along with ORS and/or IV fluids. Response to treatment was determined on the basis of decrease in frequency of stools i.e. <3 formed stools /day after 72 hours of commencement of treatment. We have also studied the relationship between hygiene and food intake practices with the occurrence of diarrhoea in children.

Results: Acute diarrhoea was found to be more prevalent in children with poor hygiene practices and using unboiled water. Among the treatment groups, at the end of 3rd day total of forty eight (96%) patients in group C had improved consistency of stools as well as decrease in diarrhoea frequency to less than three formed stools per day while in groups A and B thirty nine (78%) and sixteen (32%) patients respectively showed response to treatment in 72 hours.

Conclusion: Combination of zinc + probiotics therapy is more effective in children with acute diarrhoea than either alone. Among the zinc and probiotics therapy, zinc is superior in terms of clinical efficacy than probiotics alone.

Keywords: Clinical Efficacy, Zinc, Probiotic, Acute Diarrhoea
Comparison Of Clinical Efficacy Of Combined Versus Monotherapy Of Oral Zinc And Probiotic In Pediatric Acute Diarrhoea

SUBJECTS AND METHODS:

This single centered, randomized controlled clinical trial was conducted in Abbottabad at Benazir Bhutto Shaheed Teaching Hospital between May, 2017 to December, 2017. Prior approval to carry out the research was taken from the Ethical Committee of the hospital. One hundred and fifty children of either sex, aged between six months to ten years presenting with acute diarrhoea having stool frequency of more than five semi liquid stools per day reporting in OPD as well as admitted children were employed in the study. Permission was sought from the parents/guardians of the children and the children whose parents did not approve were excluded from the study. Other features of exclusion criteria included severely dehydrated children and those requiring ICU, presence of blood in stools, use of antibiotics/probiotics in last four weeks and children likely to move away from the study area during the treatment. Data comprising of duration and frequency of diarrhoea along with associated symptoms such as vomiting, fever as well as detailed food intake and hygiene practices of both mothers and children was collected on specially designed questionnaire. Patients were then divided by simple randomization based on random numbers into three groups (A, B and C) of fifty patients in each on the basis of treatment modality.

Group A: Fifty patients received zinc 1-2mg/kg/day orally for five days as per WHO protocol along with ORS and/or IV fluids if required.

Group B: Fifty patients were given 1-2 sachets/day of probiotics according to age (<1 years old - 1 sachet) for five days along with ORS and/or IV fluid if required. The composition of probiotics sachet was: saccharomyces boulardii

Group C: Fifty patients were administered a combination of zinc and probiotics in doses mentioned above for five days along with ORS and/or IV fluid as required.

Response to treatment was taken as the decrease in frequency of stools; that is less than three formed stools in a day. Data was analysed using SPSS version 21.0. For comparative analyses chi-square test was used, p value <0.05 was considered significant. Frequencies of categorical variables evaluated in this study are expressed in percentages.

RESULTS:

The study was performed on 150 patients with acute diarrhoea divided randomly into three groups of fifty patients in each. In Group A, in which zinc suspension was given, in the first twenty four hours two patients responded with decrease in diarrhoeal episodes to less than three stools per day as well as improvement in its consistency while maximum therapeutic effect was seen on 3rd day where out of total fifty patients thirty nine (78% of group population) children showed response to therapy, only eleven children did not respond and still had more than 5 episodes of watery diarrhoea even after 72 hours of treatment as shown in Figure 1.

In group B, in which only probiotic was given, initially in the first 24 hours no response to therapy was observed. However on the 2nd day six patients had decrease in frequency of diarrhoea followed by ten more children recovering in the next 24 hours (32% of group population) as shown below in Figure 1. However thirty four children did not show improvement even after 72 hours of starting the treatment.

In group C where combination of Zinc suspension and probiotic was given, response to therapy was appreciable in first 24 hours where five children recovered from watery diarrhoeal episodes and by the end of third day all fifty patients except for two (96% of group population) had less than 3 stools per day with semi solid consistency as shown below in Figure 1.

On comparison between Group A and Group B after 72 hours of starting treatment p value is <0.05 that is considered statistically significant. Also when Group C was compared with Group A and Group B respectively, p value was < 0.05.
which shows that combination therapy is clinically more efficacious in terms of decreasing stool frequency in patients with acute diarrhoea as compared to monotherapy with either.

