

# Clinico-etiological Profile of Hyponatremia among Elderly Patients Admitted to a Tertiary Care Hospital, Guntur

Chandana Kaspal<sup>1</sup>, Abhinay Shankar Govindu<sup>2</sup>

## ABSTRACT

**Introduction:** Many serious neurological sequelae associated with hyponatremia and its management. The possible causes of hyponatremia should always be sought in every case. The presence of symptoms and duration of hyponatremia guide the treatment strategy. Thorough evaluation for hyponatremia mandates accurate history taking and clinical examination along with various investigations. The present study was conducted to study the incidence of hyponatremia in hospitalized adult patients in medical wards and to determine the etiology and clinical presentation of hyponatremia patients admitted to the medical wards of Guntur Medical College, Guntur.

**Material and methods:** A cross sectional study was conducted during January 2019 to June 2019 where out of the total number of hospital admission in medical wards patients with hyponatremia less than 130 mmol/L was about 3384 patients (16.09%). Out of these 3384 patients, 100 patients with with serum sodium less than 130 mmol/L who fulfil the inclusion and exclusion criteria were selected Using simple random sampling method using random table number method. Clinico etiological profile of these patients was studied.

**Results:** 100 patients were enrolled in the study with a mean age of 62.46 years. Majority were Male(57%). In the study, 67 patients had neurological symptoms like nausea, vomiting, giddiness and altered sensorium. 14 patients presented with seizures. The incidence of symptomatic hyponatremia is more with lowering sodium levels which is statistically significant. All patients with severe hyponatremia had symptoms Comorbidities in the study were Hypertension (58%) and diabetes mellitus (55%), Cardiac problems (31%), Renal problems (19%), Respiratory problems (18%).

**Conclusion:** Symptomatic hyponatremia is common among the hospitalized patients. Neurological symptoms are common in hyponatremia patients. SIADH and euvoletic hyponatremia formed the largest subgroup in the study. Drugs, especially diuretics, are a common cause of hyponatremia. Older age groups had more incidence of hyponatremia

**Keywords:** Clinico-etiological, Hyponatremia, Patients Admitted

## INTRODUCTION

Hyponatremia is defined as the plasma sodium concentration of <135 mEq/L, which occurs primarily due to imbalance in water homeostasis, antidiuretic hormone (ADH) regulation, and renal handling of filtered sodium. Syndrome of inappropriate ADH secretion (SIADH), a common cause of hyponatremia, is associated with many clinical conditions. These include neoplasia, central nervous system (CNS) disorders, drugs and pulmonary diseases.<sup>1</sup>

It is the most common electrolyte disorder among hospitalized patients<sup>2-4</sup> and has been associated with increased mortality ranging from 5% to 50%<sup>5</sup>, depending on severity and acuity of onset.<sup>6</sup> Its prevalence among non-hospitalized elderly patients has been estimated to be between 7 – 11.4%, increasing to 11 – 22.5% among hospitalized patients.<sup>7</sup>

The clinical presentation has a wide spectrum, varying from asymptomatic patients to ones having seizures and coma.<sup>8</sup> Unless addressed meticulously, the prognostic implications are grave and far reaching.<sup>9</sup>

These symptoms range from restlessness, altered consciousness, lethargy, seizures to coma. As the symptomatology vary markedly, the diagnosis of hyponatremia is difficult to establish. Prompt recognition and optimal management of hyponatremia in hospitalized patients may reduce in-hospital mortality and symptom severity, allow for less intensive hospital care, decrease the duration of hospitalization and associated costs and improve the treatment of underlying co morbid conditions and patients quality of life. So the treating clinician should have a high index of suspicion to diagnose hyponatremia.

There are serious neurological sequelae associated with hyponatremia and its management. The possible causes of hyponatremia should always be sought in every case. The presence of symptoms and duration of hyponatremia guide the treatment strategy. Thorough evaluation for hyponatremia mandates accurate history taking and clinical examination along with various investigations.

