Use of Low Osmolarity Oral Rehydration Salt solution (LORS) in the treatment of dehydration in children.

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Abstract

Background: Diarrhea is 2nd biggest cause of mortality in young individuals who are under the age of five in India, after pneumonia. According to the 4th National Family Health Survey, 9.2 percent of children under the age of five had diarrhoea in the previous two weeks. LORS is an important step in management of Diarrhea or Dehydration. As diarrhea being very common in India and many other underdeveloped or developing countries, especially in child even, immediate therapy for dehydration in diarrhea is important, usually by oral rehydration therapy or by intravenous saline. ORT is achieved by oral rehydration solution but in children Low Osmolarity Oral Rehydration Salt solution (LORS) is mostly used. Justification: The IAP's "Comprehensive Management of Diarrhea" recommendations were last published in 2006, with a reassessment in 2016. Low Osmolarity Rehydration Solution (LORS) was a recommendation of the WHO in 2002 and by our Government in 2004 as the universal rehydration solution for people of all age groups and for all the various types of dehydration. Even after such initiation, the usage of LORS on India remained low, at 51 percent, despite an increase in awareness of ORS from 14 percent in 2005 to 69 percent in 2015. Objectives: To present the most recent research on ORT and to equip pediatricians, particularly those working in rural settings, to better manage dehydration by incorporating LORS. There were a lot of different compositions of ORS available in India, which created a lot of confusions. This more modern formula of LORS has higher attractiveness than vintage WHO ORS. LORS also can be used in, intense acute malnutrition, neonates and infants, extreme dehydration, renal failure, acute febrile illness, dengue and different viral infections, typhoid, malaria and warmth stroke. Conclusion: Decreased osmolarity ORS that is LORS is good enough to control dehydration in maximum amount of children. At present, the usage of ORS for management of diarrhea, in ultimate NFHS-4 remains low, even though attention is extensively higher. Hence use of LORS is recommended for both diarrhea and dehydration.

Keywords: Diarrhea, Treatment, Dehydration, Oral rehydration therapy, Oral Solution (ORS), Low Osmolarity Oral Rehydration Salt solution (LORS).

Introduction

The scenario remained identical even after years, because the occurrence decreased just by 0:2% by the end of 2005 [1-4]. Dehydration and its complication are one of the main causes for death in the case of diarrhea.

WHO released worldwide diarrheal diseases control program with oral rehydration therapy (ORT) as its center method in about 12 months 1978 [5]. In 2002 a new formulation low sodium low glucose ORS was launched with the aid of using 20% and prevalence of vomiting with the aid of using 30% in comparison to older method ORS. It additionally lets in quicker water absorption, precludes danger of hyper nativenina and is cheaper.

Being involved with hypernatremia, especially in kids having non-cholera diarrhea, low osmolar ORS (LORS) system turned into endorsed as an widespread answer via way of means of WHO and UNICEF in a joint announcement wherein LORS changed into endorsed as secure and powerful to accurate dehydration in diarrhea, along with cholera in adults in addition to youngsters [6]. The safety and usage of WHO recommended ORS was released in India.

Objectives are, to present the most recent research on ORT and to equip pediatricians, particularly those working in rural settings, to better manage dehydration by incorporating LORS. There were a lot of different compositions of ORS available in India, which created a lot of confusions. This more modern formula of LORS has higher attractiveness than vintage WHO ORS. LORS also can be used in, intense acute malnutrition, neonates and infants, extreme dehydration, renal failure, acute febrile illness, dengue and different viral infections, typhoid, malaria and warmth stroke.

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Background

Types of diarrhea: There are five types of diarrhea.

Secretory diarrhea

Toxin causing active out-put of fluid into the gut as in cholera and ETEC is one of the cause of secretory diarrhea. There take place an excessive lack of fluids, bicarbonates and electrolytes, specifically potassium causing excessive diarrhea and metabolic acidosis [7].

Watery diarrhea

It commonly travels through the stomach to the intestines by processes used in secretary or osmotic diarrhea. Electrolytes concentration in the lumen remains in equilibrium with that of its concentration in the blood. Any alternate on this bi-directional flow, both through increased secretion or reduced absorption or either one of them, bring about extra fluid coming into the gut. Diarrhea consequences if the fluid exceeds maximum ability of the colon for absorption [8].

Osmotic diarrhea

Mucosal damage of the gut due to unabsorbed substances, like carbohydrates, results in excessive osmotic load, which in turn leads to continuous passive motion of fluid and various electrolytes into the lumen. An instance is rotavirus-caused transient lactose intolerance. Other etiological sellers encompass norovirus, astrovirus and enteroviruses.

