

Effectiveness of oral rehydration in the management of dehydration in children with acute gastroenteritis: Case Review and Analysis

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Received: June 10, 2025 ◦ Revised: July 10, 2025 ◦ Received: July 30, 2025 ◦ Published: August 10, 2025

ABSTRACT

Introduction: Acute gastroenteritis is a leading cause of dehydration in children and is commonly encountered in healthcare settings. It presents with symptoms such as diarrhea and vomiting, which lead to significant fluid and electrolyte loss. If not managed promptly, dehydration can result in serious complications, including death. Oral rehydration therapy (ORT) has long been recommended as a first-line, effective treatment for mild to moderate dehydration in pediatric patients. This study aimed to evaluate the effectiveness of oral rehydration solution (ORS) in treating dehydration caused by acute gastroenteritis in children.

Methods: This descriptive case study involved two male pediatric patients, aged 1 and 2 years, who presented with dehydration due to gastroenteritis. The intervention included administration of ORS at a dosage of 40–100 ml/kg within the first 4–6 hours, accompanied by clinical monitoring over three days. Clinical parameters observed included frequency of defecation, skin turgor, oral mucosa condition, eye appearance, and level of consciousness.

Results: Both patients showed improvement in clinical signs of dehydration. The frequency of defecation decreased from 4–5 times to 1–2 times per day. Skin turgor normalised, oral mucosa became moist, eyes appeared less sunken, and both children became more active and responsive. No adverse effects were reported, and both subjects responded positively to the therapy.

Conclusion: Oral rehydration therapy using ORS effectively manages dehydration caused by acute gastroenteritis in children. It is a safe, simple, and accessible method that can be utilised in clinical settings and at home as a first-line response to dehydration.

Keywords: Children, Dehydration, Gastroenteritis, Oral Rehydration Therapy.

INTRODUCTION

Acute gastroenteritis remains one of the most common illnesses affecting children worldwide and continues to be a leading cause of morbidity and mortality, especially in developing countries. Characterised by the sudden onset of diarrhea, with or without vomiting and fever, gastroenteritis causes rapid loss of fluids and electrolytes, placing children under five at significant risk of dehydration [1]. The World Health Organization (WHO) estimates that there are over 1.7 billion cases of diarrheal disease globally each year, with approximately 760,000 deaths among children under the age of five. This staggering number underscores the urgent need for effective, low-cost pediatric dehydration interventions [2].

In Indonesia, acute gastroenteritis continues to be a major public health problem, with high prevalence rates reported annually. According to the Ministry of Health (2021), over seven million cases were recorded nationwide, with children most affected. Regional data further shows that areas such as Makassar have consistently reported high case counts, particularly among toddlers aged 1–4. In this vulnerable age group, gastroenteritis-related dehydration can progress rapidly to a life-threatening condition if not treated immediately and effectively [3]. Dehydration caused by acute gastroenteritis results from excessive loss of water and electrolytes through diarrhea and vomiting. The child may exhibit symptoms such as increased thirst and dry mucous membranes in mild cases. However, moderate to severe dehydration presents more concerning signs such as sunken eyes, reduced skin turgor, lethargy, and diminished urine output [4]. If left untreated, this can lead to hypovolemic shock, kidney failure, electrolyte imbalance, and even death. These clinical realities demand timely intervention, making early identification and appropriate fluid management crucial [5].

Oral Rehydration Therapy (ORT) has emerged as the gold standard for treating mild to moderate dehydration resulting from diarrhea. Introduced in the 1970s, ORT involves using an Oral Rehydration Solution (ORS), a simple, cost-effective mixture of water, salts, and glucose that enhances intestinal absorption of fluids. This solution addresses rehydration and electrolyte replacement, preventing complications and reducing the need for intravenous therapy [6]. According to WHO and UNICEF, the widespread use of ORS has saved millions of lives globally and remains one of the last century's most important public health interventions [7]. Despite its proven efficacy, ORT is still suboptimal in many areas due to a lack of awareness, delayed care-seeking behavior, or misconceptions among caregivers regarding its importance. Therefore, it is critical to continue educating communities and healthcare workers about the role of ORT as a first-line treatment for childhood diarrhoea and dehydration. In hospital settings, nurses are vital in identifying dehydration, administering ORS appropriately, and monitoring the patient's response [8].

