

# Clinical and Etiological Profile of Patients Presenting with Hyponatremia in a Tertiary Care Teaching Hospital of North Eastern India

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## ABSTRACT

**Introduction:** Hyponatremia is a common electrolyte abnormality in hospitalized patients. It is defined as serum sodium concentration less than 135mEq/L. It occurs due to disruption of sodium and water homeostasis. Clinical presentation varies from asymptomatic patients to ones having seizures and coma. Aims and objective: To delineate the clinical profile and causes of hyponatremia in patients admitted in a medical ward.

**Material and methods:** This study was conducted on 100 patients admitted in medicine ward of tertiary care teaching hospital of northeast India from September 2016 to February 2017. Patients older than 18 years with serum sodium less than 135mEq/L were included in the study. Detailed history, clinical examination and all necessary investigations were done accordingly. P value <0.05 was taken as statistical significance.

**Results:** In the present study 72% were male, and 84% of patients was older than 50 years. Out of all patients 70% were symptomatic, out of which 40% had moderate hyponatremia. Symptomatic hyponatremia in mild, moderate and severe groups were present in 42.8%, 84.8%, 96% respectively. Out of 100 cases of hyponatremia euvolemic, hypervolemic and hypovolemic cases were 47%, 33% and 20% respectively. Most common cause was gastrointestinal loss (24%) and most common symptom was altered sensorium in 24% of patients. Interestingly 10% cases of hyponatremia gives history of salt restriction.

**Conclusion:** Hyponatremia is commonly encountered electrolyte imbalance in hospitalized patients mostly in temperate countries like India. Most common cause being gastrointestinal loss followed by diuretic use. Restricted salt intake advised by physicians or family members is also an important factor of it.

**Keywords:** Hyponatremia, Hypovolemia, Coma, Electrolytes, Diuretics

## INTRODUCTION

Hyponatremia is a common electrolyte abnormality in hospitalized patients.<sup>1,2</sup> Incidence varies from 1% to 40%.<sup>1-3</sup> Despite the awareness on hyponatremia since mid 20<sup>th</sup> century, this common disorder is still incompletely understood in many basic areas, due to its association with a wide range of underlying causes, multiple etiologies and differing pathophysiological mechanisms.<sup>4,5</sup>

Hyponatremia is defined as serum sodium concentration of less than 135mmol/L. It can be sub divided into mild hyponatremia (130-134mmol/L), moderate hyponatremia (120-129mmol/L) and severe hyponatremia (<120 mmol/L).<sup>6-8</sup> Mild hyponatremia is found in as many as 15-30% of hospitalized patients or in the institutionalized elderly.<sup>9,10</sup> Clinically, hyponatremia is often unrecognized when it is mild or when it develops gradually. But severe hyponatremia (serum sodium <120 mmol/L), particularly of rapid onset, is associated with substantial morbidity and can

be life threatening.<sup>11</sup> Also, moderate to severe hyponatremia bears a substantial associated morbidity and mortality.<sup>12</sup> It is common in the elderly, mainly owing to impaired water and electrolyte balance in response to diet, drugs and environmental changes.<sup>13,14</sup>

Hyponatremia occurs due to disruption of sodium and water homeostasis, normally maintained by complex multisystem physiological mechanisms. Hyponatremia is subdivided diagnostically into three groups, depending on clinical history and volume status, like hypovolemic, euvolemic, and hypervolemic.

In hypovolemic hyponatremia, hypovolemia leads to increased circulating levels of arginine vasopressin hormone (AVP), which helps to maintain blood pressure via vascular and baroreceptor V1A receptors and increase water reabsorption via renal V2 receptors; activation of V2 receptor can lead to hyponatremia in setting of increased free water intake.<sup>15</sup> Common causes are diuretic use, vomiting, diarrhea, pancreatitis, burns, mineralocorticoid deficiency, salt losing nephropathy, ketonuria and cerebral salt wasting syndrome.

In euvolemic hyponatremia, glucocorticoid deficiency, hypothyroidism, stress, drugs, syndrome of inappropriate antidiuretic hormone secretion are causes.

