

SHORT REPORT

Zinc Therapy for Diarrhoea Increased the Use of Oral Rehydration Therapy and Reduced the Use of Antibiotics in Bangladeshi Children

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ABSTRACT

Excessive use of antibiotics for diarrhoea is a major contributing factor towards increasing rates of antimicrobial resistance in developing countries. Zinc therapy for diarrhoea has been shown to be beneficial in controlled efficacy trials, and it is of interest to determine if availability of zinc syrup for treatment of diarrhoea would satisfy the demand for a 'medicine' for diarrhoea, thus reducing the use of antibiotics, without competing with the use of oral rehydration therapy (ORT). This community-based controlled trial was conducted from November 1998 to October 2000, and all children aged 3-59 months in the study area were included. In this trial, the availability of zinc supplements, along with ORT and appropriate education programmes, was associated with significantly higher use of ORT and lower use of antibiotics.

Key words: Zinc; Zinc therapy; Diarrhoea; Diarrhoea, Infantile; Oral rehydration therapy; Antibiotics; Bangladesh

INTRODUCTION

Oral rehydration therapy (ORT) prevents or corrects dehydration, the principal cause of death from diarrhoea. One of the major barriers to the use of ORT is the perception that ORT is not a 'medicine' because it does not stop diarrhoea. Thus, there is a demand for other therapies, including antibiotics, for treatment of diarrhoea. Given the emergence and spread of enteric and other pathogens resistant to multiple antibiotics,

excessive use of antibiotics for diarrhoea is a major public-health concern.

Numerous clinical trials have demonstrated that a zinc supplement during diarrhoeal episodes reduces the duration and severity of illness (1). It has also been demonstrated that if zinc is given during and after diarrhoea for 14 days, it reduces the incidence of diarrhoea and acute lower respiratory infection (ALRI) in the subsequent 2-3 months (2). A concern has been that the availability of zinc therapy for diarrhoea might reduce the use of ORT because families may prefer the zinc supplement, which looks like a medicine. On the other hand, the availability of the zinc supplement may reduce the use of antibiotics and other unnecessary drugs for diarrhoea.

In this study, we evaluated the effect of zinc therapy for the treatment of diarrhoea on the use of oral rehydration therapy (ORT), antibiotics, and other drugs.

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MATERIALS AND METHODS

We have previously reported the impact of a two-week zinc therapy for diarrhoea on morbidity and mortality due to diarrhoea and ALRI in a community-based cluster randomized trial (3) in the Matlab field area of ICDDR,B: Centre for Health and Population Research in Bangladesh. Thirty service areas (clusters) around Matlab Treatment Centre—each with about 200 children aged 3-59 months—were randomly allocated to intervention or comparison areas. One community health worker served each cluster. The study was conducted from November 1998 to October 2000, and all children aged 3-59 months were included in the study.

The ethical review committees of ICDDR,B, approved the study procedures.

Trained field workers who were not involved in the implementation of the intervention made home visits every two months to collect data on diarrhoea morbidity, use of ORT and zinc therapy, and other therapies for diarrhoea in the week preceding the interview (3).

Comparisons of variables between treatment groups were done using the chi-square test. The impact of zinc therapy on the probability of antibiotic use was determined adjusting for age and sex of child and type of diarrhoea using logistic regression analysis.

RESULTS

In the intervention clusters, 3,974 children and, in the comparison clusters, 4,096 children were recruited for the trial (11,880 child-years of observation). Because

Table 1. Percentage distribution of diarrhoeal episodes by use of therapy and type of care sought, Zinc Effectiveness Trial, Matlab, Bangladesh

Variable	Intervention (n=3,276)*	Comparison (n=3,945)*	p value†
Therapy (% received)			
Packet ORS	74.9	50.2	<0.01
Home-made solution	8.7	6.4	<0.01
Either packet ORS or home-made solution	79.0	52.8	<0.01
Intravenous fluid	0.2	0.3	NS
Zinc syrup	85.5	-	<0.01
Antibiotics	13.1	34.3	<0.01
Other medicines	15.3	44.8	<0.01
Home-made herbal	5.7	10.6	<0.01
Sought care (% sought)			
ICDDR,B hospital/sub-centre	3.0	3.8	<0.01
Pharmacy	16.2	33.5	<0.01
Private qualified doctor	2.1	1.9	NS
Village doctor	12.4	27.0	<0.01
Traditional/spiritual healer	11.3	12.2	NS
Homoeopath	6.1	12.8	<0.01

*Number of diarrhoeal episodes; †p value determined using chi-square statistic
NS=Not significant; ORS=Oral rehydration solution

In both the study areas, community health workers and community volunteers, known as *bari* mothers, distributed packets of oral rehydration solution (ORS) and advised on feeding to a parent who brought a child with diarrhoea. In the intervention clusters, community health workers and *bari* mothers also distributed zinc syrup to children with diarrhoea and instructed the mothers on how to use the syrup. Both ORS and zinc were provided free of charge. Children in the intervention villages were to receive 20 mg of elemental zinc as acetate per day for 14 days, regardless of the duration of diarrhoeal episode, in a once daily dose of 5 mL.

many children contributed less than two years in the study, data from 46,880 recall periods of one week were expected. Data were available for 41,788 (91%) recall periods. We previously reported that, compared to children in the comparison areas, children in the intervention areas had 24% shorter duration of diarrhoea, a trend suggesting fewer diarrhoea-related hospitalizations, and 51% lower rates of non-injury deaths (3).

Uses of ORS and other home fluids were significantly higher among children in the zinc intervention areas than those in the comparison areas (Table 1). Compared

to children in the intervention area, significantly higher percentages of children in the comparison area sought care from a pharmacy, a village doctor, or a homeopath and used antibiotics and other medications (Table 1). The probability of use of an antimicrobial during diarrhoea was only about one-third in the intervention children compared to that in the comparison children (Table 2).

Variable	Odds ratio	95% confidence interval
Intervention area*	0.30	0.25-0.35
Age (months) of child [†]		
0-11	1.33	1.07-1.67
12-23	1.30	1.06-1.61
24-35	1.07	0.85-1.36
Male [‡]	1.18	1.01-1.38
Bloody diarrhoea [¶]	2.12	1.71-2.63

Reference categories: *Comparison area; [†]36-59 months; [‡]Female; [¶]Non-bloody diarrhoea

DISCUSSION

More children in the zinc intervention areas were given ORS, indicating that if the delivery of ORS and zinc is from the same service location and is coupled with appropriate education, zinc therapy for diarrhoea may increase the use of ORT. This is probably because mothers seek the zinc supplement thinking of it as a medication to shorten the duration of diarrhoea (which it does) and are given ORT at the point of contact.

Antibiotic use for the treatment of diarrhoea was about 70% less in the zinc intervention areas. In addition, visits to pharmacists and village doctors were significantly less; visits to village doctors and pharmacists are among the most important determinants of inappropriate antibiotic use (4). A study of antibiotic use in a rural area of Bangladesh found that 26% of purchased drugs were antibiotics, which were most frequently purchased for children aged 0-4 year(s) and most frequently for diarrhoea (5); 48% of antibiotics were purchased in quantities of less than a single day's dose. These practices have probably not led to improve-

ments in health and may have promoted the emergence and persistence of drug-resistant microorganisms.

The significant reduction in antibiotic use and related behaviours in the intervention group demonstrate that the benefits of zinc supplementation extend well beyond reducing childhood morbidity and mortality. Zinc supplementation for diarrhoea with education programmes, in addition to ORT, could reduce inappropriate antibiotic use that is leading to antimicrobial-resistant pathogens.

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