The present study was conducted to study the incidence of hyponatremia in hospitalized adult patients in medical wards and to determine the etiology and clinical presentation of hyponatremia patients admitted to the medical wards of Guntur Medical College, Guntur.

## MATERIAL AND METHODS

A cross sectional study was conducted during January 2019

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to June 2019 where total number of hospital admission in medical wards was 25,326 and serum sodium estimates was done for 21,020 patients. The number of patients with hyponatremia less than 130 mmol/L was about 3384 patients (16.09%)

Out of these 3384 patients, 100 patients with with serum sodium less than 130 mmol/L who fulfil the inclusion and exclusion criteria were selected Using simple random sampling method using random table number method. Clinico etiological profile of these patients was studied.

**Inclusion Criteria**

All inpatients >12 years of age with atleast two serum sodium values <130 mmol/L.

**Exclusion Criteria**

Patients with age less than 12 years and patients who are treated with Mannitol and osmotic diuretics.

**Data collection technique**

In the hospital, on all the patients, as routine, blood samples were taken and serum electrolytes were done in central biochemistry laboratory. The records were followed up for patients with hyponatremia and values repeated once for confirmation.

A standard proforma was used to record to detailed history of present complaints, past history including diabetes mellitus, systemic hypertension, Ischemic heart disease, dyslipidaemia, neurological, chronic kidney disease / renal disease, regulatory and endocrine problems. A detailed drug history was also recorded.

Findings on clinical exam including volume status of patients were recorded.

Based on investigations and management of a patient, the following data was recorded.

Initial serum, sodium, final sodium at discharge/death, calculated serum osmolality, urine osmolality, urine spot sodium and endocrine work up (as and when required) were done.

The fluid management and drugs, if used were also noted.

The probable cause was correlated and the outcome of hospitalization was recorded.

**STATISTICAL ANALYSIS**

The data was tabulated in Excel 2013 and analysed using SPSS software version 16. Quantitative and Qualitative variables were expressed in terms of Descriptive statistics like (mean + standard deviation), frequencies and percentages. Non parametric statistic i.e. Chisquare test was used to find the statistical significant difference between the variables. P value <0.05 was considered as statistically significant in this study.

**RESULTS**

Total of 100 patients were enrolled in the study with a mean age of 62.46 years. Youngest age was 18 years old. The oldest age was 88 years. Male(57%) and female (43%) in the present study. Age and gender distribution of the study patients is mentioned in [Table 1].

