

Oral Rehydration Salt

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Abstract

Acute diarrhoeal diseases are among the leading causes of mortality in infants and young children in many developing countries. In most cases, death is caused by dehydration. Dehydration from diarrhoea can be prevented by giving extra fluids at home, or it can be treated simply, effectively, and cheaply in all age-groups and in all but the most severe cases by giving patients by mouth an adequate glucose-electrolyte solution called Oral Rehydration Salts (ORS) solution. Oral rehydration therapy (ORT) is a type of fluid replacement used to prevent or treat dehydration especially that due to diarrhea. It involves drinking water with modest amounts of sugar and salt added (an oral rehydration solution or ORS) while continuing to eat. Routine therapy also includes supplemental zinc. Caretakers are taught the signs of dehydration and/or worsening dehydration. The World Health Organization specify indications, preparations and procedures for ORT.

Keywords: Oral Rehydration Salts (ORS); Oral Rehydration Therapy (ORT); Diarrhea.

Overview

One of the great medical advances of the 20th century is the introduction of oral rehydration therapy (ORT) refers to the restitution of water and electrolyte deficits in dehydrated patients using an oral rehydration salt solution . The term 'ORS solution' is applied to special fluid formulations containing as essential ingredients an organic solute (for example, a carbohydrate or amino acid) and sodium chloride. Such solutes are subject to active intestinal co-transport and thereby enhance salt and water absorption. Typically, ORS solution contains glucose and sodium chloride in specified concentrations.

History

Indian physician **Sushruta** described the treatment of acute diarrhea with rice water, coconut water, Over 2,500 years ago.



Fig. 1: Indian physician sushruta

ORT was not known in the West until 1960, and dehydration was a major cause of death.

Indian physician Hemendra Nath Chatterjee, in 1957 published his results of treating people with cholera with ORT [1].

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Fig. 2: Hemendra nath chatterjee

Humans have often used oral fluids to replace perceived losses of water, either instinctively or with a therapeutic orientation in the form of folk remedies. Replacement therapy with intravenous (IV) fluids was formally introduced in the last century for the treatment of patients with cholera. The modern implementation of oral replacement therapy was begun by pediatricians in the 1940s who used electrolyte solutions as maintenance therapy in mildly purging children with diarrhea. However, the scientific development of oral rehydration therapy (ORT) has occurred only in the last 30 years. Basic physiologic research in the 1950s demonstrated the co-transport mechanism of sodium and organic solutes (sugars and amino acids) in the intestinal cells, thereby establishing the scientific basis for ORT. The use of ORT based on scientific observations was first reported in 1964 from the Philippines by Phillips and coworkers. Research laboratories in Dhaka and Calcutta subsequently demonstrated that the mechanism of sodium and glucose co transport remains intact in cholera patients and that oral solutions can successfully rehydrate and maintain hydration in these patients. Clinical studies carried out in Dhaka and Calcutta confirmed the efficacy of oral rehydration solutions (ORS) and showed that nearly 80% of IV fluid could be saved if patients were hydrated by the oral route. Further studies demonstrated the safety and efficacy of ORT in patients of all ages suffering from acute diarrhea of any cause. The use of ORT has substantially reduced morbidity and mortality from acute diarrhea, particularly after the World Health Organization adopted and promoted ORT on a worldwide scale. Researchers continue to search for better ORS formulations in terms of safety, efficacy, availability, and cost. Food-based ORS are a promising area of research.



Fig. 3: ORS sample

Oral Rehydration Salt

Types

- Who ORS
- Cereal based ors /rice based ors /(super ors)
- ORS with Micronutrients.
- Zn fortified ORS
- ORS fortified with amino acid
- Other type of ORS
- Homemade ORS
- The composition of the original WHO ORS solution (glucose 111, sodium 90, potassium 20, chloride 80 and bicarbonate 30, all in mmol/l) was selected to allow for use of a single solution that would effectively treat dehydration secondary to diarrhea caused by various infectious agents and resulting in varying degrees of electrolyte loss.^{2,3,4} However, in developed countries, viral gastroenteritis is common and is associated with less severe salt losses, and so there was concern that the sodium content of the original WHO ORS solution might be excessive [5-9] From the 1970s, efforts focused on improving the efficacy of ORS solution by altering its composition. It was found that solutions with higher concentrations of co-transporters (such as sugars) and higher osmolarity decreased rather than increased intestinal sodium and water absorption. Additionally, hypernatraemia was reported with their use. The current formulation WHO ORS solution adopted in 2002 (glucose 75, sodium 75, potassium 20, chloride 65 and citrate 10, all in mmol/l) preserves the 1:1 molar ratio of sodium to glucose that is critical for efficient co-transport of sodium. It has a reduced osmolar load (245 mOsm/l) compared with the original formulation (311 mOsm/l). It also has a longer pre-mixed shelf life owing to its citrate content.
- ORS solution has been manufactured using a range of constituents in differing concentrations. Various organic solutes have been included such as glucose, starch and amino acids. Sodium chloride has been used in varying concentrations. Other non-essential constituents, including potassium,

bicarbonate and acetate are often included. Much research has been carried out to evaluate the effectiveness and safety of these various solutions. Two key areas of research have focused on the optimal sodium/osmolar concentration in ORS solution and on the relative efficacies of glucose versus rice starch as the organic constituent in ORS solution.

