

The Role of Zinc in Improvement of Weight Gain of Children with Protein Energy Malnutrition

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Background

- Child malnutrition is an important indicator for monitoring progress towards the Millennium Development Goals.
- In Africa no. of stunted and underweight children increased from 40 to 45 & 25 to 31, respectively.
- South central Asia continued to suffer very high levels of malnutrition.

Zinc

- It is a trace element.
- Required for maintenance of normal structure and functions of multiple enzymes.
- Important for cell division.
- Plays an important role in protein synthesis.

Promising in malnutrition?

Zinc

- Available in animal flesh particularly **red meat** and **poultry**.
- Absorption is affected by:
 - zinc level in diet.
 - interfering substances specially phytates.
- Deficiency leads to anaemia, short stature, hypogonadism and impaired wound healing.
- Dietary Reference Intakes (DRIs):
 - infants: 2-3 mg/d
 - preadolescents: 8 mg/d
 - adults: 11 mg/d

Objective

To review the available data on the effect of zinc on the improvement of weight gain in children under five years of age with protein energy malnutrition.

Methods

Identification of studies:

- A search was conducted in MEDLINE (1966-Feb 2005).
- Manual search for journals with relevant articles.

Inclusion criteria:

- Randomized double blinded placebo controlled trials.
- Restricted to studies of malnourished subjects, as evidenced by mean initial anthropometric Z-scores ($<-2.0Z$).
- Subjects below 5 years of age.

Exclusion criteria:

- Studies were excluded if they were reports, editorials, or letters to the editor.
- If they did not provide complete data.
- If the subjects were suffering from severe infection or chronic illness.

Results

Study	Study duration	Sample size	Age of subjects	Intervention	Primary outcome: weight gain	Secondary outcome
Khantun et al, 2001 Bangladesh	One week	48 (Zn n=24) (C. n=24)	6-24 months	20 mg/d bd	P<0.045	Infectious morbidity
Roy Sk et al, 1997 Bangladesh	Eight weeks	111 (Zn n=57) (C. n=54)	3-24 months	20 mg/d tds	P<0.03	Infectious morbidity
Bhutta Za et al, 1999 Pakistan	Two weeks	87 (Zn n=43) (C. n=44)	6-36 months	3 mg/kg/d	Not sig.	IGF-1 level
Castillo et al, 1987 Chile	Two months	32 (Zn n=16) (C. n=16)	2-12 months	2 mg/kg/d	P<0.05	Infectious morbidity
Herchkovitz E et al, 1999	Three months	25 (Zn n=14) (C. n=11)	3-9 months	2 mg/kg/d	Not sig.	IGF-1 level
Ninh Nx et al, 1996 Vietnam	Five months	146 (Zn n=73) (C. n=73)	4-36 months	10 mg/d	P<0.001	Infectious morbidity
Umata M. et al, 2000 Ethiopia	Six months	100 (Zn n=50) (C. n=50)	6-12 months	10 mg/d	P<0.001	Infectious morbidity

Summary of the results

Equivocal evidence supports the implementation of zinc intervention to promote weight gain.

Intersubjects heterogeneity of the outcome

- Not all supplemented subjects showed significant weight gain.
- Some subjects showed weight gain at the end of the first week.
- Some subjects showed weight gain in the second to the third week.

Secondary clinical outcomes

- Improvement in diarrhoeal morbidity.
- Improvement in RTI infection.
- Increased serum IGF-1 level.

Conclusion

- Weight response to supplemental zinc is inconsistent in different studies.
- Yet, there will be essential benefits of any intervention enhancing zinc status in malnourished children.

Implications for future research

- Determination of the causes of the outcome.
- Evaluate combination of different interventions.

Thanks