

Diarrhoea and malnutrition in children

Replacing fluid and minerals, particularly zinc, remains vital

The 8th Commonwealth Congress on Diarrhoea and Malnutrition in Dhaka, Bangladesh, earlier this month questioned whether we are doing enough towards combating malnutrition and intestinal diseases in children. We could be, if recent advances in managing diarrhoea and malnutrition and in supplementing micronutrients, particularly zinc, were to be widely implemented.

Most episodes of diarrhoea are infectious and are caused by a variety of bacteria, viruses, and parasites.^{w1} Dehydration is the most direct effect of diarrhoea, accounting for the majority of deaths. The advent and widespread adoption of oral rehydration therapy has greatly reduced the mortality related to diarrhoea.^{w2}

Yet diarrhoeal illnesses in young children continue to be a leading cause of morbidity and mortality worldwide. Every year around 10 million children under 5 die: about half of these deaths are associated with undernutrition and about 2 million with diarrhoea (out of a total of 2.5 billion episodes of diarrhoea).^{w3} Most mortality related to diarrhoea occurs in less developed countries, and the highest rates of diarrhoea occur among malnourished children.¹ The case fatality rate is highest among children aged 6-12 months because at this age the immune system is not yet fully mature, maternal antibodies are waning, and the foods introduced to complement breastfeeding may be contaminated.

For more than three decades an oral rehydration solution containing 90 mmol/l of sodium and 111 mmol/l of glucose has been used, saving millions of lives around the world. Recently, WHO and Unicef have recommended the use of a new reduced osmolarity formulation for oral rehydration comprising 75 mmol/l of sodium and 75 mmol/l of glucose and an osmolarity of 245 mmol/l.² This new formulation is at least as efficacious as the standard oral rehydration solution, and a meta-analysis showed that it reduced the need for unscheduled intravenous therapy by 33%, stool output by 20%, and the incidence of vomiting by 30%.^{w4}

Although the effectiveness of oral rehydration therapy has been proved, only about 20% of children with diarrhoeal episodes worldwide currently receive it appropriately.³ Furthermore, knowledge and use of appropriate home treatments to manage diarrhoea successfully may be declining. Adherence to recommendations for children is poor because oral rehydration therapy does not reduce the duration of diarrhoea: this often leads to use of antibiotics and other treatments of no proved value. The continued high morbidity, mortality, and malnutrition associated with diarrhoeal diseases have led to a search for adjunctive treatments.

Numerous randomised controlled trials have shown the therapeutic benefits of zinc supplementation during diarrhoea,^{w5 w6} and WHO and Unicef have recently recommended the therapeutic use of zinc for 10-14 days at a dose of 10 mg daily in infants less than 6 months old and 20 mg daily in older children.² The effectiveness of different delivery strategies for zinc is currently being evaluated.

Thus the clinical management of acute diarrhoea has four main components: replacement of ongoing losses of fluid and electrolytes, zinc therapy, antimicrobial therapy when indicated, and continued feeding to supply enough nutrients to meet both the patient's usual maintenance requirements and the increased needs imposed by infection and malabsorption.^{w1}

About 10% of diarrhoeal episodes in less developed countries lead to persistent diarrhoea of more than two weeks' duration and require specialised treatment in addition to rehydration therapy. Although dehydration is the most direct effect of diarrhoea, many other adverse and potentially fatal nutritional consequences arise in the absence of proper nutritional management. Undernutrition increases the incidence and severity of diarrhoea and diarrhoea is detrimental to nutritional status.⁴ Moreover, infection and micronutrient deficiencies including zinc deficiency can induce immunodeficiency in otherwise healthy children, increasing susceptibility to diarrhoea and other infections. This can lead to a vicious cycle of repeated infections, reduced immunity, and deteriorating nutritional status.⁵

Diarrhoeal illnesses account for 10-80% of growth retardation in the first few years of life worldwide, with the magnitude of effect possibly modified by other factors such as aetiology and clinical type of diarrhoea, the source and adequacy of dietary intake, treatment, and feeding practices.⁶ Understanding the mechanisms of diarrhoea induced undernutrition and appropriate treatment of diarrhoea is important for managing the immediate illness and also for maximising children's wellbeing in the long term.

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References w1-w6 are on bmj.com

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