

Study of Zinc Supplementation on Growth of Schoolchildren in Yasuj, Southwest of Iran

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Abstract: Zinc is an important nutrient which is critical for normal immune function and physical growth. Zinc deficiency seems to be common in developing countries and that makes children in those countries prone to infectious diseases. In countries where zinc deficiency is common; zinc supplementation has been shown to reduce the rates of diarrhea and to enhance the physical growth of children at risk of stunting. The aim of this study was to find out the effect of zinc supplementation on growth of school children in a relatively deprived setting, Yasuj city, in Southwest of Iran. This is a randomized placebo controlled trial in which eight hundred and four schoolchildren aged 8-11 years, from primary schools (year 1 to 5) in Yasuj city, Southwest of Iran were the subjects of this study. Children were randomly assigned to zinc or placebo group to receive daily supplementation of zinc (2.2 g/lit) or placebo, in an identical form (syrup) and identical pre-coded containers, 6 days per week, for 7 months. Anthropometric assessment (weight and length) was performed at the time of enrolment and monthly afterward. Significant increase in weight (mean 1.9 kg) and length (mean 3.25 P<0.0001) growth was found in Zn group in compare with placebo group. Zinc supplementation improves children's growth and step should be taken to supply this nutrient to the children, in particular where zinc deficiency is common.

Key words: Zinc supplementation, schoolchildren, growth

Introduction

Zinc is an essential nutrient that is critical for normal immune function (Shankar and Prasad, 1998). Zinc deficiency is widespread in developing countries and make children vulnerable to microbial infections especially diarrhea which in turn causes excess fecal losses of zinc (Zinc Investigators' Collaborative Group, 1999). The rate of moderate zinc deficiency in children is reported to be 5-30%. Zinc deficiency contributes to skin inflammation, diarrhea, hair loss, malfunctioning and delay in sexual development. Moreover psychosomatic symptoms, stunning, immunodeficiency and growth impairment have been recorded in connection with zinc deficiency in children (Brown *et al.*, 2002; Gibson and Ferguson, 1998). Zinc supplementation reduces the rate of diarrhea in stunted children Sur *et al.*, 2003. Zinc deficiency is common in some parts of Iran (Mahmoodi and Kimiagar, 2001). Previous reports showed that zinc deficiency is present in children in area where this study was conducted (Afshoon *et al.*, unpublished data). This study was designed to find out the effect of zinc supplementation on growth of schoolchildren in a relatively deprived setting, Yasuj city, Southwest of Iran.

Materials and Methods

This is a randomized double blind placebo controlled trial carried out in Yasuj, Southwest of Iran. Eight hundred and four children (374 male and 430 female,

year 1 to 5 of their study) from all primary schools (state and private) aged 8-11 years were randomly assigned to two groups, zinc group (195 male and 191 female) and placebo group (179 male and 239 female) to receive daily supplementation of zinc (10 mg of 2.2 g/lit in syrup form) or placebo, 6 days per week, for 7 months. Zinc and also placebo were administrated to the children, between meals, in an identical form (syrup) and identical pre-coded containers. Subjects were enrolled in the study only after an ethical approval was obtained from the Human Ethics Committee of the university and also after their parent provided written consent.

Weight, length and other anthropometric indicators were measured at the time of enrolment and then monthly for 7 months. Weight was checked by a digital balance (Seca, ± 100 g error) and length was measured with an appropriate device (± 0.5 g error). Collected data were analyzed statistically using SPSS software.

Results

Consumption of the supplement was the same in both study groups. Results of this study showed that the Zn group had a significant increase in weight (mean 1.9 kg) in compare with placebo group (mean 0.68, P<0.0001). There was a significant difference between groups in length gain during the seven months study of supplementation. Zinc supplementation enhanced linear growth (mean 3.25 P<0.0001). Table 1 shows the differences in weight and length levels in both groups.

