

Frequency of Hyponatremia & Hypokalemia in Children under 5 Years with Acute Diarrhoea

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Abstract

Background: Acute diarrhea poses a significant health threat to children globally, often leading to severe morbidity and mortality, particularly in developing countries. Electrolyte imbalances, including hyponatremia and hypokalemia, are common complications associated with acute diarrhea, further exacerbating the risk of adverse outcomes. **Objective:** This study aimed to evaluate the frequency of sodium and potassium abnormalities, specifically hyponatremia and hypokalemia, in children presenting with acute diarrhea. **Methodology:** A prospective cohort study was conducted at the Pediatric department of a tertiary hospital from July 2022 to June 2023. A total of 130 pediatric patients aged up to 5 years, presenting with acute diarrhea, were included in the study. Clinical examinations were conducted, and demographic data, including age, gender, residence, and socioeconomic status, were recorded. Serum sodium and potassium levels were determined from venous blood samples, and hyponatremia and hypokalemia were defined as sodium levels <130 mmol/l and potassium levels <3.5 mmol/l, respectively. Statistical analysis was performed using SPSS 24.0. **Results:** The mean age of the patients was 2.38 years, with a disease duration of 3.54 days. Male patients accounted for 60% of the cohort, and urban residency was predominant (55%). Clinical symptoms included loose motion (100%), abdominal pain (70%), fever (35%), vomiting (31%), and lethargy (27%). Hyponatremia was observed in 30% of patients, while hypokalemia was present in 40% of cases. **Conclusion:** Sodium and potassium imbalances are prevalent among children with acute diarrhea, highlighting the need for vigilant monitoring and appropriate management strategies to prevent adverse outcomes. The high incidence of hyponatremia and hypokalemia underscores the importance of early recognition and intervention in pediatric patients presenting with acute diarrhea.

Keywords: Acute diarrhea, Hyponatremia, Hypokalemia, Pediatric patients, Electrolyte imbalance.

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INTRODUCTION

Acute diarrhea is a common pediatric condition worldwide, often presenting with electrolyte imbalances such as hyponatremia and hypokalemia. In children, these imbalances can escalate rapidly, leading to severe complications if left untreated. Understanding the dynamics of hyponatremia and hypokalemia in the context of acute diarrhea is crucial for effective management and prevention of adverse outcomes [1-4].

Hyponatremia, characterized by low serum sodium levels, is a frequent electrolyte disturbance encountered in children with acute diarrhea. The excessive loss of sodium through watery stools, coupled with inadequate intake or reabsorption, contributes to its development [5-6]. In the pediatric population, hyponatremia poses a significant risk of cerebral edema and neurological sequelae, necessitating prompt recognition and intervention. Factors such as age, severity of diarrhea, and comorbid conditions influence

the clinical presentation and management strategies in these cases [7].

Hypokalemia, defined by decreased serum potassium levels, commonly accompanies acute diarrhea in children. The rapid depletion of potassium due to gastrointestinal losses exacerbates its occurrence, leading to a spectrum of clinical manifestations ranging from mild weakness to life-threatening cardiac arrhythmias. Children are particularly vulnerable to the adverse effects of hypokalemia, necessitating vigilant monitoring and appropriate supplementation. The etiology, severity, and duration of diarrhea play pivotal roles in determining the extent of potassium depletion and guiding therapeutic interventions [8-9].

The presence of hyponatremia and hypokalemia complicates the clinical management of children with acute diarrhea, necessitating a multifaceted approach. Rehydration therapy, comprising oral or intravenous electrolyte solutions, forms the cornerstone of treatment to address fluid and electrolyte deficits. Close monitoring of serum electrolyte levels, fluid balance, and clinical status is imperative to tailor interventions and prevent complications. Additionally, identifying and addressing underlying causes such as infectious agents or metabolic disorders is essential for comprehensive management and favorable outcomes.

Prevention plays a pivotal role in mitigating the burden of hyponatremia and hypokalemia in children with acute diarrhea. Emphasizing the importance of proper hygiene, safe food and water practices, and timely vaccination can help reduce the incidence of diarrheal illnesses. Furthermore, early recognition of symptoms, prompt initiation of rehydration, and appropriate electrolyte supplementation are vital in preventing electrolyte imbalances and their associated complications.