This study evaluates the effectiveness of oral rehydration in managing dehydration among pediatric patients suffering from acute gastroenteritis at RSUP Dr. Tadjuddin Chalid, Makassar. By analysing the clinical progression of two pediatric cases before and after the administration of ORS, this research aims to provide empirical evidence on how oral rehydration therapy can significantly improve hydration status and overall clinical outcomes. The rationale behind this case study lies in the increasing burden of diarrheal diseases among children in Makassar and the need for effective, scalable interventions. Through detailed observation of patient symptoms such as frequency of diarrhea, mucous membrane condition, skin turgor, eye appearance, and level of consciousness, this research assesses whether oral rehydration alone can reverse signs of dehydration in acute gastroenteritis cases. The results can offer valuable insights for healthcare professionals and policymakers to strengthen primary interventions for diarrheal diseases.

Ultimately, this study underscores the essential role of ORT in pediatric care. Given its safety, affordability, and accessibility, ORT remains a cornerstone in managing diarrheal dehydration, especially in low-resource settings. The findings from this case review are expected to reaffirm the importance of prompt oral rehydration in clinical practice and promote its wider adoption as an effective response to one of the most pressing pediatric health challenges.

MATERIALS AND METHODS

Study Design

This study employed a descriptive case study design using a quantitative approach. It aimed to evaluate the effectiveness of oral rehydration therapy (ORT) in managing dehydration caused by acute gastroenteritis in pediatric patients. The focus was observing clinical improvements in hydration status before and after administering Oral Rehydration Solution (ORS).

Study Site and Duration

The study was conducted in Lily 4A Pediatric Ward of RSUP Dr. Tadjuddin Chalid Makassar, South Sulawesi, Indonesia. The research was carried out over one week, from May 2 to June 2, 2025. Subjects. Two pediatric patients were purposively selected as the subjects of this study. Inclusion criteria included: Children aged between 1 and 2 years; Diagnosed with acute gastroenteritis accompanied by signs of dehydration; Admitted to the pediatric inpatient ward during the study period; Caregivers provided informed consent for participation. Exclusion criteria included: Children with comorbid chronic illnesses; Children requiring immediate intravenous rehydration due to severe dehydration.

Intervention Protocol

The intervention consisted of oral administration of ORS based on the WHO guidelines for dehydration management: Initial Rehydration Phase: 40–100 ml/kg of ORS was given over the first 4–6 hours, adjusted according to body weight and severity of dehydration. Maintenance Phase: An additional 10–20 ml/kg of ORS was given after each episode of diarrhea or vomiting. ORS was administered slowly and in small volumes to avoid vomiting. If the child vomited, ORS administration was paused for 10 minutes and then resumed gradually.

Clinical Monitoring and Evaluation

The effectiveness of oral rehydration therapy was assessed using the following clinical parameters: Frequency of bowel movements per day; Skin turgor response (pinch test); Condition of oral mucosa and lips; Appearance of the eyes (sunken vs normal); Level of consciousness and activity. These parameters were documented daily over three consecutive days for each patient. Improvements in clinical signs were recorded using structured observation sheets.

