

ANNOTATION

Glucose-Electrolyte Hydration Powders for the Management of Gastroenteritis

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The three basic principles of management for gastroenteritis have always been cessation of food intake; maintenance, and if necessary, replacement of fluids and electrolytes; and gradual return to normal feeding. Very little else has any effect on the prognosis for the vast majority of cases anywhere in the world. The fluid and electrolyte replacement can be carried out at home in the simplest possible manner, by oral administration of boiled water to which sugar and a pinch or two of kitchen salt are added by the mother; or it can be administered intravenously in a hospital with the latest equipment, pathological facilities and technical skill. The vast majority of cases even when seen in a hospital or clinic are, of course, treated at home.

It has long been realized that the loose stools of gastroenteritis will, after infection has subsided, often return if full feeding is resumed too rapidly, and that this is due, seemingly, to the action of food itself on the intestinal mucosa. This "residual diarrhoea" as it used to be called, is commonly of brief duration, but sometimes resumption of milk feeding is repeatedly followed by a return of explosive diarrhoea, usually lasting for a few days only, but occasionally for several weeks or even longer. This phenomenon, reflecting a persisting inability to split disaccharide sugars, is most often due to intolerance to lactose in milk, but it can also happen with sucrose when the mother uses cane sugar in

the home. Moreover, in addition to this disaccharide intolerance, the "pinch or two of salt" only partially meets electrolyte needs, and other salts are often useful. It has consequently become a common practice to give mothers proprietary bottled solutions of glucose and electrolytes to take home and use for a few days. Though effective, these solutions are both expensive and heavy, and the number of bottles that can be carried home is limited.

Some fifteen years ago, in the Rehydration Centres in the refugee camps for Palestinian refugees from Israel, set up by the United Nations Works Relief Association (UNWRA), Dr Najjer devised glucose-electrolyte powders which, after adding to water, could be used orally, both whilst the infants were in the centres, and also handed to mothers in envelopes, to be added to boiled water when she got home. These powders had the immense advantage of light weight, and they cost only a small fraction of the proprietary solutions in bottles.

This method of home hydration has been adopted in the Paediatric Department, Ahmadu Bello University, Zaria, Nigeria, to keep pace with the increasing numbers of children attending the out-patient department suffering from mild to moderate gastroenteritis. The powders are put up in paper envelopes, with written instructions on the outside and taken home by mothers. The composition of the powders has remained

unchanged from that devised by Dr Najjer, except the addition of a small amount of magnesium hydroxide to combat the magnesium deficiency which is often present in children with gastroenteritis associated with an underlying malnourished state.

The formula of the powders is as follows:-

Substance	Quantity (g)
Sodium Chloride	10
Sodium Citrate	50
Disodium Phosphate	25
Potassium Chloride	25
Magnesium Hydroxide	10
Glucose	880
Total Hydration Powder	1 kg.

Instructions

Fifteen-gram portions of the powder are placed in envelopes to be added to 250 ml. or about 8oz. of boiled water when required. Each kg. of powder therefore makes up 66 envelopes. Each envelope bears the instructions to add the contents of one envelope sized to an empty Coca Cola or other similar bottle containing 250 ml; or of 2 envelopes to a one pint beer bottle, and the bottles are filled with boiled water.

When made up the composition of the fluid is as follows:

Glucose	5.2 per cent	
Sodium	62.26 MEq./l	} As Anhydrous Salts
Potassium	20 "	
Magnesium	20.4 "	

Maximum mille-equivalents are obtained when anhydrous salts are used. Commercial preparations of sodium citrate and sodium phosphate

often contain varying amounts of water of crystallization. This affects mainly the sodium cation of the powder, which can be down to 49 Meq./litre of prepared fluid if sodium phosphate with 12H₂O is used, but even this difference in sodium content is relatively unimportant.

The weight of two envelopes containing the powders is a twentieth of the weight of a $\frac{1}{2}$ -litre bottle of, for instance, half-strength Darrow's solution, and the cost, in Nigeria, is about a tenth of the cost of this quantity of Darrow's solution. The individual salts are available in 500g. packets and the glucose in 2-kilo bags. Two packets each of sodium chloride and magnesium hydroxide, 5 packets of disodium hydrogen phosphate, and potassium chloride and 10 packets of sodium citrate, together with forty-four 2kg. bags of dextrose will provide 100kg of hydration powder. This will make up into 1666 litres of maintenance disaccharide-free fluid, at a cost of about ₦265, and considerably less if purchased wholesale.

The powders may also be used to make up a disaccharide free milk. Four of the powders (52g. glucose) with 40—45 g. casilan and 35g. cooking oil, or perhaps red palm oil to supply vitamin A., made up to 1 litre in boiling water and beaten with a mixer, makes a satisfactory food which looks and tastes very much like milk and contains the appropriate calorie, protein and electrolyte content.

In our experience this mixture is not only useful for the management of gastroenteritis but is also proving invaluable for children with protein calorie malnutrition and chronic diarrhoea.