Objective

In this study our main goal is to evaluate the frequency of sodium and potassium abnormalities

(hyponatremia and hypokalemia) in children presented with acute diarrhea.

METHODOLOGY

This prospective cohort study was carried out at the Pediatric department of tertiary hospital, spanning from July 2022 to June 2023, encompassing a duration of one year. A total of 130 patients, comprising both genders and aged up to 5 years, presenting with acute diarrhea, were recruited for this study. Prior to enrollment, written informed consent was obtained from the patients' parents or guardians, and clinical examinations were conducted. Demographic information including age, gender, height, and weight, along with the socioeconomic status of the parents or guardians, was recorded. Co-existing illnesses were also noted. Exclusion criteria comprised neonates, critically ill patients, those with serious co-morbid conditions affecting the outcome, and individuals experiencing persistent diarrhea for more than two weeks.

Upon admission, caregivers were interviewed regarding the administration of Oral Rehydration Solution (ORS), with a specific focus on the preparation method. Various ORS formulations were reported, including concentrate or dilute solutions. Dehydration severity and signs were assessed through meticulous clinical examinations, and stool tests were conducted.

A venous blood sample of 2 ml was collected from all patients for the determination of serum sodium and serum potassium levels. Hypokalemia was defined as potassium levels <3.5 mmol/l, while hyponatremia was characterized by sodium levels <130 mmol/l. Statistical analysis was performed using SPSS 24.0 to interpret the collected data.

RESULTS

The mean age of the patients was 2.38 years, with a disease duration of 3.54 days. Gender distribution showed a higher percentage of male patients (60%) compared to female patients (40%). Additionally, the majority of patients resided in urban areas (55%) compared to rural areas (45%).

Table No 1: Baseline details of all the patients

Characteristics	Mean
Mean age	2.38±1.52
Disease Duration (days)	3.54±1.33
Gender %	
Male	60%
Female	40%
Residence %	
Urban	55%
Rural	45%

Loose motion was universally observed in all patients, followed by abdominal pain, reported in 70% of cases. Fever was present in 35% of patients, while

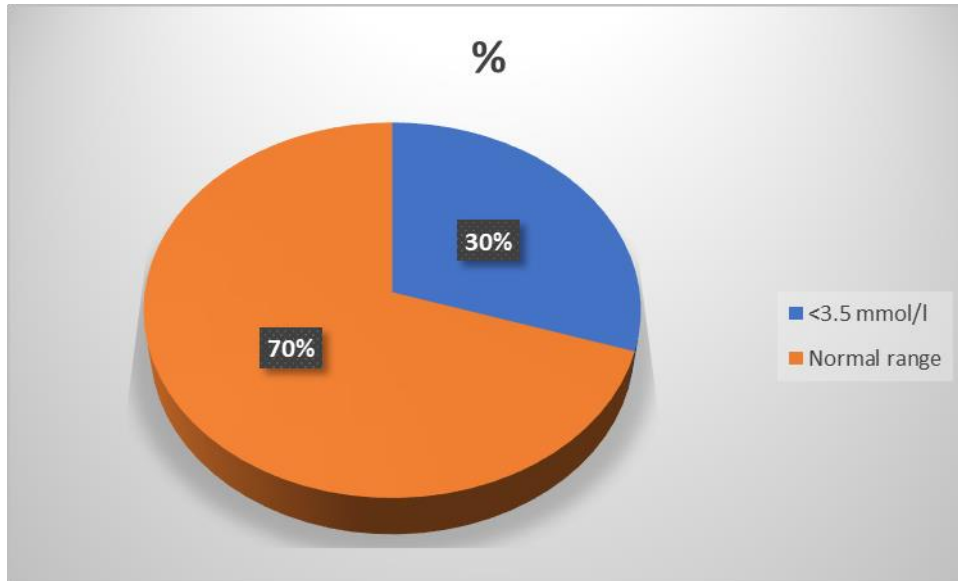
vomiting and lethargy were observed in 31% and 27% of cases, respectively.

