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Formulation And Evaluation of Oral Rehydration Salts(ORS) Of Actinidia deliciosa Extract

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Abstract: *Dehydration following non-specific diarrhoea may be prevented by oral administration of a simple glucose/salt mixture. A solution tablet of this mixture would have advantages of stability under environmental exposure and transport if the*
costs could be held within reasonable limits. The moisture adsorption and compression characteristics of Oral Rehydration Salts (ORS) ingredients have been studied.
Combinations of ingredients resulted in a moisture adsorption higher than that of the individual components. This may be explained in terms of critical relative humidity, RHo, and environmental relative humidity RHi. Preparation of a stable ORS solution tablet therefore requires protection of moisture adsorbing components from the environment. The present UNICEF ORS mixture compacted easily by direct compression but gave fragile tablets, which were hygroscopic. This can be reduced by film coating the electrolyte component as granules with a resin (Eudragit L), or by simulating direct compression of the glucose as a compression-coating around the precompressed electrolytes. The packaging of compression-coated solution tablets in inexpensive polyethylene bags may lengthen the shelf-life and make the preparation less costly than the currently supplied ORS powders packed in laminated aluminium sachets. The increased dissolution lag time for the compacted tablet is a disadvantage that can be overcome by instructions to crush the product immediately before use..

Keywords: ORS, RHO, RHI

I. INTRODUCTION

Oral Rehydration Salts (ORS) is a life-saving, cost-effective to combat particularly diarrhea, vomiting, and excessive fluid loss due to sweating or heat. Dehydration can be a criticalcondition, especially in infants, young children, the elderly, and those with weakenedimmune systems. ORS is a carefully balanced solution of water, salt (sodium chloride), and sugar (glucose) that helps restore the body's fluid and electrolyte levels, preventingsevere dehydration and its potentially fatal consequences

The formula for ORS was developed in the 1960s by researchers seeking asimple and inexpensive way to treat dehydration in areas with limited access to healthcare. Its effectiveness was later confirmed by the World Health Organization (WHO), which has since endorsed its use globally as a key intervention in the treatment of dehydration. The solution works by enhancing the absorption of sodium and water in the intestines, helping to replenish lost fluids and electrolytes in the body.

ORS is not only effective in treating dehydration caused by gastrointestinal diseases like cholera and acute diarrhea but can also be used in cases of dehydration due to fever, heatstroke, or excessive physical activity. The simplicity of ORS is one of its greatest advantages: it can be easily prepared at home using readily available ingredients (water, salt, and sugar) or can be purchased in pre-packaged form as a powder or liquid.

The widespread availability of ORS has led to a significant decrease in mortality rates related to dehydration in developing countries, making it one of the most successful public health interventions worldwide. In fact, the use of ORS has been credited with saving millions of lives, particularly in children under five years old, who are most vulnerable to dehydration from diarrhea and other gastrointestinal infections.

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LITERATURE AND R

The foundation of ORS lies in the discovery of sodium-glucose co- transport mechanism in the 1960s by Drs. Robert Crane and Nalin & Cash. This discovery revolutionized fluid therapy during cholera outbreaks, where oral solutions with the correct ratio of sodium and glucose promoted water and electrolyte absorption from the intestine.

1975: WHO recommended its first standard ORS formula (311 mOsm/L).

2004: WHO introduced low-osmolarity ORS (245 mOsm/L) to reduce side effects like vomiting and high stool output

AIM AND OBJECTIVI

1. To prevent and treat dehydration caused by acute diarrhea, especially in children and vulnerable populations.
2. To restore and maintain fluid and electrolyte balance in the body by replenishing lost sodium, potassium, chloride, and water.
3. To provide a simple, effective, and affordable therapy that can be administered orally, even in low-resource settings.
4. To reduce morbidity and mortality associated with diarrheal diseases, particularly in developing countries.
5. To promote early rehydration at home or in community settings, reducing the need for intravenous therapy or hospitalization.

HISTORY OF ORS..