Data Collection Methods

Data were collected using a combination of the following approaches: Interview. Short interviews were conducted with the caregivers to gather subjective data, including symptom history, prior management, and feeding patterns during illness. Direct Observation Researchers conducted real-time clinical observations focusing on signs of dehydration (based on WHO classification: mild, moderate, severe), physical appearance, and response to ORS therapy. Physical Examination: Vital signs and physical assessment were performed to identify: Hydration status; Urine output; Temperature, pulse, and capillary refill time (CRT). Document Review: Hospital records and patient charts were reviewed to validate diagnosis, treatment, and nursing care during hospitalisation. Instrumentation The main instruments used in this study were: Standard ORS packets (approved by the Indonesian Ministry of Health); Pediatric weight scale; Dehydration assessment form (based on WHO criteria); Thermometer, measuring spoon, and glass for ORS preparation; Patient monitoring sheet for daily documentation.

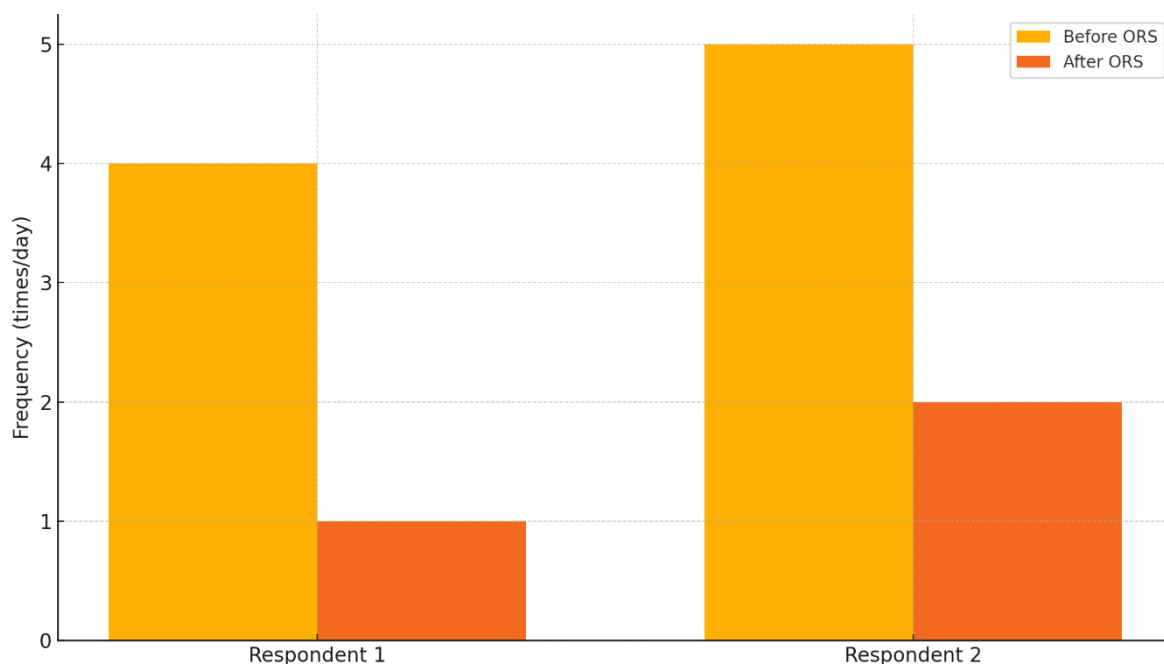
Ethical Considerations The study followed strict ethical protocols: Informed Consent: Written informed consent was obtained from each patient's guardian before inclusion. Confidentiality: Patient data was anonymised and recorded using initials only. Voluntary Participation: Guardians were informed that participation was voluntary and they had the right to withdraw at any time. Ethics Approval: The study was conducted in accordance with the ethical standards of Politeknik Sandi Karsa and RSUP Dr. Tadjuddin Chalid Makassar.