Mal absorptive diarrhea

The conventional examples are - cystic fibrosis, giardiasis, diffuse mucosal ailment, celiac disorder and defects in pancreas and/or biliary system. The digestion or absorption of nutrients, minerals and vitamins, is poor, causing malnourishment or problem in coping in day-to-day activity. Extended and intense sickness most effectively shows, dehydration and electrolyte imbalance, causing diarrhea.

Bloody mucous containing diarrhea

Diarrhea with noticeable blood within feces is known as dysentery and is related to symptoms like fever and severe belly ache. Common infective reasons consist of *Salmonella*, *Entamoeba histolytica*, Shigella and ETEC, Also the other reasons such as, milk protein allergy and inflammatory bowel sickness.

Reason for using Low-Osmolar ORS (LORS)

Main motive for moving to low-osmolar ORS (LORS)

Cholera cases have been reduced since there is availability of advanced infrastructure, proper water delivering systems and higher sanitations. But simultaneously cases of Rotavirus infections became diagnosed as a chief etiological agent for acute diarrhea on young once. Also, reduce in the stool electrolyte (such as Na+, K+, HCO3-) in diarrhea not associated with cholera was also diagnosed. The advanced WHO oral rehydration solution had been a bad recognition through pregnant women for now no longer decreasing prevalence of the volume of stool and vomitus [9]. Decreased osmolarity of LORS (i.e, 45 mOsm/L) than plasma (i.e, 90 mMol/L), facilitated faster absorption of Na+ and water (**Table 1**).

Water diarrhea- Rehydration

Of the 10 generally used symptoms and symptoms to assess dehydration, extended capillary fill up time, ordinary skin turgor, bizarre respiration pattern, cool extremities, vulnerable pulse and shortage of tear have better specificity [10]. Management plan-A is the house control of diarrhea with very slight or no dehydration. Recommendation of LORS at the concentration of 10 mL/kg with every episode of watery stool.

LORS used for children suffering from cholera

For the people suffering from dehydration during cholera, LORS has been discovered to be secure and powerful. A systemic evaluate through WHO on numerous research performed in youngsters with cholera dealt with both the LORS or standard WHO ORS, reaffirmed the protection and efficacy of LORS. The standard serum sodium in kids with cholera decreased after 24 hours (mean 131 mEq/L) than the ones having non-cholera diarrhea (mean 137 mEq/L), each being inside appropriate range.

Vomiting

If the child is not able to stop vomiting thorough medical examination has to be ruled out as any natural or metabolic reason desiring pressing intervention. Cases of excessive dehydration, continuous vomiting, or sepsis have to be hospitalized for different lab investigations, giving I.V. fluids, near tracking and early interventions. In cases of continual vomiting or growing stomach distensions, LORS should be given slowly, along with continuous checking of bowel sounds or movements. Vomiting along with dehydration or diarrhea, causes worsening of fluid loss thus, impairing oral rehydration. Tablet ondansetron, an antiemetic dung is taken into consideration more secure for youngsters to stop vomiting with a dose of 0.15 mg/kg in such conditions [11,12]. Normal breastfeeding should be done as usual in order to enable early restoration of the mucosa and prevention of malnutrition in the newborns.

Table 1. *Electrolyte composition of plasma, stool and Oral Rehydration Solution (ORS) Composition (mMol/L).*

Composition	Na	K	Cl	HCO3	Citrate	Glucose	Osmolarity
Human plasma	135	5	-	25	-	90	290
Cholera stool	105	25	30	30	–	–	–
Non-cholera stool	52	25	14	14	–	–	–
Conventional ORS	90	20	80	–	10	111	311
Low osmolar ORS	75	20	65	–	10	75	245
ReSoMal	45	40	76	–	7	125	300

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Dehydration

The infant with dehydration should be provided with continuous acute intervention to make sure that there may be proper and adequate tissue perfusion. The concentration of potassium may has to be reduced or much less frequently, increased, relying at the medical situation. On physical examination, signs of dehydration recommend the need for a continued rehydration. Mostly rehydration is done by IV fluid or ORS.

There are three types of dehydration. They are

1. Hypertonic
2. Hypotonic
3. Isotonic

The most common in humans are isotonic dehydration.

LORS used for Special Situations other than Diarrhea

Severe Acute Malnutrition (SAM)

Diarrhea is commonly caused due to malnutrition in rural areas. Less intake of food, lack of appetite, bad absorption and extended nutrient requirement, all bring about loss of weight and delay in treatment and recovery from diarrhea, developing a vicious cycle. In such children, rehydration and nutritional rehabilitation need to be simultaneously started. Considering from data, both LORS with a liter of water with 15 mL of 20% KCl solution, or mReSoMal may be taken into consideration powerful for rehydration as well as for the correction of hypokalemia related to SAM along with diarrhea [13].