Disadvantage of Conventional WHO ORS

- Poor acceptability due to taste
- Increase Volume Purge rate , duration of diarrhea.
- It provides more sodium which is dangerous to edematous child.
- Chronic cardiac failure can occur in patients with anemia.
- Cannot be used in severely malnourished child.
- Because of potential risk of hypernatraemia.

Advantages of Low Osmolarity ORS

- Treatment of acute diarrheal disease in newborn and young Infants.
- The reduced osmolarity ORS is effective as standard ORS in adults with cholera.
- Osmolarity ors promotes more water and sodium absorption than WHO ORS.
- There is less stool output decreased frequency of vomiting, additional risk of no developing hypernatraemia.
- More stability of reconstituted solution Decreased number of hospitalization.
- Single formulation would be promoted to all ages irrespective etiology of nutritional status .

Super ORS

- Rice based ORS is superior to WHO ORS in efficacy in patients with cholera .

Advantages

- Decrease purge rate
- Slow release of glucose from starch

ORS with Micronutrients

- Micronutrients help in absorption of water and

sodium

Zinc Fortified ORS

- modifies course of diarrheal illness
- decrease severity of diarrhea
- Prevents recurrent episodes of diarrhea

ORS fortified with Amino Acid

- ORS fortified with amino acid such as L alanine , glycine, glutamine
- All have high osmolarity, more effective in cholera.

ORS in Severely Malnourished Child (Resmol)

- This is rehydration solution for severely malnourished child, who has potassium deficiency but have high level of sodium.
- They also have deficiency of magnesium zinc , copper. So use of standard WHO ORS is dangerous in them .
- Hence ORS an ORS solution with potassium 40meq/l and sodium 45meq/l with magnesium, zinc and copper has been recommended by WHO.

Home Made ORS

In severely Malnourished child.

4gm salt , 40 gm sugar , added to 1 lit of water .

Conclusion

The comparison of this reduced-osmolarity ORS solution with the standard WHO-ORS solution showed that reduced-osmolarity ORS solution significantly reduced stool output, vomiting, and the need for unscheduled intravenous infusion. Besides, reduced-osmolarity ORS solution also significantly decreased mean serum sodium concentration at 24 hours. Treatment appears that reduced-osmolarity ORS solution, containing a reduced amount of sodium and glucose, had beneficial effects on the clinical course of diarrhoea and is as safe as the standard WHO-ORS solution for use in acute infantile diarrhea.

References

1. Guerrant R. L.; et al. "Cholera, diarrhea, and oral

- rehydration therapy: triumph and indictment" (PDF). *Clinical Infectious Diseases*. 2003; 37(3): 398–401.
2. King CK, Glass R, Bresee JS, et al. Centers for Disease Control and Prevention. Managing acute gastroenteritis among children: oral rehydration, maintenance, and nutritional therapy. *MMWR: Morbidity and Mortality Weekly Report*. 2003; 52: 1–16.
 3. Bryce J, Boschi-Pinto C, Shibuya K, et al. WHO estimates of the causes of death in children. *Lancet*. 2005; 365: 1147–52.
 4. Duggan C, Fontaine O, Pierce NF, et al. Scientific rationale for a change in the composition of oral rehydration solution. *JAMA: the Journal of the American Medical Association*. 2004; 291: 2628].
 5. World Health Organization. *The World Health Report 2007 – a Safer Future: Global Public Health Security in the 21st Century*. Geneva: WHO; 2007. Bryce J, Boschi-Pinto C, Shibuya K, et al. WHO estimates of the causes of death in children. *Lancet*. 2005; 365: 1147–52.
 6. Kosek M, Bern C, Guerrant RL. The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. *Bulletin of the World Health Organization*. 2003; 81: 197–204.
 7. Fontaine O. Effect of zinc supplementation on clinical course of acute diarrhoea. *Journal of Health Population and Nutrition*. 2001; 19: 339–46.
 8. Practice parameter: the management of acute gastroenteritis in young children. American Academy of Pediatrics, Provisional Committee on Quality Improvement, Subcommittee on Acute Gastroenteritis. *Pediatrics*. 1996; 97: 424–35.
 9. Van DP, Giaquinto C, Huet F, et al. Multicenter prospective study of the burden of rotavirus acute gastroenteritis in Europe, 2004–2005: the REVEAL study. *Journal of Infectious Diseases*. 2007; 195(Suppl 1): S4–S16.
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