Oral Rehydration Salts (ORS) is a medical solution used to treat dehydration especially caused by diarrhea, vomiting, or excessive sweating. It is a simple and cost-effective remedy that has saved millions of lives worldwide, particularly in low-resource settings.

The concept of oral rehydration dates back to ancient times. Various cultures used fluids like saltwater or rice water to treat dehydration. However, it wasn't until the 1960s that the formulation of ORS as we know it today was developed.

The modern ORS was developed in the 1960s by researchers working with the World Health Organization (WHO) and UNICEF. The breakthrough came when scientists discovered that dehydration could be effectively treated with a solution containing water, salt, and sugar in specific proportions. This combination helps the body absorb fluids more efficiently by facilitating the absorption of sodium and glucose in the intestines. The formulation was tested and proven effective in the treatment of cholera and other diarrheal diseases, which were leading causes of death, especially in developing countries. In 1967, the first successful use of ORS in the field occurred in Bangladesh during a cholera epidemic, leading to significant reductions in mortality.

Since its introduction, ORS has been hailed as one of the most important medical advances of the 20th century. By the 1980s, WHO and UNICEF began promoting its widespread use as a simple and low-cost solution to prevent dehydration and reduce mortality rates from diarrhea-related diseases.

In 1978, WHO officially recommended the standard ORS formula, which consists of:

- Sodium chloride (salt)
- Potassium chloride
- Glucose (or sucrose)
- Powder

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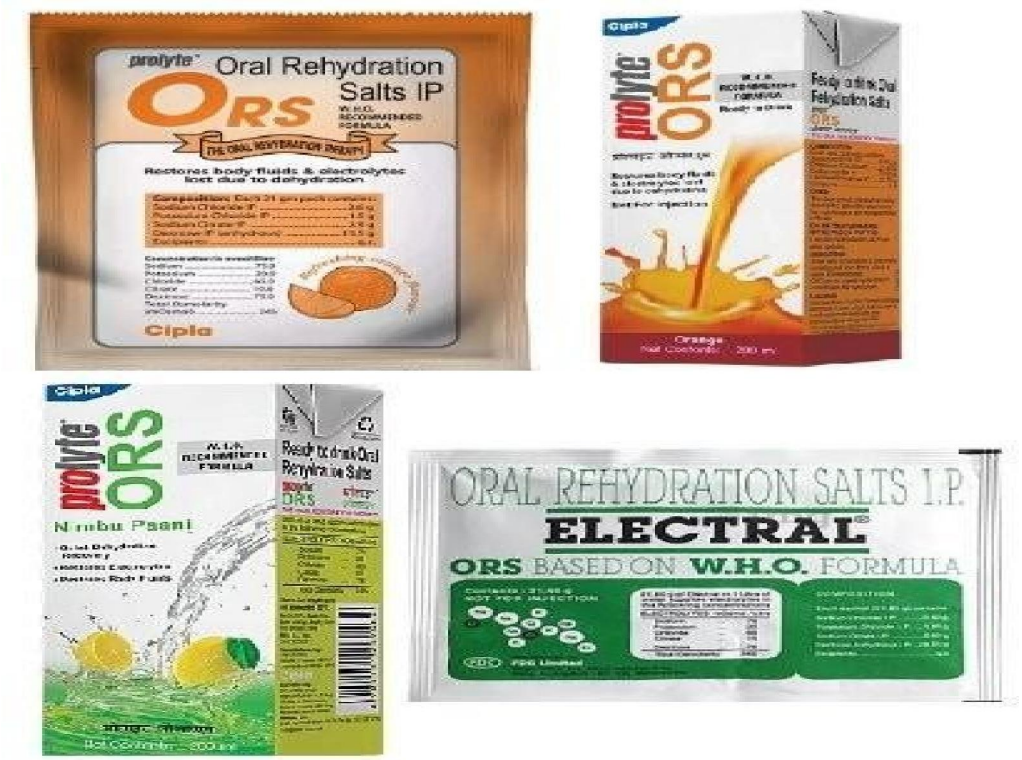

This formula has remained largely unchanged, although variations exist to adapt to local conditions or specific needs.

