Zinc supplements increased growth more in stunted infants than in nonstunted infants

Umeta M, West CE, Haidar J, Deurenberg P, Hautvast JG. **Zinc supplementation and stunted infants in Ethiopia: a randomised controlled trial.** Lancet. 2000 Jun 10;355:2021-6.

QUESTION

In stunted and nonstunted infants, do zinc supplements promote growth?

DESIGN

Randomized (unclear allocation concealment*), blinded (investigators and field assistants),* placebo-controlled trial with 6-month follow-up.

SETTING

Dodota Sire district, central Ethiopia, Africa.

PATIENTS

100 stunted (length-for-age Z score [LAZ] < −2) and 100 nonstunted (LAZ > −2) infants who were 6 to 12 months of age. Inclusion criteria were apparent health and willing participation of mothers. Exclusion criterion was diagnosis of intestinal parasites. 90% (mean age 10 mo, 53% boys) of stunted and 94% (mean age 9 mo, 53% girls) of nonstunted infants completed the 6-month follow-up.

INTERVENTION

Stunted and nonstunted infants were matched by sex, age, and recumbent length and allocated within the pair to zinc supplement, 10 mg of zinc sulfate in 3 mL of syrup, or placebo syrup. Syrup was administered by trained field assistants every morning after the infants were breast-fed (but before weaning foods were fed) for 6 days per week for 6 months.

MAIN OUTCOME MEASURES

Change in anthropometric measurements: recumbent length (growth), weight, knee-heel length, mid–upper-arm circumference, and triceps skinfold.

MAIN RESULTS

Stunted infants who received zinc supplementation had a 2.5-fold greater increase in growth than did stunted infants who received placebo ($P < 0.001$); the increase in growth in nonstunted zinc-supplemented infants did not reach statistical significance (Table). Zinc had a greater stimulatory effect in stunted infants than in nonstunted infants ($P < 0.001$). Weight gain did not differ between groups among stunted and nonstunted infants (Table). Changes in knee-heel length, mid-upper-arm circumference, and triceps skinfold thickness did not reach statistical significance between groups.

CONCLUSIONS

In stunted infants, zinc supplements increased growth. The effect of zinc was greater in stunted than in nonstunted infants.

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For correspondence: Professor C.E. West, Division of Human Nutrition and Epidemiology, Wageningen University, P.O. Box 8129, 6700 EV Wageningen, The Netherlands. FAX 31-317-4-83342.

*See Glossary.

Zinc supplement vs placebo for change in length and weight in stunted and nonstunted infants†

Outcomes at 6 mo	Stunted		Difference in means (95% CI)	Nonstunted		Difference in means (CI)
	Zinc	Placebo		Zinc	Placebo	
Increase in length (cm)	7.0	2.9	4.1 (1.4 to 6.8)	6.6	5.0	1.6 (–0.8 to 4.0)‡
Increase in weight (kg)	1.73	0.95	0.78 (–0.32 to 1.9)‡	1.19	1.02	0.17 (–0.83 to 1.17)‡

†CI defined in Glossary and calculated from data in article.
‡Not significant.

COMMENTARY

The aim of the study by Umeta and colleagues was to investigate whether the low rate of linear growth of apparently healthy breast-fed infants in a rural village in Ethiopia can be improved with zinc supplementation.

The results of this high-quality study show that daily oral zinc supplementation for 6 months improved the linear growth of stunted infants. The investigators attribute the beneficial effect of zinc to its essential role in the immune system.

The zinc status of the children was assessed using serum and hair, which are acknowledged as imperfect markers of zinc status. Nonetheless, stunted children had lower zinc levels than did nonstunted children, and zinc supplementation increased the zinc levels of stunted children, further implicating zinc deficiency as a cause of the stunting. Other randomized studies have suggested that zinc supplementation improves weight gain in malnourished children (1).

Why are these breast-fed infants zinc deficient? The breast milk of malnourished mothers has a zinc concentration similar to that of mothers in developed countries. However, the volume of breast milk produced by malnourished women is lower, and daily zinc intake of their infants at 9 months is as low as 10% of the recommended daily allowance (2). This finding is less than the relatively low estimation calculated by Krebs and Hambidge to be essential for growth (3). We do not know the zinc status of the mothers or the birthweights of the babies, but given the staple diet in Ethiopia, the mothers are likely to be zinc depleted. Zinc-deficient mothers have growth-retarded babies (4) who, in turn, are zinc depleted, increasing the likelihood of zinc deficiency during growth spurts.

The clinical implication of this study is that infants in malnourished communities need more zinc. For breast-fed infants, this could be achieved by dietary supplementation of the mothers (5). Alternatively, routine supplementation of weaning foods could be implemented and monitored.

Karen Simmer, MBBS, PhD
Flinders Medical Centre
Bedford Park, South Australia, Australia

References

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