RESULTS

Table 1. Clinical outcomes before and after ORS

Parameter	Respondent 1 - Before	Respondent 1 - After	Respondent 2 - Before	Respondent 2 - After
Bowel Movements (times/day)	4	1	5	2
Skin Turgor	Slow return	Normal	Slow return	Normal
Oral Mucosa	Dry, cracked lips	Moist lips	Dry, pale tongue	Moist lips, clean tongue
Eye Condition	Sunken	Normal	Sunken	Normal
Consciousness Level	Lethargic, irritable	Active, responsive	Lethargic, irritable	Active, responsive

There was a significant reduction in diarrhea frequency, indicating the effectiveness of oral rehydration in controlling fluid loss. The restoration of skin elasticity reflects successful rehydration at the interstitial level. These improvements confirm the restoration of systemic fluid balance and mucosal hydration. The improvement in eye condition is further evidence of successful fluid replacement. Improved mental status and alertness indicate enhanced circulation, energy levels, and overall recovery. Over three days, the Oral Rehydration Solution (ORS) administration produced significant positive outcomes in both pediatric respondents. Clinical indicators—objective (diarrhea frequency, skin turgor, eye condition) and subjective (mucosal moisture, activity level)—demonstrated clear signs of hydration recovery and improved clinical stability. These results validate that ORS is a safe, low-cost, and highly effective first-line therapy for managing mild to moderate dehydration in children with acute gastroenteritis. The intervention led to substantial symptom relief and physiological restoration, reinforcing its essential role in pediatric dehydration management.



Bar graph. 1 above specifically illustrates the change in bowel movement frequency, highlighting the effectiveness of ORS in reducing diarrhea severity

The bar graph illustrates the change in the frequency of bowel movements per day for two pediatric respondents before and after receiving oral rehydration therapy (ORS). Respondent 1 Before ORS: Experienced 4 episodes of diarrhea per day, indicating moderate dehydration. After ORS: The

frequency reduced to 1 episode per day, suggesting a significant clinical improvement. Respondent 2 Before ORS: Experienced 5 episodes of diarrhea per day, representing a more severe condition. After ORS: Reduced to 2 episodes per day, indicating substantial symptom relief and progress toward recovery. The graph clearly shows a decreasing trend in diarrhea frequency for both patients following the administration of ORS. This reduction highlights the effectiveness of oral rehydration therapy in stabilising gastrointestinal function and reducing fluid loss. The therapy led to rapid clinical improvements in both cases and supports ORS as a highly effective intervention in pediatric dehydration due to gastroenteritis.

DISCUSSION

The present case study evaluated the clinical effectiveness of oral rehydration therapy (ORT) in managing dehydration caused by acute gastroenteritis in two pediatric patients admitted to RSUP Dr. Tadjuddin Chalid Makassar. The study demonstrated that both patients responded positively to the administration of Oral Rehydration Solution (ORS), with clear improvements observed across multiple clinical indicators, including bowel movement frequency, skin turgor, oral mucosa hydration, eye condition, and level of consciousness. These findings strongly support the established role of ORT as a first-line, cost-effective treatment for pediatric dehydration.

Reduction in Diarrhea Frequency. The most immediate and measurable impact of ORS was the reduction in the number of bowel movements per day. Respondent 1 declined from 4 to 1 bowel movement per day, while Respondent 2 decreased from 5 to 2. This reduction is clinically significant, as it indicates that the therapy effectively mitigated the ongoing fluid loss, one of the most critical concerns in gastroenteritis-induced dehydration. According to WHO guidelines, diarrhea-associated fluid loss must be controlled promptly to avoid progression to moderate or severe dehydration. ORS is pivotal in achieving this goal by rapidly and safely replacing lost electrolytes and fluids [9].

Improvement in Physical Signs of Hydration. Pre-intervention signs such as dry mucous membranes, delayed skin turgor, and sunken eyes suggest moderate dehydration. These indicators were substantially improved following ORT administration. For instance, normalising skin turgor suggests that interstitial fluid levels were restored. Similarly, moist oral mucosa and normal-appearing eyes signalled adequate systemic rehydration [10]. These physical signs are widely recognised in clinical practice as markers of hydration status and reinforce the reliability of ORS in reversing fluid deficits in a non-invasive and accessible manner [11].