PLAN OF WORK

1. ORS (Oral Rehydration Salts) with Kiwi Extract – A formulation where kiwi is added to standard ORS to enhance taste, provide additional nutrients (like vitamin C, potassium, antioxidants), or offer other health benefits.
2. ORS as a brand or product name – Are you referring to a specific brand that uses "ORS" in its name and also includes kiwi extract?
3. A homemade or natural ORS recipe – Are you looking to make a rehydration drink at home using kiwi?

▪ Depending upon age and severity of dehyadration Infants and Children: 1-2 litres (5-10 glasses) over a period of 24 hours
▪ Adults: 2-4 litres (10-20 glasses) over a period of 24 hours
▪ Continue treatment until diarhoea stops/dehydration is corrected
▪ Use with caution in inpaired renal function or intestinal obstruction.
▪ Solution to be used within 24 hours.
▪ Discard the unused solution.
▪ Store in a cool and dry place.
▪ Store protected from moisture.

Dissolve the contents of the packet in litre of freshly boiled and cooled water.

▪ Sachet of 21.8g -24 Months
▪ Overdose In oral electrolyte replacement therapy. toxicity is rare in previously

healthy people. In subjects with renal impairment, hypernatraemia and hyperkalaemia might occur

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INGREDIENTS

Ingrec	Quantity(gm)
Sodium Chloride	2.6 g
Potassium Chloride	1.5 g
Sodium Citrate	2.9g
Dextrose	13.5g
Actinidia deliciosa powder	10.5g

WHO -ORS	mOsmol/L
Sodium	75
Chloride	65
Glucose, anhydrous	75
Potassium	20
Citrate	10
Total Osmolarity	245

PROCEDURE

To prepare Oral Rehydration Salts (ORS) in a laboratory setting, the procedure involves precise measurements and maintaining aseptic conditions.

Here's a step-by-step guide for making ORS in a laboratory:

1. Sodium chloride (NaCl) (analytical grade)
2. Actinidia deliciosa (For vitamins)
3. Glucose (D-glucose) (analytical grade)
4. Potassium chloride (KCl) (analytical grade) (optional, depending on the formula)

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5. Trisodium citrate or citric acid (optional, for buffering)
7. Mix beakers or mixing containers
8. pH meter or pH indicator strips (optional, for pH verification)
9. Sterile storage containers
▪ Glucose (D-glucose): 20 grams
▪ Potassium chloride (KCI): 1.5 grams (optional)
▪ Trisodium citrate or citric acid: 2.9 grams (optional)
This is based on the World Health Organization's standard ORS formula, which is typically used for the treatment of dehydration due to diarrhea.
▪ Clean and disinfect the workspace and all equipment (beakers, measuring spoons, etc.).
▪ Wear gloves and ensure you are working in a sterile environment to avoid Contamination.

Accurately weigh out:
▪ 3.5 grams of sodium chloride (NaCl)
▪ 20 grams of glucose (D-glucose)
▪ (Optional) 1.5 grams of potassium chloride (KCI)
▪ (Optional) 2.9 grams of trisodium citrate or citric acid
▪ Add the weighed chemicals into a sterile, clean beaker or container.
▪ Stir the mixture with a sterile stirrer or glass rod until all the solutes (salt, glucose, etc.) are completely dissolved.
▪ Using a pH meter or pH indicator paper, check the pH of the solution. Ideally, the PH should be around *7*. If necessary, adjust the pH with a small amount
of citric acid (for lowering pH) or sodium hydroxide (for raising pH), although this step is usually not critical for standard ORS.
▪ If prepared in a lab setting for clinical or experimental use, it's important to ensure that the solution is sterile. You can do this by filtering the solution through a sterile filter (0.22 µm) or autoclaving, depending on the specific requirements.
▪ Transfer the prepared ORS into clean, sterile storage bottles. Seal the packet tightly.
▪ Label the containers with the preparation date and any relevant information.
▪ Store the solution at room temperature or in a cool place, but use it within 24 hours to ensure it remains safe and effective