Neonates and infants

More water loss takes place on infants due to larger body surface are to body mass ratio, except immature kidneys. They rapidly go into extreme dehydration and associated complications. Administration of LORS may be done after 2 months of age, at the same time as continuing to breastfeed of the infant [14].

Severe dehydration

If the Facility of I.V. Fluid Treatment Is Unavailable: In resources restricted settings wherein IV remedy facility is both now no longer possible or it isn't always viable to get right of entry to IV line because of collapsed veins or edema, small amount of LORS or via NG tube, at a dose of about 20 mL/kg for at least 1-6 hours (overall, about 120 mL/kg) can be given. Maintenance close after each 1-2 hrs is important.

Acute febrile illness

Fever causing immoderate fluid loss because of excessive sweating, dwindled thirst and improper consumption of water, leading to impaired water-electrolyte balance. An extra 20% fluid consumption is recommended in all instances of fever no matter the reason. Fever is frequently related to vomiting, especially in young once. It can lead to severe dehydration and electrolyte imbalance, causing a need for i.v. fluids and a need to be hospitalized. Early management of LORS can save children from complications [14,15].

Typhoid

Some of the commonest cause for dehydration is excessive fever, continuous vomiting, un-adequate intake of food, loose stools like a diarrhea, which are some of the symptoms of typhoid. In such cases, low glucose, sodium and potassium levels takes place and thus proper rehydration (oral or i.v.) along with the treatment of typhoid is needed to be done. LORS, domestic primarily based totally fluids and suitable food regimen are taken into consideration in such conditions [16].

Dengue and various different viral infections

LORS is desired for remedy of slight to slight dehydration, as opposed to undeniable water in febrile dengue patients. Other viral infections, which includes Ebola and COVID-19 throughout fever purpose dehydration and call for enough fluids, along with ORS.

Renal failure

Poor renal perfusion or acute tubular necrosis heads to Azotemia. Diarrhea leads to misplacement of a desirable amount of bicarbonates which are usually recovered via the kidneys, which when fails causes dehydration. Deficiency of bases and production of extra lactic acid leads to severe metabolic acidosis, which further leads to vomiting, deep however fast respiration and variably altered sensorium. Proper feeding of LORS or giving iv. Fluids may help in dehydration by renal failure.

Malaria

A great affiliation became observed among severity of dehydration and parasitaemia. Parasite-positivity became related to excessive fever and vomiting, inflicting dehydration. ORS changed into discovered in? Precious in stopping dehydration and hypoglycemia [17].

Heat stroke

It outcomes dehydration, decrease on electrolytes and in refractory and extended hyperpyrexia, that is increase on body temperature (temperature being more than 410°C). Its management is usually done by following methods such as, cold shower, body sponging, applying ice packs, sprinkling water all over the face of body. Intake of ORS at some point of out of doors paintings with inside the warm surroundings can successfully save you injuries and warmth stroke. These tips can effectively be extrapolated, recommending LORS use in children [18].

The intensified diarrhea control fortnight (IDCF)

The Ministry of Health and Family Welfare under the Government of India released a program known as IDOF in the year of 2014 from 28th July to 3rd of august, with the purpose to decrease the mortality of children below 5 years of age group by diarrhea. It immensely helped in developing recognition on diarrheal disorder and its remedy all around the nation through related to all stakeholders from medical doctors to small working employees of ASHA and Anganwadi. Participation of NGOs, clinical colleges, number one fitness centers, and

expert of pediatricians, dieticians and nurses ensured extensive exposure for this system and it's a hit implementation [19].

Strategies need to country- Wide for increasing the use of LORS

- The confirmation of availability of a proper composition of ORS and LORS in market in packets or solutions, with legally binding regulatory guidelines should be done.
- Availability of LORS at various places such as the anganwadis, schools, kirana shops and pharmacy shops packed in packages, with a conformation of WHO composition should be taken care of.
- Various collages should conduct proper workshops on the management of diarrhea and the use of ORS.
- Proving LORS to be a lifesaving drug.
- Conducting schooling packages, refresher guides and workshops to enhance and enhance know-how of primary medical experts in addition to practitioners from all structures of medicine.
- Encouragement of the celebration of IDCF week in all training institutes and number one fitness-care centers as a mass motion.
- Various industries need to take part in the management of diarrhea, hence carrying the manufacture, dispense and popularisation of LORS as their company social responsibility (CSR).
- Provision for secure and healthy consuming water at each and every corner of the nation.
- Evolving revolutionary techniques through specialists for proper behaviour between the stake holders for the setup of credibility of LORS for prevention and control of dehydration.
- Awareness through the digital and social media to make the public aware about LORS use and to teach them about ORS, also catchy slogans and colourful packages should be made available in their local languages for the rural people.
- Co-ordination of attempts through partnership between self and the public whilst mitigating personal region dangers for accomplishing public zone targets for the popularisation of ORS and making it freely available and cheap, affordable for everyone.