In hypervolemic hyponatremia there is increase in total Na<sup>+</sup> and Cl<sup>-</sup> that is accompanied by a proportionately greater increase in total body water, leading to reduced plasma sodium concentration.<sup>15</sup> Common causes are acute or chronic renal failure, nephrotic syndrome, cardiac failure, cirrhosis of liver.

The clinical presentation has a wide spectrum, varying from asymptomatic to very lethal presentation as seizures and coma. Hyponatremia induces generalized cellular swelling, a consequence of water movement down the osmotic gradient from the hypotonic ECF to ICF. The initial CNS response to acute hyponatremia is an increase in interstitial pressure, leading to shunting of ECF and solutes from the interstitial space into the cerebrospinal fluid and then on into the systemic circulation. This is accompanied by an efflux of the major intracellular ions, Na<sup>+</sup>, K<sup>+</sup>, and Cl<sup>-</sup> from brain cells. Acute

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hyponatremic encephalopathy ensues when these volume regulatory mechanisms are overwhelmed by a rapid decrease in tonicity, resulting in acute cerebral edema. While persistent, chronic hyponatremia results in an efflux of organic osmolytes (creatinine, betaine, glutamate, myoinositol, and taurine) from brain cells; this response reduces intracellular osmolality and the osmotic gradient favoring water entry and leading to brain edema.<sup>15</sup> When coupled with a recent history of altered fluid balance, these symptoms suggest the possibility of hyponatremia, which can cause substantial morbidity and mortality. Morbidity varies widely in severity, serious complications can arise from the disturbances itself as well as from the underlying causative conditions. Hyponatremia is also an important predictor of mortality in heart failure, cirrhosis and acute pancreatitis. Unfortunately, hyponatremia is also often iatrogenic.

Clinical management of hyponatremia is based on diagnosing and treating the underlying cause and restoring salt and water balance. Hyponatremia is important to recognize because of the potential morbidity and mortality. Accurate determination of etiology of hyponatremia is notoriously challenging. However, early recognition and management drastically alters prognosis. Silchar Medical College is the only tertiary care hospital in Barak Valley and receives patients from Karimganj, Hailakandi and Cachar districts. It also provides service to patients from its neighboring states like Mizoram, North Tripura, West Manipur etc. No previous study has been conducted on this topic in this area. This study will assess the numerous patients of hyponatremia presenting to SMCH, and attempt to clarify the likely etiologies in this part of North East India.

Aims and objectives of the study were to find out the various etiologies of hyponatremia in patients admitted in the Medicine Department of Silchar Medical College and Hospital, Silchar.

**MATERIALS AND METHODS**

The study was conducted in department of Medicine, Silchar Medical College, Silchar, Assam from September 2016 to February 2017 on 100 cases. The present study was a hospital based prospective observational study.

**Inclusion criteria**

Patients age >18 years with serum sodium level < 135meq/l.

**Exclusion criteria**

- 1) Overcorrected hypernatremia

- 2) Patients with hyperlipidemia
- 3) Hyperproteinemia
- 4) Patients not willing to participate in the study were excluded from study.

**Method of collection of data**

All patients fulfilling the inclusion and exclusion criteria were explained about the purpose of the study. A written informed consent was obtained from the patients. A detailed history and physical examination was done in all included patients as per a pre-determined proforma. History specially included intake of diuretics and decreased salt intake(self/ advised by physician). Routine laboratory investigations including complete blood count, kidney function test, random blood sugar, serum sodium, serum potassium, urine sodium, liver function test and where indicated lipid profile, thyroid stimulating hormone, serum cortisol level in selected cases and other investigations to find out the etiology.

**STATISTICAL ANALYSIS**

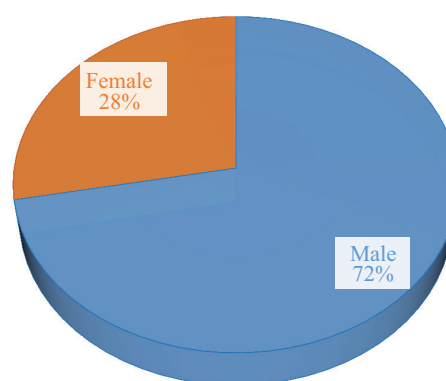
Collected data was compiled and tabulated. Statistical analysis was done using Chi square test wherever required using calculator from www.socscistatistics.com. A p value of less 0.05 was accepted as indicating statistical significance.