Ingredients	Quantity (per lite	Function
Sodium Chloride	2.6 g	Provide sodium and chloride Ions
Kiwi powder	10.5g	Good source of vitamin C
Glucose	13.5 g	Facilitates sodium and water absorption
Potassium chloride	1.5 g	Replenishes potassium
Trisodium Citrate Dihydrate	2.9 g	Corrects metabolic acidosis, provides sodium
Total weight	30.5 g	

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EVALUATION PARAMETER

We specialize in the complicated, messy and complex, especially for organizations focused on systems-level change, advocacy and policy and other broad-based efforts that can benefit from systematic inquiry to address key questions to help organizations learn and share back results.

A hallmark of ORS Impact's approach is the blending of creative thinking while balancing the appropriate amount of methodological rigor. We don't think of rigor as isolated to a particular method, but rather we understand it as the quality and integrity of the entire design and its implementation.

Do research questions appropriately reflect what is feasible given inputs and investments from both the foundation and the grantees themselves?

Are methods the right fit, and have we been transparent about the balance of methodological strengths and weaknesses

Have we successfully avoided risks to reliability and validity in the tools, samples and implementation processes

Are findings based on triangulated data

All these considerations would be brought to bear in creating a thoughtful, rigorous research design. While being thoughtful about rigor and data quality, we also consider ways in which a balance of more traditional research methods and approaches (e.g., surveys, focus groups, case studies, social network analysis) fit with more innovative approaches (e.g., process tracing, systems mapping).

The dosage and requirements of Oral Rehydration Solution (ORS) depend on the age, severity of dehydration, and the specific condition** being treated (e.g., diarrhea, vomiting, or heat-related dehydration). Below is a detailed guide on how to use ORS correctly:

▪ For most cases of mild to moderate dehydration, the goal is to replace lost fluids gradually over several hours.

▪ Infants (0-6 months):

▪ If the infant is breastfed, continue breastfeeding frequently and use ORS for supplementary rehydration.

▪ Dosage: 50-100 mL of ORS per kilogram of body weight over 4-6 hours.

▪ Example: For a 5 kg infant, you would give about 250-500 mL of ORS during the first 4-6 hours.

▪ Children (7 months - 5 years):

▪ Dosage: 75-100 mL of ORS for every episode of diarrhea (or vomiting).

▪ Over the first 4-6 hours: Aim to give 00-400 mL of ORS per kg of body weight (adjustbased on the severity of dehydration).

▪ Example: For a 10 kg child, give 500-1000 mL of ORS over 4-6 hours.

▪ Older Children and Adults: - Dosage: Typically, 2-4 liters of ORS over the course of 4-6 hours, depending on the severity of dehydration.

▪ Example: For a 70 kg adult, give 2-4 liters of ORS spread throughout the day.

In cases of severe dehydration (e.g., from cholera, vomiting, or severe diarrhea), rehydration may need to be done more quickly. Intravenous (IV) fluids are often preferred in such cases, but ORS can still play an important role when IV fluids are not available.

▪ Dosage: For severe dehydration, give ORS slowly over the first 4 hours**, starting With 100 mL/kg for children and infants.

▪ Example: For a 10 kg child, give 1 liter of ORS in the first 4 hours.

▪ If symptoms persist, continue giving small sips or spoonfuls of ORS over the next several hours.

Dosage: For severe dehydration, an adult would typically need 2-4 liters** of
ORS in the first 4 hours, depending on their weight and the severity of dehydration.

▪ Example: A 70 kg adult might need 2 liters of ORS over the first 4 hours, and up to 4 liters if more severe dehydration is present.

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▪ After the first 4-6 hours of intensive rehydration, ORS should be continued in smaller amounts to maintain hydration. This is particularly important when diarrhea continues.

After the initial rehydration, continue to give *ORS in small, frequent amounts throughout the day.

For children, give 100-200 mL of ORS* for each episode of diarrhea or vomiting, and continue as needed.

