Original Article

# A descriptive study of hyponatremia in a tertiary care hospital of Eastern India

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## ABSTRACT

**Background:** Hyponatremia is one of the commonest electrolyte disturbances encountered in medical wards and contributes to substantial morbidity and mortality. However, early recognition and management drastically alters prognosis. Therefore, this observational study was taken up to explore the clinical profile of hyponatremia. **Aim:** To assess the incidence and clinical profile of hyponatremia in medically ill patients. **Materials and Methods:** This observational study was conducted in the medical ward of a tertiary care hospital from March 2010 to April 2011. All patients underwent routine hemogram, blood biochemistry, serum electrolytes, thyroid function tests, and morning serum cortisol estimation. This was followed by a plasma and urinary osmolality determination (osmometer 800 CL) as well as urinary sodium estimation. Patients were diagnosed to have syndrome of inappropriate antidiuretic hormone secretion (SIADH) if they satisfied the Bartter and Schwartz criteria. **Results:** 201 patients (16.4%) had a serum Na < 135 meq/l. There were 126 (62.69%) male patients and 75 (37.31%) female patients. Severe hyponatremia (Na < 120 meq/l) was detected in 30 patients (2.4%). The largest group of hyponatremic patients were euvolemic [102 (50.74%)], followed by hypervolemic [54 (26.86%)] and hypovolemic [45 (22.4%)]. Sixty-six patients fulfilled the criteria for SIADH. The most common underlying predisposing factor for hyponatremia in our case series was fluid loss by vomiting/diarrhea. During the hospital stay, 13.5% (15/201) hyponatremic patients died, while the corresponding figure in normonatremic patients was 8.5% (87/1020). **Conclusion:** The incidence of hyponatremia in our series was higher than values mostly reported in western literature. Euvolemic hyponatremia was the most common type, a significant fraction of which is SIADH.

**Key words:** Euvolemic, hyponatremia, syndrome of inappropriate antidiuretic hormone secretion

## Introduction

Hyponatremia is one of the commonest electrolyte disturbances plaguing hospital admitted patients at any point of time.[1,2] It is defined as a serum sodium concentration less than 135 meq/l. The clinical presentation has a wide spectrum, varying from asymptomatic patients to ones having seizures and coma.[3] Unless addressed meticulously, the prognostic implications are grave and far reaching.[4] We conducted an observational, descriptive, hospital-based study in the medical ward of a tertiary care hospital in Eastern India for a period of 1 year.

### Aims

1. To assess the incidence of hyponatremia in medically ill patients
2. To explore the clinical profile of such patients

## Materials and Methods

This observational study was conducted in the medicine teaching unit of a tertiary care hospital in Eastern India from March 2010 to April 2011. History and clinical examinations were recorded in all patients at admission. History specially included compulsive water drinking and intake of diuretics/selective serotonin reuptake inhibitors (SSRIs).

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Clinical evaluation of extracellular volume status to designate hypo or hypervolemia was performed. Complete hemogram, measurement of fasting blood glucose, urea, and creatinine, lipid profile, thyroid function tests, liver function tests (LFTs), measurement of uric acid, morning serum cortisol, and serum electrolytes were done in every patient. The sodium estimation was done in the "Easylite" Automated Analyzer by Ion Selective Electrode (ISE) technology. This was followed by a plasma and urinary osmolality determination (osmometer 800 CL) as well as urinary sodium estimation. Patients with hyperglycemia, hyperlipidemia, paraproteinemias (known cases), as well as those receiving mannitol were excluded from the study. Clinical evaluation and serum electrolytes were recorded again at the time of discharge. Patients were diagnosed to have syndrome of inappropriate antidiuretic hormone secretion (SIADH) if they satisfied the Bartter and Schwartz criteria which are:

1. decreased effective osmolality of extracellular fluid (ECF);
2. inappropriate urinary concentration in the presence of hypoosmolality;
3. clinical signs of euvolemia; absence of signs of hypovolemia (tachycardia, orthostatic changes) or hypervolemia (edema, ascites);
4. elevated urinary sodium excretion with normal salt and water intake; and
5. absence of other causes of euvolemic hypoosmolality (hypoadrenalism/hypothyroidism).