**RESULTS**

In present study, out of 100 patients 72% were males and 28% were females (figure-1). Patients were between 18 to 91 years. In present study maximum number of cases (46%) were of age group 51 to 70 years, with 84% patients older than 50 years of age (table-1,2).

Out of total patients 70% were symptomatic. Out of the symptomatic patients due to hyponatremia mild, moderate and severe hyponatremia was found in 25.7%, 40% and 34.3% cases respectively (figure-2, table-3). The largest group of hyponatremic patients were euvolemic (47%), followed by hypervolemic (33%) and hypovolemic (20%) (figure-3).

Neurological symptoms like altered sensorium was present



**Figure-1:** Gender distribution

Age Group (Yrs)	Male	Female	Total
18-30	4	2	6
31-50	6	4	10
51-70	34	12	46
≥ 71	28	10	38
Total	72	28	100

**Table-1:** Age distribution among patients with hyponatremia

Age Group	Hiccups	Vomiting	Altered sensorium	Seizures	Others	Total
18-30	0	2	0	0	3	5
31-50	0	1	0	1	2	4
51-70	3	8	11	4	5	31
≥ 71	5	4	13	4	4	30
Total	8	15	24	9	14	70

**Table-2:** Distribution of patients with symptoms according to age

in 24% cases, while seizures were present in 9%. The most common underlying predisposing factor was gastrointestinal fluid loss (24%). Most common comorbid condition was hypertension (57%), followed by diabetes mellitus (42%). History of salt restriction was found in 10% patients (figure-4). In the hyponatremic group history of salt restriction was there as per advice of family members, physicians and self-induced in 5%, 2%, 3% respectively and in 90% cases no history of salt restriction was there.

**DISCUSSION**

Hyponatremia is a common electrolyte abnormality seen in adult hospitalized patients. Studies on etiological profile of hyponatremia are scarce, especially from northeast India. This study was conducted with novel idea to find out clinical profile and various etiologies of hyponatremia from Barak valley.

In present study there were 72% males and 28% females, comparative to study by Patni et al<sup>5</sup> (74% male, 26% female). This trend was found may be due to more male admission in the hospital.

The incidence of hyponatremia in patients above 50 years of age was 84%, Hochman et al<sup>16</sup> and Vurgese et al<sup>17</sup> also observed similar trend that elderly patients were more prone to hyponatremia.

Among gastrointestinal symptoms nausea and vomiting were the most common similar to study of Farooqui M et al<sup>18</sup> (51.42%), and Agrawal SM et al<sup>19</sup> (54%). Among neurological symptoms altered sensorium (24%) was most common symptom, and seizures were present in 9% patients similar to studies of Rao MY et al<sup>20</sup> (33%), Agrawal SM et al<sup>19</sup> (42%) and Nandkumar et al<sup>21</sup> (53.2%), who found drowsiness as most common neurological symptom.

In the present study euvolemic hyponatremia (47%) was most common type of hyponatremia followed by hypervolemic (33%) and hypovolemic hyponatremia was the least. Similar trend was seen by Patni et al<sup>5</sup> (49%). In present study Gastrointestinal loss (24%) was the most common etiological factor, followed by use of diuretics (20%) as second most common cause. Whereas studies by V. Padma et al<sup>22</sup>, Rao MY et al<sup>20</sup> (30%) and Patni et al<sup>5</sup> (44%) have found SIADH as the commonest cause in the

elderly.