Enhancement in Level of Consciousness and Activity. Perhaps one of the most telling signs of effective intervention was the children's improved alertness and activity level. Initially described as lethargic, irritable, and in some cases apathetic, both patients became cheerful and responsive after three days of therapy. Improved mental status is essential in dehydration management, as it reflects the restoration of blood volume and cerebral perfusion and the child's general well-being and comfort [12]. This improvement supports findings from prior studies that highlight ORS as a powerful tool for physical recovery and enhancing patient responsiveness and vitality. A well-hydrated child is likelier to eat, sleep, and interact normally, accelerating overall recovery and reducing hospitalisation time [13].

Reinforcement of ORS as a Global Health Solution. The results of this study align with extensive global literature that supports ORS as a lifesaving therapy for children with diarrheal diseases. ORS has been described as one of the most important medical advances of the 20th century [14]. Since its introduction, it has been credited with reducing mortality rates from diarrhea-related dehydration by more than 90% in many regions [15]. Its simplicity, affordability, and ease of administration make it particularly valuable in low-resource settings such as public hospitals and rural communities. Furthermore, ORS does not require advanced equipment, specialised personnel, or hospital infrastructure, making it an ideal frontline intervention. This case study exemplifies how ORS can be applied effectively even in modest clinical environments with minimal risks or complications [16].

While the results of this case study were positive, there are some limitations to consider. First, the sample size was small, limited to only two children. While useful for qualitative insight, small numbers

do not provide statistical power or allow generalisation to larger populations. Additionally, both patients had only moderate dehydration. The study does not explore the boundaries of ORT effectiveness in severe cases where intravenous therapy may be required. Another consideration is compliance and acceptability. While both children in this study tolerated ORS well, some children may refuse to drink or vomit the solution, limiting its effectiveness [17]. In such cases, alternative methods such as nasogastric administration or IV fluids must be considered. This study has direct implications for nursing practice and public health. Nurses play a central role in assessing dehydration, initiating ORT, and educating caregivers. By recognising early signs of dehydration and administering ORS promptly, nurses can prevent progression to more severe illness. Moreover, educating families about preparing and using ORS at home empowers communities to respond effectively to diarrheal episodes without immediate medical intervention. In regions like Makassar, where cases of pediatric gastroenteritis remain high, wide-scale adoption of ORT protocols and health education initiatives can significantly reduce morbidity and prevent avoidable hospital admissions.

CONCLUSIONS

This case study confirms that oral rehydration therapy (ORT) using Oral Rehydration Solution (ORS) is highly effective in treating dehydration caused by acute gastroenteritis in children. Both pediatric respondents showed significant improvements in key clinical indicators, including reduced diarrhea frequency, improved skin turgor, moist oral mucosa, normalised eye appearance, and enhanced alertness after three consecutive days of ORS administration. The therapy successfully decreased the severity of dehydration from moderate or severe to mild or resolved levels within the first 4–6 hours of treatment. These results demonstrate that ORS is safe, easy to administer, and a cost-effective and practical first-line intervention in both clinical and home settings. In summary, oral rehydration therapy should continue to be promoted as the primary method for managing mild to moderate dehydration in children suffering from acute gastroenteritis. Its application can significantly reduce complications, minimise the need for hospitalisation, and ultimately save lives, especially in resource-limited areas.

Acknowledgement

Appreciation is extended to the supervising lecturer for valuable support and feedback and to the academic and clinical teams of Politeknik Sandi Karsa Makassar for their contribution to the author's education. Sincere thanks are also given to the medical staff of RSUP Dr. Tadjuddin Chalid Makassar, especially the pediatric ward team, for their cooperation during the study. Deepest gratitude goes to the author's family for their unwavering support and to peers and colleagues whose encouragement greatly assisted this research. May this work contribute to pediatric nursing practice and future academic efforts.

Authors' contributions

All authors contributed significantly to the development and completion of this research study.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this research. No financial, professional, or personal relationships have influenced the outcomes or interpretations presented in this study.

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