The normal serum sodium range is 135–145 meq/l, serum osmolality is 275–293 mosm/kg serum water, and urine osmolality is 500–850 mosm/kg water. Hyponatremia is defined as Na < 135 meq/l and severe hyponatremia defined as serum Na < 120 meq/l.

Excel and SPSS software packages were used for data entry and analysis. Chi-square test was applied to find the significance of difference between two proportions. A *P* value of less than 0.05 was accepted as indicating statistical significance.

## Results

This study was conducted for a period of 1 year in our unit in the medical ward of tertiary care hospital in Eastern India. The total number of patients admitted in that period was 1221. Out of them, 201 patients (16.4%) had a serum Na of < 135 meq/l. There were 126 (62.69%) male patients and 75 (37.31%) female patients [Figure 1]. Severe hyponatremia (Na < 120 meq/l) was detected in 30 patients (2.4%). The mean sodium level was 126.34 meq/l. The largest group of hyponatremic patients were euvolemic [102 (50.74%)], followed by hypervolemic [54 (26.86%)] and hypovolemic [45 (22.4%)] [Figure 2]. Sixty-six patients fulfilled the criteria for SIADH.

The most common underlying predisposing factor for hyponatremia in our case series was gastrointestinal (GI) fluid loss followed by cerebrovascular accident (CVA) and pulmonary sepsis [Table 1]. The clinical picture had

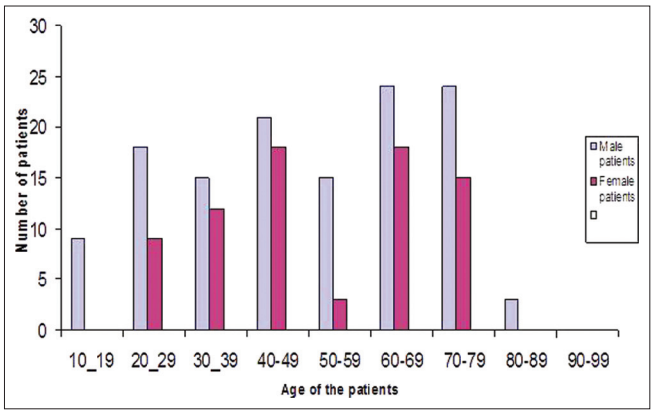


**Figure 1:** Age sex distribution of hyponatremic patients

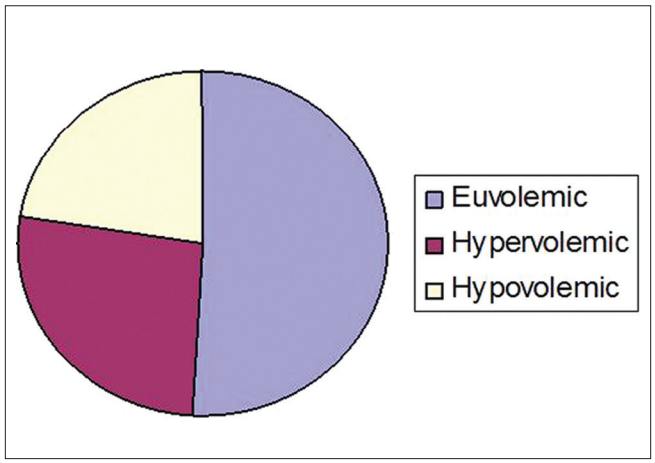


**Figure 2:** Volume status of hyponatremic patients

**Table 1: Etiological distribution of hyponatremic patients**

| Causes | Number of patients |
|---|---|
| GI fluid loss | 39 |
| Cerebrovascular accident | 30 |
| Lung sepsis | 18 |
| Renal failure | 16 |
| Multifactorial | 16 |
| Congestive cardiac failure | 15 |
| Malignancy | 14 |
| Pulmonary Koch's | 12 |
| Meningitis | 12 |
| Chronic liver disease | 12 |
| Nephrotic syndrome | 10 |
| Drugs | 7 |

wide variations – 11.94% patients were unconscious at admission, 31.8% patients were disoriented while 4.47% patients had seizures. The largest percentage of patients (48.21%) was asymptomatic.

