

# Zinc supplementation for acute gastroenteritis

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## 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.<sup>1</sup> Symptoms of acute gastroenteritis are pathogen dependent and frequently include vomiting, diarrhea, abdominal pain, and fever.<sup>1</sup> Nearly all causative organisms are viruses; other causes are bacteria and parasites.<sup>1</sup>

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.<sup>2,3</sup> A pooled analysis of all published and unpublished randomized controlled trials of zinc supplementation in children up to 5 years old with acute or persistent diarrhea found that zinc-supplemented children had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.<sup>4</sup> 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.<sup>4</sup> A more recent meta-analysis reported zinc supplementation reduced the incidence of diarrhea by approximately 20%, especially in children older than 1 year.<sup>2</sup>

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.<sup>5</sup>

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.<sup>6</sup> 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.<sup>7</sup> 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,<sup>2</sup> 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.<sup>2</sup>

## 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.<sup>8</sup> Health Canada recommendations<sup>9</sup> 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,<sup>10</sup>

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zinc intake in general is good among Canadian children, with only pockets of zinc deficiency identified.<sup>11</sup>

### 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,<sup>12</sup> Canadian children who eat a regular diet do not need such supplementation. 🌿

### Competing interests

None declared

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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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