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[Intervention Review]

Oral zinc for treating diarrhoea in children

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ABSTRACT

Background

In developing countries, diarrhoea causes around 500,000 child deaths annually. Zinc supplementation during acute diarrhoea is currently recommended by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF).

Objectives

To evaluate oral zinc supplementation for treating children with acute or persistent diarrhoea.

Search methods

We searched the Cochrane Infectious Diseases Group Specialized Register, CENTRAL (the Cochrane Library 2016, Issue 5), MEDLINE, Embase, LILACS, CINAHL, *m*RCT, and reference lists up to 30 September 2016. We also contacted researchers.

Selection criteria

Randomized controlled trials (RCTs) that compared oral zinc supplementation with placebo in children aged one month to five years with acute or persistent diarrhoea, including dysentery.

Data collection and analysis

Both review authors assessed trial eligibility and risk of bias, extracted and analysed data, and drafted the review. The primary outcomes were diarrhoea duration and severity. We summarized dichotomous outcomes using risk ratios (RR) and continuous outcomes using mean differences (MD) with 95% confidence intervals (CI). Where appropriate, we combined data in meta-analyses (using either a fixed-effect or random-effects model) and assessed heterogeneity.

We assessed the certainty of the evidence using the GRADE approach.

Main results

Thirty-three trials that included 10,841 children met our inclusion criteria. Most included trials were conducted in Asian countries that were at high risk of zinc deficiency.

Acute diarrhoea

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There is currently not enough evidence from well-conducted RCTs to be able to say whether zinc supplementation during acute diarrhoea reduces death or number of children hospitalized (*very low certainty evidence*).

In children older than six months of age, zinc supplementation may shorten the average duration of diarrhoea by around half a day (MD –11.46 hours, 95% CI –19.72 to –3.19; 2581 children, 9 trials, *low certainty evidence*), and probably reduces the number of children whose diarrhoea persists until day seven (RR 0.73, 95% CI 0.61 to 0.88; 3865 children, 6 trials, *moderate certainty evidence*). In children with signs of malnutrition the effect appears greater, reducing the duration of diarrhoea by around a day (MD –26.39 hours, 95% CI –36.54 to –16.23; 419 children, 5 trials, *high certainty evidence*).

Conversely, in children younger than six months of age, the available evidence suggests zinc supplementation may have no effect on the mean duration of diarrhoea (MD 5.23 hours, 95% CI –4.00 to 14.45; 1334 children, 2 trials, *low certainty evidence*), or the number of children who still have diarrhoea on day seven (RR 1.24, 95% CI 0.99 to 1.54; 1074 children, 1 trial, *low certainty evidence*).

None of the included trials reported serious adverse events. However, zinc supplementation increased the risk of vomiting in both age groups (children greater than six months of age: RR 1.57, 95% CI 1.32 to 1.86; 2605 children, 6 trials, *moderate certainty evidence*; children less than six months of age: RR 1.54, 95% CI 1.05 to 2.24; 1334 children, 2 trials, *moderate certainty evidence*).

Persistent diarrhoea

In children with persistent diarrhoea, zinc supplementation probably shortens the average duration of diarrhoea by around 16 hours (MD –15.84 hours, 95% CI –25.43 to –6.24; 529 children, 5 trials, *moderate certainty evidence*).

Authors' conclusions

In areas where the prevalence of zinc deficiency or the prevalence of malnutrition is high, zinc may be of benefit in children aged six months or more. The current evidence does not support the use of zinc supplementation in children less six months of age, in well-nourished children, and in settings where children are at low risk of zinc deficiency.

12 April 2019

Up to date

All studies incorporated from most recent search

All eligible published studies found in the last search (30 Sep, 2016) were included and two ongoing studies have been identified (see 'Characteristics of ongoing studies' section)

PLAIN LANGUAGE SUMMARY

Oral zinc supplementation for treating diarrhoea in children

In low- and middle-income countries, millions of children suffer from severe diarrhoea every year and many die from dehydration. Giving fluids by mouth (using an oral rehydration solution (ORS)) has been shown to save children's lives, but it has no effect on the length of time the children suffer with diarrhoea. Zinc supplementation could help reduce the duration and the severity of diarrhoea, and therefore have an additional benefit over ORS in reducing children mortality.

What is oral zinc and how may it shorten the duration and severity of diarrhoea

Zinc is usually given as zinc sulphate, zinc acetate, or zinc gluconate, which are all water-soluble compounds. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommend 10 mg to 20 mg of zinc per day for children with diarrhoea. There are several mechanism of action of zinc on acute diarrhoea, some of which are specific to the gastrointestinal system: zinc restores mucosal barrier integrity and enterocyte brush-border enzyme activity, it promotes the production of antibodies and circulating lymphocytes against intestinal pathogens, and has a direct effect on ion channels, acting as a potassium channel blocker of adenosine 3-5-cyclic monophosphate-mediated chlorine secretion. Cochrane researchers examined the evidence available up to 30 September 2016.

What the evidence in the review suggests

Thirty-three trials that included 10,841 children met the inclusion criteria of this review.

Among children with acute diarrhoea, we don't know if treating children with zinc has an effect on death or number of children hospitalized (*very low certainty evidence*). In children older than six months, zinc supplementation may shorten the average duration of diarrhoea by around half a day (*low certainty evidence*), and probably reduces the number of children whose diarrhoea persists until day seven (*moderate certainty evidence*). In children with signs of malnutrition the effect appears greater, reducing the duration of diarrhoea by around a day (*high certainty evidence*). Conversely, in children younger than six months, the available evidence suggests zinc supplementation may have no effect on the mean duration of diarrhoea (*low certainty evidence*), or the number of children who still have diarrhoea on day seven

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(*low certainty evidence*). Zinc supplementation increased the risk of vomiting in both age groups (*moderate certainty evidence*). No other adverse effects were reported.

Among children with persistent diarrhoea, zinc supplementation probably shortens the average duration of diarrhoea by around 16 hours (*moderate certainty*) but it probably increases the risk of vomiting (*moderate certainty evidence*).

In areas where the prevalence of zinc deficiency or the prevalence of malnutrition is high, zinc may be of benefit in children aged six months or more. The current evidence does not support the use of zinc supplementation in children less six months of age, in well-nourished children, and in settings where children are at low risk of zinc deficiency.