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Table 1: Differences in length and weight growth in zinc and placebo treated children in Yasuj, Southwest of Iran

	Zinc group	placebo group
Length	3.265 ± 1.55	1.659 ± 946
Weight	1.707 ± 1.148	0.651 ± 1.198

Discussion

It has been reported that zinc supplementation improves children's development (Bhatnagar and Natchu, 2004). Zinc supplementation improves growth and reduces morbidity in zinc deficient children (Bhutta *et al.*, 1999; Lind *et al.*, 2004). Previous studies in our region indicated that children are suffering from zinc deficiency. The reason for this is unknown but having a particular nutritional culture in the area might account for this. This study was designed to test whether seven months zinc supplementation would enhance growth of schoolchildren. Our findings of improvement of weight and length in zinc supplemented group is in keeping with a recent meta analysis of zinc supplementation and child growth in which stunted children who received zinc supplementation had increased linear growth and weight gain (Brown *et al.*, 2002). In another study Dutta *et al.* (2000) demonstrated that zinc supplementation in malnourished children enhance their growth and reduces the morbidity (Dutta *et al.*, 2000). This is in part consistent with our findings regarding the impact of zinc on growth of children. The effect of zinc on improvement of children's growth has been pointed out in other studies (Salgueiro *et al.*, 2002; Kikafunda *et al.*, 1998; Rivera *et al.*, 1998; Castillo-Dura'n *et al.*, 1994).

To sum up, findings of this study support the results of previous studies which verified a positive role for zinc in enhancement of children's weight and length growth.

Acknowledgments

The authors would like to thank Dr Bahador Sarkari for reviewing of this manuscript.

References

Bhatnagar, S. and U.C. Natchu, 2004. Zinc in child health and disease. *Indian J. Pediatr.*, 71: 991-5.
Bhutta, Z.A., R.E. Black and K.H. Brown, 1999. Prevention of diarrhea and pneumonia by zinc supplementation in children in developing countries: pooled analysis of randomized controlled trials. *J. Pediatr.*, 135: 689-97.
Brown, K.H., J.M. Peerson, J. Rivera and L.H. Allen, 2002. Effect of supplemental zinc on the growth and serum zinc concentrations of prepubertal children: a meta-analysis of randomized controlled trials. *Am. J. Clin. Nutr.*, 75: 1062-71.

Castillo-Dura'n, C., H. Garcý'a and P. Venegas, 1994. Zinc supplementation increases growth velocity of male children and adolescents with short stature. *Acta Paediatr.*, 83: 833.
Dutta, P., U. Mitra, A. Datta, S.K. Niyogi, S. Dutta, B. Manna, M. Basak, T.S. Mahapatra and S.K. Bhattacharya, 2000. Impact of zinc supplementation in malnourished children with acute watery diarrhoea. *J. Trop. Pediatr.*, 46: 259-63.
Gibson, R.S. and E.L. Ferguson, 1998. Assessment of dietary zinc in a population. *Am. J. Clin. Nutr.*, 68: 430S-4S.
Kikafunda, J., A. Walker and K. Tumwine, 1998. Effect of zinc supplementation on growth and body composition of Ugandan preschool children: a randomized, controlled, intervention trial. *Am. J. Clin. Nutr.*, 68: 1261.
Lind, T., B. Lonnerdal, H. Stenlund, I.L. Gamayanti, D. Ismail, R. Seswandhana and L.A. Persson, 2004. A community-based randomized controlled trial of iron and zinc supplementation in Indonesian infants: effects on growth and development. *Am. J. Clin. Nutr.*, 80: 729-36.
Mahmoodi, M.R. and S.M. Kimiagar, 2001. Prevalence of zinc deficiency in junior high school students of Tehran City. *Biol. Trace Elem. Res.*, 81: 93-103.
Rivera, J., M. Ruel and C. Santizo, 1998. Zinc supplementation improves the growth of stunted rural Guatemalan infants. *J. Nutr.*, 128: 556.
Salgueiro, M.J., M.B. Zubillaga, A.E. Lysionek, R.A. Caro, R. Weill and J.R. Boccio, 2002. The role of zinc in the growth and development of children. *Nutr.*, 18: 510-9.
Shankar, A.H. and A.S. Prasad, 1998. Zinc and immune function: the biological basis of altered resistance to infection. *Am. J. Clin. Nutr.*, 8: 447S-63S.
Sur, D., D.N. Gupta, S.K. Mondal, S. Ghosh, B. Manna and K. Rajendran, 2003. Bhattacharya SK. Impact of zinc supplementation on diarrheal morbidity and growth pattern of low birth weight infants in Kolkata, India: a randomized, double-blind, placebo-controlled, community-based study. *J. Pediatr.*, 3; 112:6.
Zinc Investigators' Collaborative Group, 1999. Prevention of diarrhea and pneumonia by zinc supplementation in children in developing countries: pooled analysis of randomized controlled trials. *J. Pediatr.*, 135: 689-97.