Oral Rehydration Therapy-20th Century Wonder

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Sometimes the most complicated problems have simplest solutions, the best example being Oral Rehydration Therapy (ORT). In 1987, UNICEF called ORT the greatest medical breakthrough of 20th Century. It said “no other medical breakthrough has had the potential to prevent so many deaths over such a short period of time and at so little cost”.

Every year, millions of individuals, mainly children, die due to dehydration brought about by gastroenteritis. Until the discovery of ORT, the only efficient means for severely dehydrated patients was to provide intravenous fluids described by William Brooke (1831). Cholera like illness was too often a death sentence, since people infected had no recourse to IV therapy due to the cost and inaccessibility, particularly in developing third world countries.

ORT was not known in the West until 1960. Ancient physician Sushruta had described the treatment of acute diarrheal illness with rice water, coconut water and carrot soup. Hemendranath Chatterjee in Kolkata published his results of cholera treatment with ORT in 1957. However, he did not carry out a controlled trial. Robert Phillips also attempted to create an effective ORT solution, but his methodology was inadequate.

In 1960s, biochemist Robert Crane discovered the sodium-glucose co-transport mechanism and its role in intestinal glucose absorption. This strengthened the belief in the concept, that intestinal mucosa is not disrupted in cholera, and helped understanding the physiological basis of ORT’s effectiveness. David R. Nalin and Cash R. A found that in adults, ORT given in volumes equal to that of diarrheal loss, reduced the need for IV fluid therapy by 80% (1962), while Norbert Hirschhorn demonstrated that children would voluntarily drink as much of the solution as was needed to restore hydration. Vomiting did not pose a significant problem when given as sips of water. This resulted in a wide application of therapy in clinical settings. Physician Dilip Mahalanobis instructed his staff to distribute oral rehydration packets to families, when IV fluids ran out in a refugee camps during Bangladesh war (1971). Over 3000 people with cholera received ORT in this way, reducing mortality rate from 30% to 3.6%.

In 1980, the Bangladeshi nonprofit organization BRAC developed door to door campaign and hit upon the method of encouraging women in the village to make their own rehydration fluid using available household equipment, starting with 1 liter water (4 large cups) and adding a fistful of sugar (20 gms. or 4 tsfs), two finger pinch of salt (2 gms. or half tsf) and two finger pinch of baking soda (2 gms.). Measures being approximate, the challenge was of providing adequate glucose to the sodium pump without increasing the osmolarity of rehydration solution, which would be counterproductive. It was done successfully by substituting short chain glucose polymers (starch) from rice and other cereals for glucose in ORS. This corrected formulation had the advantage of controlling severity of diarrhea by 30%, reducing morbidity and cost. Effectiveness of rice lentil, based oral rehydration solutions have been extensively tested.

Lancet (1978) regarded “the discovery that sodium transport and glucose transport are coupled in small intestines so that glucose accelerates absorption of solute and water (is) potentially the most important medical advance this Century”.

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