Treatment was individualized. Overtly symptomatic patients were treated with hypertonic saline intravenously by proper dose and rate calculation followed by oral salt supplementation. For asymptomatic groups, correction of the cause primarily was targeted. 13.5% (15/201) hyponatremic patients died during the hospital stay, while the corresponding figure in normonatremic patients was 8.5% (87/1020). On applying chi-square test, the difference was statistically significant ($P<0.05$). There were no cases of central pontine myelinolysis in our patient group.

## Discussion

Hyponatremia is associated with substantial morbidity and mortality. The identification of risk factors associated with the development of symptomatic hyponatremias is important in determining preventive strategies. Data on prevalence and clinical profile of hyponatremias are scarce, to say the least, from the Indian subcontinent. We took up this hospital-based, observational descriptive study as an attempt to explore hyponatremias.

The incidence of hyponatremia in hospital admitted patients, as quoted in various studies, varies between 12 and 14%, with severe symptomatic hyponatremias being 1–2%.[1,2,5] In a Hungarian article, the range was quoted as 15–30%.[3] The corresponding figures obtained in our study were 16.4% and 2.4%. The slightly larger percentage obtained may be attributed to tropical weather conditions as well as associated malnutrition in most of our admitted patients. An Indian study conducted for 2 years found an increased incidence of hyponatremia in the monsoon season.[6] Importance is also being given to nutritional status as a risk factor for developing hyponatremia especially in elderly subjects.[7]

The commonest type of hyponatremia documented in a risk factor study for symptomatic patients was the hypovolemic type (32.6%) followed by congestive cardiac failure and SIADH (26%).[7] In an Indian study, with only elderly hospitalized patients, the most common causes of hyponatremia were SIADH and diuretics. The two most common causes of SIADH were lower respiratory tract infection and stroke.[8] In our study, GI fluid loss, CVA, and pulmonary sepsis were the most frequent predisposing risk factors [Table 1]. Though SIADH was clinically suspected in most cases of euvolemic hyponatremia, laboratory confirmation was found in 32.84% cases.

The diagnosis of probable etiology of hyponatremia is instrumental in formulating the management strategy, which varies widely. Determinants of therapy are extracellular volume status, the neurological signs and symptoms, the severity and duration of hyponatremia, and the rate at which it developed. Though we utilized conventional laboratory parameters for diagnosis, studies have been done with plasma copeptin as a diagnostic marker (c-terminal part of provasopressin).[9] Such endeavors are well beyond our reach.

The importance of early recognition of hyponatremia and prompt intervention is paramount.[10] In a huge multicentric trial with 151,486 patients, it was demonstrated that all types and grades of dysnatremias were associated with increased risk adjusted and raw hospital mortality rates. The odds ratios for mild, moderate, and severe hyponatremias were 1.32, 1.89, and 1.81, respectively.[1] Moreover, apart from mortality, hyponatremia prolongs the hospital stay significantly and increases the cost of medical care substantially.[11] It is important to note that patients with even mild hyponatremia, which is usually asymptomatic, are predisposed to develop severe hyponatremias as well as end up with serious adverse outcomes like myocardial infarction.[12,13] We studied the in-hospital mortality and found higher death rates in hyponatremic patients in similar age and sex groups.

However, the comparison of mortality by taking into account all comorbidities and relative severity of illnesses would require a full-scale regression analysis for a definitive comment on prognosis. Also, long-term follow-up studies are required for assessment of subsequent morbidity and quality of life in patients who were discharged.

To conclude, hyponatremia is fairly common in patients admitted in medical wards (16.4%). Euvolemic hyponatremia comprises the bulk of the patients (50.74%). A significant number suffer from SIADH (32.84%). A large fraction of cases (48.21%) are asymptomatic. Lastly, in-hospital morbidity and mortality is significantly higher in hyponatremia patients. Therefore, early recognition and prompt correction are of supreme importance in such patients.

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