Main motive for Moving to Low-Osmolar ORS (LORS)

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Conclusion

Decreased osmolarity ORS that is LORS is good enough to control dehydration in maximum amount of children. Even though the attention for the use of LORS is drastically high, its current use in diarrhea is very low. In conditions like, extreme acute malnutrition, renal dysfunction and for neonates and younger infants, the usage of LORS is quite difficult. Enteral feeding of LORS is found to be better than the parenteral feeding, which is a bit difficult to do nowadays. Not just for diarrhea, but LORS must be popularized as a powerful treatment to fight dehydration caused by any etiological factor. Usage of WHO proclaimed most effective low osmolarity ORS solutions should be made available throw out the nation. As diarrhea being very common in India and many other underdeveloped or developing countries, especially in child even, immediate therapy for dehydration in diarrhea is important, usually by oral rehydration therapy or by intravenous saline. ORT is achieved by oral rehydration solution but in children low osmolarity oral rehydration salt solution (LORS) is mostly used.

References

1. Bern C, Martines J, De Zoysa I, et al. The magnitude of the global problem of diarrhoeal disease: a ten-year update. Bulletin of the World Health Organization. 1992;70(6):705.
2. Troeger C, Blacker BF, Khalil IA, et al. Estimates of the global, regional, and national morbidity, mortality, and aetiologies of diarrhoea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Infect Dis. 2018;18(11):1211-28.
3. International Institute for Population Sciences. National family health survey (NFHS-3), 2005-06: India. Int Inst Population Sci. 2007.
4. Black RE. Progress in the use of ORS and zinc for the treatment of childhood diarrhea. J Global Health. 2019;9(1).
5. Mohanty N, Thapa BR, Mathai J, et al. Low osmolarity oral rehydration salt solution (LORS) in management of dehydration in children. Ind Pediatrics. 2021;58(3):266-72.
6. Operario DJ, Houpt E. Defining the etiology of diarrhea: novel approaches. Current Opinion Infectious Dis. 2011 Oct;24(5):464.
7. Hodges K, Gill R. Infectious diarrhea: cellular and molecular mechanisms. Gut microbes. 2010;1(1):4-21.
8. Hirschhorn N, Nalin DR, Cash RA, et al. Formulation of oral rehydration solution. The Lancet. 2002;360(9329):340-1.
9. Falszewska A, Szajewska H, Dziechciarz P. Diagnostic accuracy of three clinical dehydration scales: a systematic review. Archives Dis Childhood. 2018;103(4):383-8.

Citation: *Bawankar B. Use of Low Osmolarity Oral Rehydration Salt solution (LORS) in the treatment of dehydration in children. Asian J Biomed Pharmaceut Sci. 2022;12(92):137*

10. Fedorowicz Z, Jagannath VA, Carter B. Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents. Cochrane Database Systematic Rev. 2011(9).

11. Niño-Serna LF, Acosta-Reyes J, Veroniki AA, et al. Antiemetics in children with acute gastroenteritis: a meta-analysis. Pediatrics. 2020;145(4).

12. Houston KA, Gibb JG, Maitland K. Oral rehydration of malnourished children with diarrhoea and dehydration: A systematic review. Welcome Open Res. 2017;2.

13. Suh JS, Hahn WH, Cho BS. Recent advances of oral rehydration therapy (ORT). Electrolytes and Blood Pressure. 2010;8(2):82-6.

14. Cruz Espinoza LM, McCreedy E, Holm M, et al. Occurrence of typhoid fever complications and their relation to duration of illness preceding hospitalization: a systematic literature review and meta-analysis. Clinical Infectious Dis. 2019;69:S435-48.

15. Ibadin OM, Airauhi L, Omoigberale AI, et al. Association of malarial parasitaemia with dehydrating diarrhoea in Nigerian children. J Health Population Nut. 2000:115-8.

16. Ishikawa T, Tamura H, Ishiguro H, et al. Effect of oral rehydration solution on fatigue during outdoor work in a hot environment: a randomized crossover study. J Occup Health. 2010:1006070131-.

17. Murray CJ, Abbafati C, Abbas KM, et al. Five insights from the global burden of disease study 2019. Lancet. 2020;396(10258):1135-59.

18. Vos T, Lim SS, Abbafati C, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet. 2020;396(10258):1204-22.

19. Franklin RC, Peden AE, Hamilton EB, et al. The burden of unintentional drowning: global, regional and national estimates of mortality from the Global Burden of Disease 2017 Study. Inj prev. 2020;26(Suppl 2):i83-95.

Citation: *Bawankar B. Use of Low Osmolarity Oral Rehydration Salt solution (LORS) in the treatment of dehydration in children. Asian J Biomed Pharmaceut Sci. 2022;12(92):137*