Continue drinking ORS to maintain hydration, particularly if diarrhea or vomiting persists. An adult may consume 2-3 liters** of ORS per day, depending on fluid losses.

Administering Oral Rehydration Salts (ORS) correctly is essential to ensure effective rehydration and prevent complications. Here's a step-by-step guide on how to properly administer ORS:

▪ Use Clean powder: Make sure the powder used to mix ORS is clean and safe to drink. Contaminated can introduce harmful pathogens, which could worsen
dehydration.

▪ Mix Correctly:

▪ If you are using pre-packaged ORS packets, follow the instructions on the packet, which typically suggest mixing one packet of ORS with one liter of
clean.

▪ Stir well to dissolve the salts and sugar completely. The solution should be clear and without any visible lumps.

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▪ Do not alter the proportions: Using too much or too little water can cause the solution to become too concentrated or too dilute, affecting its effectiveness.

▪ Use Clean Utensils: Use clean cups, spoons, or syringes to prepare and administer the ORS. This helps to avoid contamination of the solution.

▪ Storage: Once prepared, use the ORS solution within 24 hours. After that time. discard any unused solution to prevent bacterial growth

▪ If Breastfeeding: Continue to breastfeed the infant frequently, as breast milk is the best source of hydration and nutrition for babies

▪ Give ORS in Small Amounts: If needed, administer small amounts of ORS using a clean spoon or dropper.

▪ Dosage: For mild dehydration, give 50-100 mL of ORS per kilogram of body weight over 4-6 hours.

▪ For example, for a 5 kg infant, give about 250-500 ml of ORS over the first 4-6 hours.

▪ Signs of Improvement: Look for signs of hydration, such as improved skin elasticity and reduced thirst. Continue breastfeeding as usual.

▪ Encourage Frequent Sips: Give the child small sips of ORS at regular intervals, especially after each episode of diarrhea or vomiting.

▪ Dosage: Give 75-100 mL of ORS per episode of diarrhea or vomiting.

▪ Over 4-6 hours, you can give 200-400 mL per kg of body weight. - For example, for a 10 kg child, give 500-1000 mL over 4-6 hours.

- Use a Spoon, Cup, or Oral Syringe: If the child is unable to drink from a cup, use a clean spoon or syringe to administer small, frequent doses (about 5-10 mL every 1-2 minutes).

▪ Signs of Improvement: Look for signs like reduced thirst, normal skin elasticity, and more frequent urination.

▪ For Older Children and Adults:

▪ Dosage: For mild to moderate dehydration, 2-4 liters of ORS can be consumed over the course of 4-6 hours.

▪ Sips or Gulps: Encourage the person to drink small sips if they are unable to drink large amounts at once.

▪ For severe dehydration, administer 100 mL of ORS per kg of body weight in the first 4 hours.

▪ Frequent Sips: Drink the solution over several hours, as the body can absorb
only small amounts of fluids at a time. Avoid drinking large volumes in a short period.

▪ Signs of Hydration: After giving ORS, monitor the person for signs of improvement:

▪ For Infants and Children: Look for improved skin elasticity, less sunken eyes, and more frequent urination.

▪ For Adults: Look for signs like improved energy, reduction in dizziness, and urination.

