

A Study of Clinical Profile and Management of Hypo/Hyponatremia in Patients Presenting to the Emergency Room with Altered Mental Status

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ABSTRACT

Background: Electrolyte disturbances, particularly hypo- and hyponatremia, are common causes of altered mental status (AMS) in emergency patients. These conditions, if not rapidly diagnosed and corrected, may lead to serious complications including cerebral edema, seizures, and death.

Objective: To assess the clinical presentation, sodium levels, management approaches, and outcomes of patients presenting with AMS due to hypo- or hyponatremia in a tertiary care emergency department.

Methods: A prospective observational study was conducted in a tertiary care hospital emergency room. One hundred and fifty patients presenting with AMS were enrolled. Serum sodium levels were measured at presentation and patients were categorized into hyponatremia (<135 mEq/L), hyponatremia (>145 mEq/L), or normonatremia (135–145 mEq/L). Clinical profiles, etiology, management, and outcomes were analyzed.

Results: Among 150 patients, 68 (45.3%) had hyponatremia, 42 (28%) had hyponatremia, and 40 (26.7%) were normonatremic. Common symptoms included confusion (82.6%), lethargy (65.3%), and seizures (18.6%). Hypovolemia was the most frequent etiology in hyponatremic patients, whereas dehydration and sepsis were predominant in hyponatremia. Mortality was higher in hyponatremic patients (19%) compared to hyponatremic (11.8%) and normonatremic patients (5%).

Conclusion: Sodium imbalances are significant contributors to AMS. Early detection and targeted correction of serum sodium levels can reduce complications and improve patient outcomes in the emergency setting.

KEYWORDS: Altered Mental Status (AMS), Hyponatremia, Hyponatremia, Tertiary Care Hospital, Electrolyte Imbalance.

INTRODUCTION

Altered mental status (AMS) is a frequent presentation in emergency departments and poses a diagnostic challenge due to its vast differential diagnosis. Among the potentially reversible causes, **electrolyte imbalances**, particularly sodium disturbances, are commonly encountered and often under-recognized [1].

Sodium plays a pivotal role in maintaining osmotic balance and neuronal function. Derangements in serum sodium levels, such as **hyponatremia** (sodium <135 mEq/L) and **hyponatremia** (sodium >145 mEq/L), can significantly impair cerebral function, resulting in confusion, seizures, coma, or death if not managed promptly [2,3].

Hyponatremia is often associated with heart failure, renal disease, syndrome of inappropriate antidiuretic hormone secretion (SIADH), or gastrointestinal losses [4]. Hypernatremia is frequently seen in elderly, debilitated, or septic patients and is associated with water loss or inadequate intake [5,6].

Both conditions require tailored correction strategies. Rapid correction, particularly in chronic hyponatremia, can lead to central pontine myelinolysis, whereas inadequate correction may result in persistent neurological deficits [7]. Similarly, overcorrection of hypernatremia can cause cerebral hemorrhage due to rapid osmotic shifts [8].

Despite their clinical significance, studies focusing on the **comprehensive profile and outcomes of sodium imbalance in AMS patients** are limited. This study aims to fill this gap by examining the **clinical profile, laboratory parameters, etiology, management, and prognosis** of hypo- and hypernatremia in patients presenting to the emergency room with AMS.

MATERIALS AND METHODS

Study Design and Setting

A prospective observational study was carried out in the Emergency Medicine Department of a tertiary care hospital between January and December 2024.

Inclusion Criteria

- Adults aged ≥ 18 years
- Presenting with altered mental status (GCS < 15)
- Diagnosed with hypo- or hypernatremia (based on serum sodium levels)

Exclusion Criteria

- Head trauma
- Known psychiatric illness
- Patients with known CNS disorders (e.g., stroke, tumor)

Data Collection

Demographic details, vital signs, Glasgow Coma Scale (GCS) scores, comorbidities, serum sodium levels, osmolality, and imaging reports were collected. Etiology was determined through clinical assessment, lab results, and physician diagnosis.

Patients were divided into three categories:

- **Hyponatremia:** Serum sodium < 135 mEq/L
- **Hypernatremia:** Serum sodium > 145 mEq/L
- **Normonatremia:** 135–145 mEq/L (control group)

Management

Sodium disturbances were corrected based on severity and duration (acute/chronic). Hypertonic saline or fluid restriction was used for hyponatremia; hypotonic fluids or oral water replacement for hypernatremia.

Outcome Measures

- Recovery of consciousness
- Duration of hospital stay

- Complications (seizures, cerebral edema)
- Mortality

Statistical Analysis

Data were analyzed using SPSS v25.0. Chi-square test and ANOVA were used for categorical and continuous variables respectively. A p-value <0.05 was considered statistically significant.

RESULTS

Out of 150 patients, 68 (45.3%) had hyponatremia, 42 (28%) had hypernatremia, and 40 (26.7%) were normonatremic.

Table 1: Demographic and Clinical Profile

Parameter	Hyponatremia (n=68)	Hypernatremia (n=42)	Normonatremia (n=40)
Mean Age (years)	65.8 ± 12.3	71.4 ± 13.1	61.2 ± 10.5
Male (%)	61.8%	66.7%	55%
GCS ≤ 8 (%)	36.7%	45.2%	20%
Seizures (%)	20.6%	14.3%	5%
Mortality (%)	11.8%	19%	5%

DISCUSSION

This study highlights the significant association of sodium imbalances with altered mental status and poor outcomes in emergency settings. **Hyponatremia** emerged as the most prevalent abnormality, consistent with findings from earlier studies [9,10].

In our analysis, patients with hyponatremia often presented with lethargy, seizures, and lower GCS scores. These findings are in line with studies showing that hyponatremia-induced cerebral edema can impair consciousness [11].

Hypernatremia, although less common, was associated with higher mortality, particularly in elderly and septic patients. The underlying mechanism is likely due to intracellular dehydration and neuronal shrinkage [12]. Similar mortality trends have been reported by Palevsky et al. and Adroge & Madias [13,14].

Management of sodium imbalances remains a challenge. Overcorrection risks neurological damage, whereas undercorrection prolongs symptoms and hospital stay. Hence, individualized correction plans based on duration and severity are crucial [15].

This study emphasizes the **need for routine electrolyte assessment in AMS cases**. Emergency physicians should consider sodium abnormalities early in diagnostic workups to prevent irreversible complications.

CONCLUSION

Sodium imbalances are significant contributors to altered mental status in emergency presentations. Hyponatremia was more frequent, but hypernatremia carried higher mortality. Timely diagnosis and cautious correction of serum sodium can improve outcomes and reduce hospital burden.

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Conflict of Interest: The authors declare no conflict of interest.

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