Zinc supplementation for acute gastroenteritis

Ran D. Goldman MD FRCPC

Abstract

**Question** Gastroenteritis with diarrhea is a common condition in children, potentially leading to dehydration, morbidity, and in some countries substantial mortality. Is there a role for zinc supplementation in these cases?

**Answer** Zinc can be found in a variety of foods, and in Canada some foods are fortified with zinc. Zinc supplementation was shown to be a safe and effective measure to shorten diarrhea-related illness in children and to possibly reduce other complications including death. Although the World Health Organization recommends a daily dose of zinc for 10 to 14 days to manage acute diarrhea in children, Canadian children who eat a regular diet do not need such supplementation.

Gastroenteritis is one of the most prevalent infectious illnesses in childhood. In the United States, it accounts for up to 10% of hospital admissions among children younger than 5 years old. Symptoms of acute gastroenteritis are pathogen dependent and frequently include vomiting, diarrhea, abdominal pain, and fever. Nearly all causative organisms are viruses; other causes are bacteria and parasites.

Zinc, a common metallic element, can be found in a variety of foods such as meat, fish, almonds, and breakfast cereal. Zinc is responsible for important enzyme-driven metabolic processes.

Zinc and gastroenteritis

Gastroenteritis, presenting mostly as diarrhea, is associated with severe zinc deficiency and is frequently seen in developing countries. A pooled analysis of all published and unpublished randomized controlled trials of zinc supplementation in children up to 5 years old with acute or persistent diarrhea found that zinc-supplemented children had a 15% lower probability of continuing diarrhea on a given day (95% CI 5% to 24%) in the acute-diarrhea trials. Similarly, there was a 24% lower probability of continuing diarrhea (95% CI 9% to 37%) and a 42% lower rate of treatment failure or death (95% CI 10% to 63%) in the persistent-diarrhea trials. A more recent meta-analysis reported zinc supplementation reduced the incidence of diarrhea by approximately 20%, especially in children older than 1 year.

A Canadian group working in Karachi, Pakistan, reported that mean (SD) longitudinal prevalence of diarrhea among 75 young children aged 6 to 12 months at high risk of diarrhea-related mortality who received micronutrients with zinc for 2 months was 15% (10%) child-days compared with 26% (20%) child-days in the placebo group.

Among almost 300 children from India with diarrhea resulting in dehydration and hospitalization, stool output was reduced in more than 30% (95% CI 1% to 52%) of children receiving zinc treatment compared with children receiving placebo. Duration of illness and proportion of episodes lasting more than 7 days were also substantially reduced.

The mechanism of action of zinc in the management of diarrhea is not completely understood. It is likely improving the absorption of fluids from the intestine, helping with clearance of organisms, and supporting regeneration and mucosal integrity, and is likely to have an immunity-related mechanism.

Zinc and other illnesses

Zinc supplementation was found to be of benefit not only for diarrhea-related illness, but also for preventing other morbidity and even mortality among children. Zinc reduced the incidence of acute lower respiratory tract infections by approximately 15% in one study, and had a 6% effect on overall child mortality. The effect was much more substantial (18% reduction in deaths) among zinc-supplemented children older than 12 months of age.

Zinc deficiency in Canada

Canadian children in general are not zinc deficient. Fortification of food in Canada is based on a few studies demonstrating mild zinc deficiency among young children from southern Ontario. Health Canada recommendations include several categories of food to which zinc can be added on either a mandatory or voluntary basis. Although zinc-fortified foods and supplements contributed only minimally to the total dietary zinc intake among a group of preschoolers studied in Ontario,
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zinc intake in general is good among Canadian children, with only pockets of zinc deficiency identified.\textsuperscript{11}

Conclusion

Zinc supplementation for diarrhea in children is a safe and effective measure to shorten the illness and to reduce other complications including death. While the World Health Organization recommends a daily dose of 10 to 20 mg of zinc (based on age) for 10 to 14 days for management of acute diarrhea,\textsuperscript{12} Canadian children who eat a regular diet do not need such supplementation.

Competing interests

None declared

Correspondence

Dr Ran D. Goldman, BC Children’s Hospital, Department of Pediatrics, Room K4-226, Ambulatory Care Bldg. 4480 Oak St, Vancouver, BC V6H 3V4; telephone 604 875-2345, extension 7333; fax 604 875-2414; e-mail rgoldman@cw.bc.ca

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Dr Goldman is Director of the PRETx program. The mission of the PRETx program is to promote child health through evidence-based research in therapeutics in pediatric emergency medicine.

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