Amongst the total study population of 150 patients, male patients predominate with a total of 87 (58%) while 63 (42%) were female; giving male to female ratio 1.38:1. Gender wise, there was no significant difference amongst the patients. Moreover, 66 out of 150 (44%) patients were 6-12 months old while 84 (56%) patients were between 12 to 120 months old.

Table 1 enlists frequencies of different variables like personal hygiene of mothers and children, sources of food and water accounting for acute diarrhoea. Amongst the variable observed during this study that contribute to acute diarrhoea as tabulated in Table 1, 123 children (82%) were not using boiled water while 64% and 78% of the mothers were not washing their hands prior to food preparation and feeding respectively. In the children over 12 months of age, only 57% and 29% of the children were in a habit of washing their hands after urination and taking meals respectively. It was also observed that only 32% of the children suffering from acute diarrhoea were consuming home made food items while 68% of the children bought the food from outside.

DISCUSSION:

In the present study, clinical efficacy of zinc suspension and probiotic monotherapy has been compared with combination therapy in children with acute diarrhoea. It has been shown in this study that by the end of 3rd day, nearly all patients in group C who were given combination of zinc suspension and probiotic showed decrease in frequency to less than three stools/day as well as improvement in consistency of stools. In Group A patients who received oral zinc suspension thirty nine patients responded to monotherapy while eleven patients continued passing watery stools even after 72 hours of starting the therapy. While in Group B patients who were given probiotics alone no significant improvement was seen even after 72 hours of therapy. So according to our findings though oral zinc suspension alone is effective in decreasing frequency and duration of diarrhoea but combination of zinc suspension and probiotics is clinically more effective in pediatric acute diarrhoea.

Our findings regarding effectiveness of oral zinc therapy in acute diarrhoea in children is in accordance with Karumyaret al13 who showed the effectiveness of zinc therapy in acute diarrhoea and fluid deficiency states. They found increase in serum zinc level after zinc treatment in diarrhoeal children. Similar findings have been reported in other studies14-17. Further, Habib et al18 showed that zinc decreases the diarrhoeal episodes with faster recovery rates in any available preparation, however better results have been seen with suspension form in terms of patients’ compliance. While this was in discordance with the study by Patel et al19, who found that the total extent of diarrhoea was not different in placebo and zinc groups; the main duration in the zinc group was 4.34 days and that in the placebo group (which received ORS only) was 4.48 days. Also Singh K et al in their study concluded that oral zinc therapy has no appreciable outcome on frequency and duration of childhood acute diarrhoea19.

Zinc is an important constituent of normal diet having pivotal action in the synthesis and repair of cell constituents. Exact mechanism of action of zinc in acute diarrhoeal states is still not known but it has been reported in literature that zinc improves the overall intestinal absorptive capacity as well as induces the synthesis of cytokines involved in mucosal protection and repair. All these mechanisms may account for the beneficial role of zinc supplementation in children with acute diarrhoea. WHO and United Nations Children’s Fund have recommended zinc supplementation for the management of diarrhea since 2004; yet, its usage remains scarce.

In our study Group B fifty children with acute diarrhoea were administered probiotics along with ORS. It was found that only sixteen children showed decrease in frequency of stools in 72 hours while thirty four children did not respond in the mentioned time period. So it is concluded in this study that probiotics alone are not effective in reduction of the acute diarrhoea in children. This is in agreement with the findings in other studies which also showed that probiotic supplementation has no role reducing duration of diarrhea or stool frequency in acute infectious diarrhoea in children20-21. While in study by Yazar et al, it was concluded that probiotics are equally effective as zinc supplementation in reduction of duration and frequency of diarrhoeal episodes in childhood acute infectious diarrhoea22. The effectiveness of S boullardii in reducing the duration of diarrhea and improving the consistency of stools in children with acute diarrhoea has been established in other studies as well 23-25.
CONCLUSION:
Acute diarrhoea was found to be more prevalent in children with poor hygiene and dietary habits. It was observed that 82% of children presenting with acute diarrhoea were using unboiled water. Regarding treatment modalities, combinations of zinc + probiotics therapy is more effective in children with acute diarrhoea than either alone; while among zinc and probiotics therapy, zinc is superior in terms of clinical efficacy than probiotics alone.

LIMITATION OF STUDY:
This study has been conducted on small group of subjects so further studies on larger scale should be conducted so that results can be extrapolated to larger population.

REFERENCES:

JBUMDC 2018; 8(4):204-209