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▪ Continue Administration: Even after initial rehydration, continue to administer ORS as needed, especially if diarrhea persists. For mild dehydration,
ORS should continue in small amounts until normal hydration is restored.
Slow Down: If vomiting occurs, wait 10-15 minutes before attempting to give ORS again.
▪ Give Small, Frequent Sips: After waiting, offer the solution in smaller sips (5- 10 mL at a time). You can use a spoon, syringe, or cup.
▪ Avoid Large Volumes at Once: Giving too much fluid too quickly may trigger more vomiting.
▪ If dehydration is severe (e.g., very dry mouth, sunken eyes, low blood pressure, or unresponsiveness), seek immediate medical attention.
▪ In severe cases, intravenous (IV) fluids may be required for rapid rehydration, as ORS may not be absorbed adequately.
▪ Continue Normal Feeding: For children who are able to eat, continue offering food alongside ORS. For infants, continue breastfeeding.
▪ Avoid Other Drinks: Do not give sugary drinks, sodas, fruit juices, or caffeinated beverages, as they can worsen dehydration.
▪ Monitor Electrolyte Imbalance: While ORS restores the balance of electrolytes, if diarrhea is prolonged or worsens, consider seeking medical advice, as additional treatment (e.g., zinc supplementation or antibiotics) may be required.
Oral Rehydration Salts (ORS) is a highly effective, low-cost treatment for dehydration caused by diarrhea, vomiting, or other conditions that lead to fluid loss. However, while ORS has numerous advantages, it also has some limitations or potential disadvantages, depending on the situation. Below is a breakdown of the advantages and disadvantages of ORS:
▪ Low Cost: ORS is an affordable salts for rehydrating patients, especially in low- resource settings where expensive intravenous fluids (IVF) or hospital care may not be accessible.
▪ Saves Lives: ORS has been credited with saving millions of lives globally, particularly in developing countries, where diarrhea and dehydration are major
causes of death, especially in children.
▪ Simple to Prepare: ORS can be mixed at home using the standard formula (salt, sugar, and water), or pre-packaged ORS can be easily dissolved in water.
▪ Oral Administration: Unlike intravenous fluids, ORS can be taken orally, which is less nvasive, and can be self-administered or administered by
caregivers without the need for trained medical personnel.
▪ Restores Electrolyte Balance: ORS helps to replace lost fluids and electrolytes like sodium, potassium, and glucose, addressing the root causes of dehydration.
▪ Prevents Complications: By preventing dehydration, ORS reduces the risk of serious complications, including organ failure, shock, and death.
▪ Global Availability: ORS is available in many countries, especially in public health campaigns where it is distributed free or at low cost. It is often included
in first aid kits, and some commercial brands are available over the counter.
▪ Storage and Shelf Life: ORS packets have a long shelf life, making them easy to store for emergency use.
▪ Suitable for Children and Adults: ORS is safe for infants, children, and adults. It is especially vital for young children who are more susceptible to dehydration.
▪ Can Be Used at Home: For non-severe cases of dehydration, ORS can be used at home, reducing the need for hospital visits.
▪ Decreases the Need for IV Therapy: For cases of mild to moderate
dehydration, ORS can often prevent the need for more costly and invasive treatments like intravenous rehydration, reducing hospital admissions and healthcare costs.

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▪ Not Effective for Severe Cases: ORS is generally not suitable for severe dehydration where intravenous fluids (IVF) may be required. In severe cases,
there may be insufficient absorption in the gut due to the intensity of dehydration, and the patient may need more intensive medical care.
▪ May Not Address Underlying Causes: ORS helps to address dehydration but does not treat the underlying causes of diarrhea, vomiting, or other fluid losses.
In cases of infections or diseases like cholera, antibiotics or other medications may be needed.
▪ Risk of Incorrect Mixing: If ORS is not prepared correctly (e.g., improper proportion of salt or sugar), it can worsen dehydration or cause electrolyte imbalances. Care must be taken when mixing the solution.
▪ Excessive Use: In some cases, people may consume excessive amounts of ORS,
especially when the patient's condition is not improving, leading to imbalances in electrolytes like sodium or potassium, though this is less common.
▪ Unpleasant Taste: Some people, especially children, may find the taste of ORS
unappealing, which can lead to poor compliance with the treatment. This is especially true for homemade ORS.
▪ Volume and Frequency: In cases of severe dehydration, a large volume of ORS may need to be consumed over several hours, which can be difficult for some
patients, particularly infants and young children, to tolerate.
▪ Symptomatic Relief Only: ORS only addresses dehydration and electrolyte
imbalance but does not treat the underlying cause of diarrhea or vomiting. Additional treatment, such as antibiotics, antidiarrheals, or specific treatments for infections, may be necessary.
▪ Price Variability: Commercial ORS products, while still relatively affordable,
can be more expensive than homemade solutions or public health-provided ORS packets, making them less accessible for some low-income populations.