Out of all the patients, the incidence of mild, moderate and severe hyponatremia was 42%, 33% and 25% respectively, mild hyponatremia being the commonest. Symptomatic hyponatremia in these groups were present in 42.8%, 84.8%,

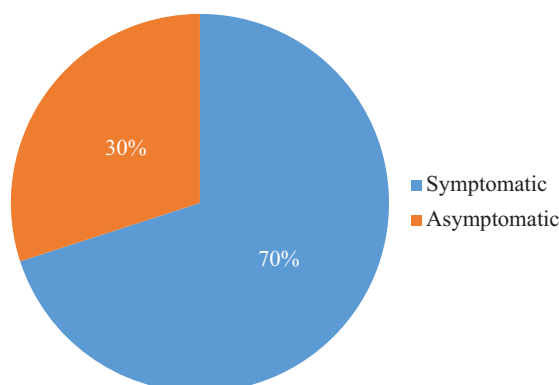


Figure-2: Symptoms of hyponatremia

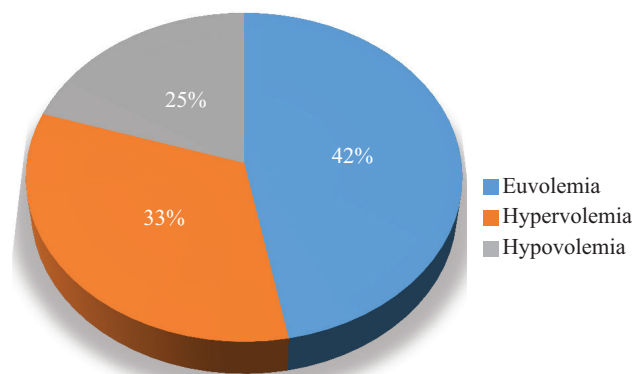


Figure-3: Distribution of patients according to volume status

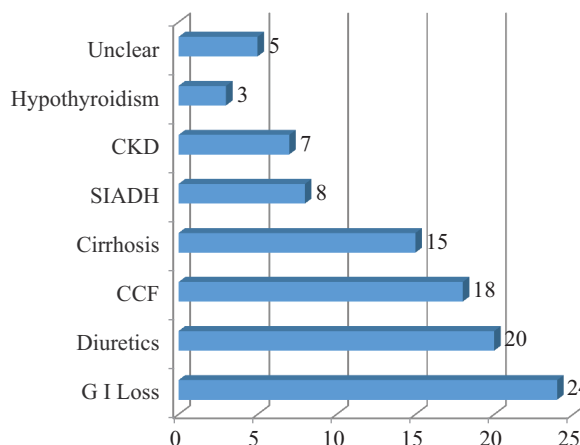


Figure-4: Distribution of patients according to diagnosis

Severity	Symptomatic (%)	Asymptomatic (%)	Total
Mild	18(42.8)	24(57.1)	42
Moderate	28(84.8)	5(15.1)	33
Severe	24(96)	1(4)	25
Total	70	30	100

(p value -.00001)

**Table-3: Distribution according to severity of hyponatremia**

Symptoms	Mild (130-134)	Moderate (121-129)	Severe (≤120)	Total(%)
Asymptomatic	24(80%)	5(16.7%)	1(3.3%)	30(30%)
Vomiting	8(53.3%)	5(33.3%)	2(13.4%)	15(15%)
Hiccups	2(25%)	5(62.5%)	1(12.5%)	08(08%)
Seizures	0	4(44.4%)	5(55.6%)	09(09%)
Altered sensorium	0	10(41.7%)	14(58.3%)	24(24%)
Others	8(57.1%)	4(28.6%)	2(14.3%)	14(14%)
Total	42	33	25	100

**Table-4: Correlation between symptoms and severity of hyponatremia**

96%. Thus the occurrence of symptoms relates to the increasing severity of hyponatremia.

Common comorbid conditions were hypertension (57%) followed by diabetes mellitus (42%). Out of 57 hypertensive patients 34 patients was on diuretics, similar trend was observed by Baji PP et al.<sup>3</sup>

Salt restricted diet was found in 10 patients among symptomatic patients (14%)

## CONCLUSION

Hyponatremia is commonly encountered electrolyte imbalance in hospitalized patients. There is increased risk of hyponatremia with increasing age, hypertension, diuretic use and gastrointestinal losses. Excessive salt restriction may be one of the important causes of hyponatremia, though salt restriction is required for blood pressure control as well as in some other situation.

Since morbidity and mortality is significantly higher in patients with hyponatremia, so timely correction is necessary in such patients.

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