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The dietary management ot acute childhood diarrhea: optimal timing of feeding and appropriate use of local mixed diets

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Earlier presentations in this symposium reviewed the nutritional risk factors for diarrheal diseases and the nutritional complications induced by these illnesses. The present paper will initiate discussion of the optimal dietary management of children with diarrhea.

The purpose of dietary therapy is to eliminate or reduce the adverse nutritional consequences of diarrhea without increasing the severity of stool output or the possibility of dehydration or elecrtrolyte imbalance. As noted previously (1), the optimal approach to dietary therapy for childhood diarrhea has been debated. Alernative treatment strategies are either continued feeding during the acute stage of illness or reduce feeding during illness and compensatory "overfeeding" during convalescence. Whereas continued feeding may reduce the nutritional deficits imposed by diarrhea and possibly diminish patient discomfort, some diets may increase the severity of diarrhea in certain patients. Dietary withdrawal during diarrhea and enhaced feeding during convelescence avoid these latter problems, but may require either increased frecuency of feeding after illness or availability of specially prepared, nutrient-rich diets that permit compensatory growth. These prerequisites may limit therapeutic success in some settings.

This presentations discusses the results of selected clinical trials that have examined how different dietary regimens used during illness affect the severity, duration, and nutritional outcome of childhood diarrhea. Special attention will be devoted to: 1) the optimal timing for feeding children in relation to the onset of illness, and 2) the use local mixed diets.

Responses to dietary therapy that should be considered in the evaluation of specific regimens include both the ensuing severity of illness as well as the nutritional outcomes. Diarrheal severity can be assessed in terms of stool output per unit time, duration of liquid stool excretion, and occurrence of the aforementioned clinical complications. Nutritional outcomes may be evaluated as net absorption of specific nutrients and changes in anthropometric status or biochemically defined nutrient reserves.

Several randomized clinical trials have compared continued versus interrupted feeding during illness. Chung and Viscorova (2) studied 115 Czechoslavakian infants with diarrhea and dehydratation.

Hospitalized patients were alternately assingned either to full feedings of a milk, sugar, and water formula at levels of 80 to 120 kcal/kg BW/d immediately following rehydratation or to water only for 24 to 48 hours, followed by introduction of the same milk formula in increasing daily increments of 20 kcal/kg BW/d. No differences in the rate of treatment failure or the duration of diarrhea were noted when the treatment groups were compared. The group with full feedings consumed greater levels of dietary energy intake and gained slightly more weight during the first week of treatment. Stool volumes were not measured, but the authors noted that "the stool of those in the fed group were much larger" than those of starved group. They concluded that it was "advantageous to feed infants early with full calories in diarrhea" even though starvation tended to

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improve the appearance of the stools and decrease their frecuency. Because their patients continued to receive intravenous therapy to maintain fluid balance, it is not possible to extrapolate the results of this study to ambulatory patients. In a more recent study, Santosham et al (3) offered patients either a soy formula plus an oral replacement solution (GES) containing glucose and electrolytes or the GES alone during the first 24 hours of hospital therapy. The children who received the formula diet and fluid therapy had a lower stool output and a shorter duration of illness than those who received GES only. Presumably, the former patients were also better satisfied nutritionally, although the study did not measure nutritional outcome.