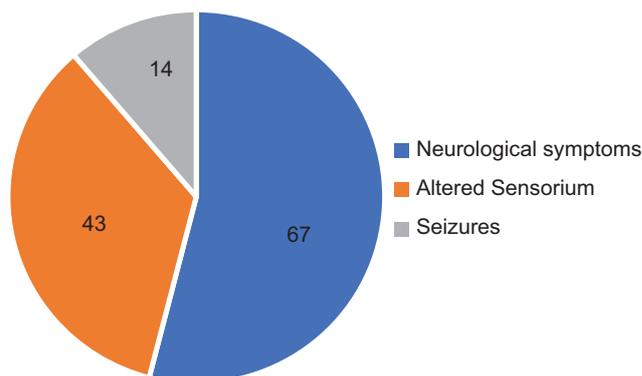


Figure-1: Symptoms

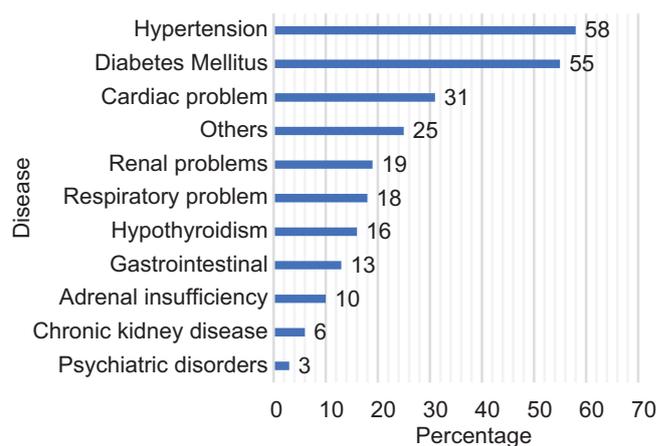


Figure-2: Comorbidities

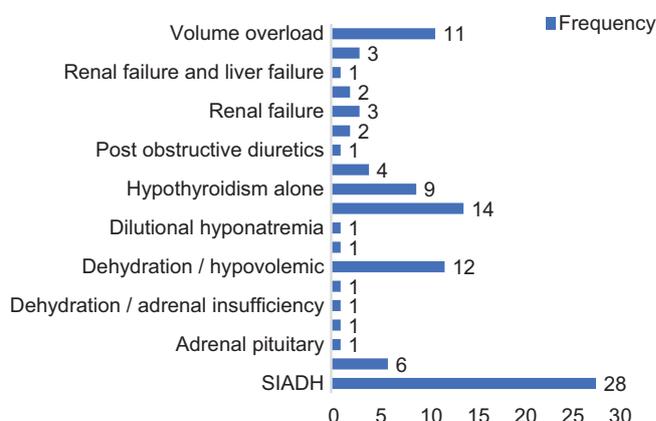


Figure-3: Cause of hyponatremia

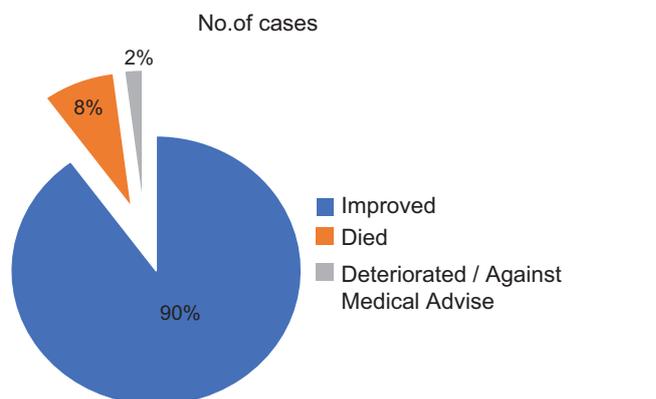


Figure-4: Severity of hyponatremia

Range	No. of patients
15 – 25	2
26 – 35	2
36 – 45	7
46 – 55	20
56 – 65	22
66 – 75	29
76 – 85	17
86 – 95	1
Total	100

**Table-1:** Age Distribution

Sodium levels	Symptomatic	Asymptomatic	P value
<110	10	0	<0.001
110 – 120	40 (71%)	16	<0.05
120 – 130	17 (50%)	17	0.32

**Table-2:** symptoms and level of hyponatremia

Volume Status	Symptomatic	Asymptomatic	P value
(n = 100)	(%)	(%)	
Euvolemia	47	15	P<0.05
Hypervolemia	7	12	P = 0.46
Hypovolemia	13	6	P = 0.21

**Table-3:** euvolemic patients

Type of Treatment	Frequency
Normal Saline + Diuretics	43
Insulin, NS	1
NS+3% saline	5
Fluid restriction diuretics	4
Fluid restriction alone	1
3% saline	31
3% saline + diuretics	1
Dialysis	1
Steroids + NS	6
Diuretics	12

**Table-4:** Type of Treatment

67 patients had neurological symptoms like nausea, vomiting, giddiness and altered sensorium. 14 patients presented with seizures. The lower the sodium value, the higher the incidence of symptomatic hyponatremia. Symptoms were given in [Figure 1].

