EDITORIAL

Diarrheal Disease: Major killer of Children, New Development

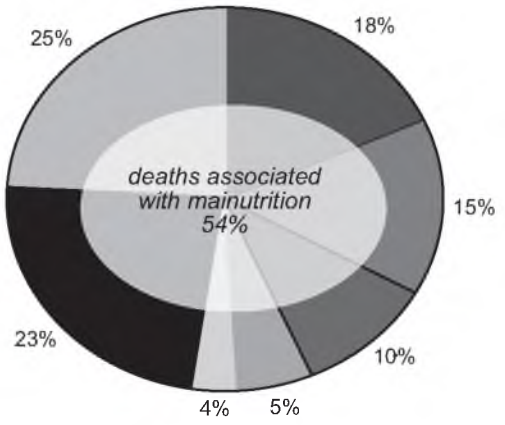
Abdul Gaffar Billoo

Disease Burden

Diarrheal disease is one of the biggest causes of childhood mortality and morbidity in developing countries of the world.

Diarrhea accounts for about 1.5 million deaths annually, making up about 15 to18% of global under-5 mortality.[1] In the Eastern Mediterranean region, diarrhea accounts for 17% of under-5 deaths.[2] According to the Pakistan Demographic and Health Survey 2006-2007, diarrhea accounts for 10.9% of deaths under the age of 5.[3] Concurrent factors such as malnutrition and poor access to rehydration are responsible for the majority of these deaths. Malnutrition is concurrently present in 54% of all diarrhea-related deaths [4] (see Fig. 1).

This emphasizes the great importance of nutritional status in determining the outcome of illness, particularly in a diarrheal episode.



Major causes of death among children under five in developing countries, 2002

Correspondence: Dr. Abdul Gaffar Billoo, Professor and Chairman of Paediatrics, Aga Khan University Hospital, Karachi, Pakistan.
E-mail: gaffar.billoo@aku.edu
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To alleviate the state of child health in resource poor settings in developing countries, the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) presented the Integrated Management of Childhood Illness (IMCI) algorithm in 1995 which is a comprehensive strategy to treat and prevent childhood illnesses and institute referrals on detection of specific danger sings[5]. Diarrheal disease is also covered in IMCI,which provides simple guide lines for assessment and management of diarrhea to improve the effectiveness of community health workers and primary physicians.[5]

A detailed history and complete physical examination remain vital. The most important aspect of the management of a patient with diarrhea is to assess and classify the degree of dehydration. The emphasis is on replacement of fluid loss with ORS and homemade fluids with continued feeding. Fluid replacement guidelines are simplified based on whether the patient has NO dehydration, SOME dehydration or SEVERE dehydration, requiring treatment PLAN-A, PLAN-B or PLAN-C respectively.[5] These guidelines have resulted in huge reduction in diarrhea related global mortality, from 4.5 million to 1.5 million deaths annually, in last two decades.

New Developments

1:- Improved Low osmolarity ORS

Evidence suggests that efficacy of ORS solution for treating children with acute non-cholera diarrhea is improved by reducing its sodium concentration to 75mEq/L from 90 mEq/L, glucose concentration to 75mmol/L from 111 mEq/L and total osmolarity to 245 mosm/L from 311 mosm/L. (See Table no. 1). The 245 mosm/L solution also appeared to be as safe and at least as effective as standard ORS for use in children with diarrhea. A systematic review of 15 randomized controlled trials concluded that in children admitted to hospital with dehydration associated with diarrhea, reduced osmolarity rehydration solution is associated with reduced need for

fluids, lower stool volume, and less vomiting compared with standard WHO rehydration solution.[6]

With reduced osmolarity ORS having established its role in improving outcomes in children with diarrhea, the latest WHO guidelines now recommend that countries use the following formulation in place of previously recommended ORS solution (See Table No. 1).Previous formulations of ORS are now to be replaced by the new ones, and to avoid confusion, the new formulation is now to be simply referred to as 'ORS' [7, 8]

2:- Zinc in treatment of diarrhea

Most children dying of diarrhea are also malnourished and have associated micronutrient deficiency. Children with marginal nutritional status are at significant risk of aggravating zinc depletion with diarrheal episodes. [9] Daily losses of zinc in the intestinal fluid during acute diarrhea are as high as 159ug/kg/day compared with 47ug in control group.[10] Zinc deficiency also impairs cellular and humoral immune function with zinc supplementation improving immunity. Zinc deficiency also has direct effects on the gastrointestinal tract such as impaired intestinal brush border, increased secretion in response to bacterial enterotoxins and a breakdown in intestinal permeability[11]

With this biological basis, zinc has been studied in numerous trials and a meeting held in New Delhi in May 2001, which reviewed all studies conducted on effectiveness of zinc concluded that zinc supplementation given during an episode of acute diarrhea significantly reduced the duration and severity of the episode.[12] In six of nine trials that evaluated prevention of diarrhea significantly, analysis demonstrated 18% less diarrhea.[13] From a program implementation perspective, use of zinc as adjunct therapy has been shown to have significantly improved the cost-effectiveness of standard management of diarrhea with particular benefitsin mortality rates in non-dysenteric diarrhea. [14] Zinc has been demonstrated to be equally useful in the Pakistani population. A triple-blinded randomized trial conducted in an urban slum in Karachi concluded that daily provision of micronutrients (including zinc) reduced the longitudinal prevalence of diarrhea and thus reduced diarrhea related mortality in young children.[15]

Based on these findings, WHO and UNICEF(2004) issued a joint statement on the clinical management of diarrhea which recommends that, along with increased fluids, Low Osmolarity ORS , and continued feeding, all diarrheic children be given 20 mg per day of zinc supplementation for 10-14 days (10 mg per day for infants below six months of age).[16]

COMPOSITION OF REDUCED OSMOLARITY ORS

Reduced osmolarity ORS	**grams/litre**
sodium chloride	2.6
Glucose, anhydrous	13.5
Potassium chloride	1.5
Trisodium citrate, dihydrate	2.9
Total weight	20.5
Reduced osmolarity ORS	**mmol/litre**
Sodium	75
Chloride	65
Glucose, anhydrous	75
Potassium	20
Citrate	10
Total osmolarity	245

CONCLUSION AND RECOMMENDATION

Diarrhea continues to be a significant cause of morbidity and mortality in Pakistani children, and reducing incidence of diarrhea would have a significant impact in helping reduce child mortality, and in turn, achieving MDG-4.

- Low osmolarity ORS should replace existing formulations, AS SOON AS POSSIBLE and should be widely distributed in the community.

- All children with diarrhea should be given ZINK SUPPLEMENTATION along with increased fluid and continued feeding.

PREVENTION OF DIARRHEA TO REDUCE THE BURDEN OF THE DISEASE.

Advocacy for **BREAST FEEDING**, especially exclusive breast feeding for 6 months, should be continued and strengthened.

HAND WASHING has proved to be the most cost effective intervention for prevention of diarrheal diseases.

Rotavirus vaccination should be seriously considered for introduction as part of universal EPI coverage.

Putting these recommendations in place would have a significant impact in improving the health status of Pakistani children. Further research is required to devise strategies and programs that would lower mortality even further.

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