Clinical Nutrition

Serum Zinc and Vitamin A Status of Malnourished Children Fed a High-protein Diet during Recovery

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Objective: Evaluate the effect of a high-protein diet on growth, serum proteins, and micronutrient status of malnourished children.

Methodology: Sixty-nine children were randomized to receive either a high-protein (HP) or a standard protein (SP) diet for three weeks in the metabolic study ward, and then followed up at home for six months. Body weight and height were measured, and concentrations of serum proteins, retinol, and zinc were also determined on admission at 3 weeks, and at 6 months.

Results: The mean±SD height increment was 5.3±1.0 cm in the HP group compared to 4.2±1.1 cm in the SP group ($p<0.001$). The mean increment of serum protein concentrations (7.5 g/L vs. 2.9 g/L) and retinol (45 µg/L vs. 20 µg/L) was significantly higher in the HP group compared to the SP group at 3 weeks, but not at 6 months. Inspite of higher dietary zinc intake in the HP group than in the SP group (5.7 mg/kg.d vs. 2.9 mg/kg.d), the serum zinc concentrations were not significantly different between the two groups.

Conclusion: Diet rich in protein, energy, and micronutrients fed during the recovery period enhances the growth of malnourished children, but does not have sustained effects on protein and micronutrient status.

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Standardized Management Reduces Mortality among Severely Malnourished Children with Diarrhoea

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Objective: Reduce mortality and cost of treating severely malnourished children with diarrhoea by following a standardized management protocol.

Methodology: The mortality rates and the cost of treatment were compared between severely malnourished children aged 0-5 years, who received standardized management (standardized group, SG) and conventional management (comparison group, CG). Key points of SG are the standardized use of rehydration fluids with emphasis on oral rehydration solutions (ORS), slower rehydration, appropriate feeding, routine micronutrient supplementation, antibiotics therapy, and proper management of complications. Conventional management included rehydration within 3-4 hours, giving antibiotics only if there were obvious features of infection, delay in feeding until rehydrated, and supplementing with micronutrients only when indicated. The SG included children admitted to one of the three clinical units from 1 January to 30 June 1997. Children admitted to the same clinical unit from 1 January to 30 June 1996 (before the protocol was implemented) constituted the CG. Odds ratios with 95% confidence intervals were calculated for outcome variables, like mortality rates.

Results: Admission characteristics of children in the SG (n=334) and CG (n=293) were comparable except that more SG children had oedema, acidosis, and *Vibrio cholerae* isolated from stools. Sixty percent of the children in the SG were successfully rehydrated with ORS rather than intravenous fluids compared to 29% in the CG (p=0.00001). The use of expensive antibiotics was less in the SG (p=0.0001). The SG children had fewer episodes of hypoglycaemia (15 vs. 26, p=0.02). Costs of laboratory tests, intravenous fluids, and antibiotics were significantly less in the SG. Thirty children (9%) died in the SG, whereas 49 (17%) died in the CG (p=0.003; OR 0.49, 95% CI 0.3-0.8).

Conclusion: Standardized management resulted in a 47% reduction in mortality among the severely malnourished children with diarrhoea, fewer episodes of hypoglycaemia, and lesser use of intravenous fluids. The use of expensive antibiotics as well as the cost of laboratory tests and intravenous fluids were also minimized. The use of a standardized approach should be considered in the care of severely malnourished ill children.

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Nutritional Rickets without Vitamin D Deficiency in the Chakaria Region of Bangladesh

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Objective: Explore the aetiology and characterize the clinical aspects of rickets in children in Chakaria.

Methodology: Fourteen rachitic children and 13 children identified by subjects' families as unaffected were evaluated clinically and investigated.

Results: The age of rachitic children (9 males and 5 females) varied from 36 to 98 months (mean 69 months); their parents reported them being symptomatic of rickets since an average of 24 months of age (range 0-48). Rachitic deformities included knock-knees (10), bowed legs (4), and sabre tibia (3). Ten of the 14 affected children had active rickets as determined by serum alkaline phosphatase activities > 350 U/L; 7 of the 12 children subjected to x-rays had radiographic evidence of active rickets. The rachitic children had a mean alkaline phosphatase activity of 492 U/L (range 198-834; controls with mean 206 and range 138-331; p<0.0001), a mean serum calcium level of 9.6 mg/dl (range 8.5-10.4, not significantly different from controls), a mean serum phosphorous level of 4.3 mg/dl (range 1.9-5.6; controls with mean of 5.2, range 4.3-5.8; p<0.003), a mean serum 25-OH-vitamin D level of 20 ng/mL (range 7-65 with two subjects less than 14; controls: mean 25, range 16-35; p<0.008), and a mean serum 1,25-(OH)2 vitamin D level of 131 pg/mL (range 78-190; control mean 73, range 22-144, and 9 of the 13 subjects above the upper limit of "normal" p<0.0005). Of the 10 children with active rickets, only two had low vitamin D levels (one with hypophosphataemia), and one had hypophosphataemia; calcium deficiency was the most likely aetiology of the rickets in at least seven of the affected children. Interestingly, three "unaffected" children had physical findings consistent with rickets (each with beaded ribs, one also with widened wrists, another also with knock-knees) without elevated alkaline phosphatase activities.