Brown et al (4) compared four treatment regimens among groups of children with acute diarrhea: 1) continued feeding with a nutritionally complete, lactose-free formula offered in amounts up to 110 kcal/kg BW/d; 2) continued feeding with the same formula diluted with water by half for the first two days of therapy; 3) fluid therapy only with oral GES for two days, followed by dilute formula for an additional two days, or 4) fluid therapy with an intravenously administered GES for two days, again followed by two days of the dilute diet. Except for intravenous GES group, which had reduced fecal output during the firts two days of treatment, all groups treated orally had similar rates of fecal excretion and duration of diarrhea, regardless of the amount of the fluid or diet given. On the other hand, the net absorption of macronutrients, retention of nitrogen, and increments in body weight, arm circumference, and skinfold thickness were directly related to the amounts of the diets offered. The patients randomly assigned to received continued feeding with the "full-strength" diet gained weight continuosly throughout the two-week period. The author concluded that continued feeding during diarrhea was advisable because of its nutritional advantage and absence of excess complications. Two recently completed studies compared the effects of continued or interrumped feeding in ambulatory patients (5, 6). The first (5), which was conducted among Bedouin infants who had acutte, watery diarrhea and mild dehydration, compared two groups of patients. One group received immediate post-rehydration feeding with their preillness diet (human milk, variuos forms of cow milk, or modified cow milk formulas) and the other received the same diets after 24 hours of treatment with orally administered GES only. At entry into the study, patients in both groups had similar characteristics and no differences in rates of recurrent dehydration, duration of diarrhea, or weight gain were detected.

The second study of ambulatory patients was particulary interesting because children were identified for participation before illness occurred so that respective treatment regimens could be initiated immediately after the onset of symptoms. When patients passed two or more watery stool in a 24-hours period, they were randomly assigned either to continuation of the usual pre-illness formula or to GES only for 24 hours, followed by introduction of a soy or a cow milk formula. No differences were observed in the rates of treatment failure, number of stool excreted duration of illness, or change in body weight. The authors reported that caregivers accepted therapeutics advice more readily in the group instructed to continue with the child's usual feeding regimen.

In summary none of these studies comparing varied times of introduction ot the same or similar diets identified adverse clinical effects of early or continuous feeding. Indeed, one study demonstrated reduced stool output with earlier feeding (3), and one described improved nutritional results (4). Even studies found no differences in clinical outcomes noted that when continued feeding was recommended, the children were more comfortable or their caregivers were more likely to implement the proposed therapy.

Other studies have examined the effects of specific foods or food components on the course of diarrhea. In this symposium Lifschitz will discuss the use of milk products. Other studies using local food mixtures will now be reviewed briefly. In Peru, mixtures of either wheat flour, pea flour, carrots, sugar, and vegetable oil or white potato, milk, carrots, sugar, and vegetable oil were compared with a commercialy-produced lactose-free soy protein isolate formula (7). Althought fecal outputs were somewhat greater in the potato-milk group during the first few days of treatment, they were similar in the other two groups. Thereafter, stool amounts stabilized at a higher plateau in the wheat-pea and potato-milk groups than in the formula group. The duration of illness was substantially shorter in the two groups that received the staple foods. On the other hand, children tended to gain slightly more weight with the formula diet.

In similar studies in Nigeria, a mixture of fermented maized pap, toasted cowpea flour, sugar and palm oil was compared with the same lactose-free soy formula noted above (Grange, unpublished). During the first two days of therapy, fecal excretion rates were significanly greater with the soy formula than with the mixed diet. Fecal output declined progressively in both groups during hospitalization and was less in the formula group than the maize-cowpea group by the sixth day treatment.The duration of illness was dramatically shorter with the local food mixture, but dietary intake, macronutrient absorption, and weight gains were somewhat greater with the formula diet.

The combined results of these studies indicate that mixtures of accessible staple foods are safe to use during diarrhea illness and yield purging rates during early therapy that are generally similar to, or in some cases possibly less

than, those observed with milk - or soy- based formula diets.

Despite these encouraging findings, it is somewhat worrisome that the children tended to consume more dietary energy and to gain slightly more weight when they received the formula diets. These results may be attributable to differences in the organileptic characteristics of the diets, such as their viscosity and flavor, or they may be due to differences in the bioavailability of nutrients from the respective food sources. Althoug minor differences in dietary intake and weight gain are probably of minimal nutritional importance if the diets are provided for only a few days, further investigations will be required if the food mixtures are to be used for a longer time. Home-prepared weaning foods, such as those described by Cameron and Hofvander (8) may presumably be used successfully to manage children nutritionally during and after diarrhea, although comprehensive data for a full range of individual foods and food components are still lacking.

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