▪ Commercial Formulations: Some commercial ORS may contain added sugars or flavors that may not be ideal for all patients, especially those with certain
health conditions like diabetes or metabolic disorders.
▪ Cultural Preferences: In some regions, there may be resistance to using ORS, either due to cultural preferences for traditional remedies or lack of awareness
about the effectiveness of ORS in treating dehydration.
▪ Misuse or Lack of Education: Some people may not be fully aware of when to
use ORS (e.g., using it too late when dehydration is already severe), or they may misuse it, thinking it can cure the underlying illness.
Oral Rehydration Salts (ORS) is one of the most effective, affordable, and accessible treatments for dehydration, particularly in the context of diarrhea and vomiting. It has been a game-changer in public health, significantly reducing mortality rates due to dehydration, especially in children in developing countries.
ORS works by replenishing lost fluids and electrolytes (like sodium, potassium, and glucose), which are crucial for maintaining cellular function and preventing complications such as shock, kidney failure, or death.
It is a simple yet highly effective remedy for mild to moderate dehydration.
ORS is easy to prepare and administer, using just basic ingredients (salt, sugar, and clean water). It can be used at home and in emergency situations, reducing the need for intravenous fluids in many cases, especially when dehydration is not severe.

ORS is an affordable solution that is available worldwide, making it particularly important in low-resource settings. It helps to alleviate the burden on healthcare systems by providing a low-cost, self-administered solution for managing dehydration.

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While ORS is effective for mild to moderate dehydration, it may not be sufficient in cases of severe dehydration or when there are complications like infections that require specific treatments. In such cases, intravenous fluids or medical intervention may be necessary.

- Proper preparation, correct dosage, and frequent monitoring of the patient's condition are essential to ensure ORS works effectively.

Additionally, ORS does not treat the underlying cause of diarrhea or vomiting; it simply addresses the caused by these symptoms.

ORS remains one of the most important public health tools for preventing death from dehydration, particularly in children under 5. Its simplicity, effectiveness, and affordability have made it a cornerstone of modern healthcare practices. However, it is vital to use ORS appropriately and in conjunction with other medical treatments when necessary. When used correctly, ORS can save lives, reduce healthcare costs, and help individuals recover from dehydration quickly and safely.

In our opinion, the development of new ORS formulations Could help to overcome these disadvantages. The main difficulty, The salty taste, can be masked using flavors, reconstituting And administering the product at low temperatures or using Pleasant textures that can resemble desserts or sweets.

Made from New Zealand green kiwifruit, this powder supports digestive health by promoting bowel regularity and enhancing protein digestion.

This liquid extract offers moisturizing and antioxidant benefits and can be used in various applications.

For references related to Oral Rehydration Salts (ORS), you can consult the following sources, which are authoritative and widely used in medical practice and research:

- The WHO provides extensive guidelines and recommendations regarding the use of ORS. You can find official information on the effectiveness, preparation,

and use of ORS for treating dehydration on their website.

- [WHO Oral Rehydration Therapy (ORT) page](https://www.who.int/news- room/fact-sheets/detail/oral-rehydration-solution)
- UNICEF also promotes the use of ORS, especially in childhood diarrhea treatment. Their website includes information on how ORS contributes to

reducing dehydration- related mortality in children.

- [UNICEF on ORS](https://www.unicef.org/health/oral-rehydration-salts-ors)
- The CDC provides guidelines and educational materials on ORS, particularly for travelers and health professionals managing dehydration and diarrhea cases.

[CDConORSDehydration](https://www.cdc.gov/healthywater/emergency/diarr hea .html)

- A Simple, Effective Treatment for Dehydration" by the National Institutes of Health (NIH):
- A comprehensive review article about ORS, its development, and its role in treating dehydration, particularly in children and in developing countries.
- [NIH article on ORS](https://pubmed.ncbi.nlm.nih.gov/1942055/) These

references provide a thorough foundation for understanding the clinical, practical, and scientific aspects of Oral Rehydration Solutions.