Table-2: Clinical symptoms observed in the patients

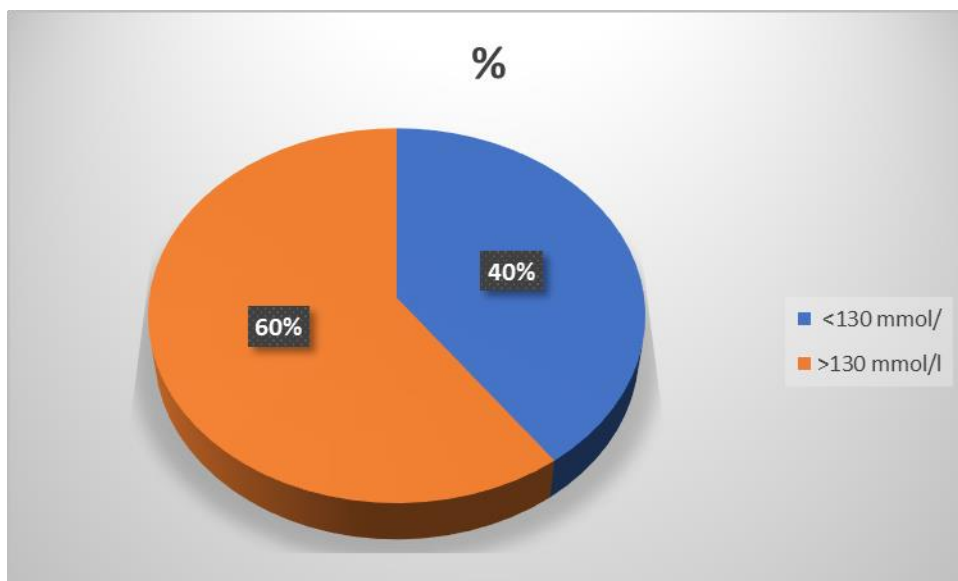
Clinical Symptom	Number of Patients (%)
Loose Motion	100%
Abdominal Pain	70%
Fever	35%
Vomiting	31%
Lethargy	27%

*multiple responses were noted.

We found that 30% patients had serum sodium level <3.5 mmol/l (hyponatremia) while 70% patients had serum sodium level in normal range.

**Figure-1: Frequency of Hyponatremia among all the patients**

Hypokalemia was observed in 40% patients with potassium level <130 mmol/l while 60% patients had potassium level >130 mmol/l.

**Figure No 2: Frequency of Hypokalemia among all the patients**

DISCUSSION

Diarrhea remains a significant threat to children under five globally, often leading to severe morbidity

and even mortality if not promptly and adequately managed. Complications associated with diarrhea frequently involve sodium and potassium imbalances,

contributing to increased morbidity and mortality rates. In developing countries, diarrheal diseases pose a substantial burden, particularly among infants who are not breastfed and those exposed to unhygienic feeding practices and malnutrition, exacerbating the risk of gastroenteritis [10-11]. Vulnerability is heightened in young children due to their larger body surface area, resulting in rapid water loss and a predisposition to electrolyte imbalances. Our study aimed to investigate sodium and potassium abnormalities, such as hyponatremia and hypokalemia, in children with acute diarrhea. Among the 130 patients examined, 55% were male, with a mean age of 2.38 ± 1.52 years, consistent with previous findings [12]. The majority resided in urban areas and had middle socioeconomic status. Clinical manifestations included loose motion in all patients, 70% of cases. Fever was present in 35% of patients, while vomiting and lethargy were observed in 31% and 27% of cases, respectively. Hyponatremia (<3.5 mmol/l) was present in 30% of patients, while 40% exhibited hypokalemia (<130 mmol/l). Comparable rates were reported in other studies, indicating the prevalence of electrolyte abnormalities in diarrheal illnesses [13-16]. Notably, dilute ORS intake was associated with hyponatremic dehydration, emphasizing the importance of proper ORS preparation to mitigate electrolyte imbalances in acute gastroenteritis cases.

CONCLUSION

Sodium and potassium imbalances are prevalent among children experiencing acute diarrhea, posing a significant risk of increased morbidity and mortality. Our findings indicate a notably high incidence of hyponatremia and hypokalemia in pediatric patients with acute diarrhea.

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