The incidence of symptomatic hyponatremia is more with lowering sodium levels which is statistically significant. All patients with severe hyponatremia had symptoms. The symptoms and level of hyponatremia were given in [Table 2] Comorbidities in the study were Hypertension (58%) and diabetes mellitus (55%), Cardiac problems (31%), Renal problems (19%), Respiratory problems (18%). [Figure 2]

62% of the patients were Euvolemic, 19% were Hypovolemic and 19% were Hypervolemic. Among those 62 patients with Euvolemia, 47 patients were Symptomatic and 15 patients were asymptomatic. Out of the 19 patients with Hypervolemia, 7 patients were symptomatic and 12 were asymptomatic. 13 patients were symptomatic and 6 were asymptomatic in the Hypovolemia group. A statistically

significant difference was observed as most of the euvolemic patients were symptomatic (P<0.05). [Table 3]

The commonest cause of hyponatremia was SIADH (28%). Single cause in 59% of the patients and Multifactorial causes were observed in 37% of the patients, and 4% had causes unclear. [Figure 3]

The mean initial sodium was  $118.6 \pm 5.48$  mEq/L and mean final sodium was  $122.53$  mEq/L with standard deviation of 3.87.

In the present study, on 92 patients had urine osmolality done. 78 patients had thyroid function tests done. 53 patients had serum cortisol / ACTH stimulation tests done.

16 patients had hypothyroid problems. 10 patients had adrenal insufficiency. (by ACTH stimulation test (Adreno Corticotrophic Hormone). In majority of the patients (43%), more than 1 method of correction was used. Among 31% of the patients, 3% saline was used for correction. [Table 4]

Condition of 90 patients was improved on medical intervention one patient went to develop extrapontine myelinolysis but recovered. 2 patients had Deteriorated / Against Medical Advice.

Mortality of patients in this study was 8%. The mortality did not correlate with severity of hyponatremia (p.value 0.125). The mortality depended on the underlying illness rather than severity of hyponatremia. [Figure 4]

## DISCUSSION

In our study, the mean age of the patients was 62.46 years and Male were 57% and female were 43%, which was comparable to a hospital-based study by Jain et al<sup>10</sup> where Mean age of the patients was  $73.87 \pm 6.54$  years with a male to female ratio of 1:0.96

The incidence of hyponatremia among elderly patients, in this study, was 18.9%, which is comparable the study by Jian et al<sup>10</sup> where the incidence of hyponatremia among elderly patients, was 25.98%

In the present study, 67 patients had neurological symptoms like nausea, vomiting, giddiness and altered sensorium. 14 patients presented with seizures. Baji et al<sup>11</sup> reported that drowsiness was the most common neurological symptom (42%).

The major pre-existing illnesses Comorbidities in the study were Hypertension (58%) and diabetes mellitus (55%), Cardiac problems (31%), Renal problems (19%), Respiratory problems (18%). The studies on hyponatremia have not demonstrated a direct correlation between hyponatremia and hypertension, although the correlation of hyponatremia with the age and diuretic use is evident.<sup>12,13</sup>

Study by Shanmugasundaram et al<sup>14</sup> reported that Hypertension followed by diabetes mellitus was the most common pre-existing illness present among the patients. Heart diseases like congestive cardiac failure, neurological diseases like stroke and pulmonary diseases like pneumonia, fibrosis and pleural effusion were also present in few patients. The commonest cause of hyponatremia was SIADH (28%) which is similar to the study conducted by Jain et al<sup>10</sup> where SIADH was 31% and Vurghese et al<sup>15</sup> where SIADH was

34.8% reported.

Single cause in 59% of the patients Multifactorial causes were observed in 37% of the patients, and 4% had causes unclear. which is in line with reported 34.8% by Vurgese et al<sup>15</sup> reported Multiple etiological factors in 10.9%, 75% by Clayton et al.<sup>16</sup> These studies emphasize the importance of establishing the various factors responsible for hyponatremia in the patient so that relevant corrective measures can be considered during the treatment.

62% of the patients were Euvolemic, 19% were Hypovolemic and 19% were Hypervolemic. Among those 62 patients with Euvolemia, 47 patients were Symptomatic and 15 patients were asymptomatic. Out of the 19 patients with Hypervolemia, 7 patients were symptomatic and 12 were asymptomatic. 13 patients were symptomatic and 6 were asymptomatic in the Hypovolemia group. A statistically significant difference was observed as Most of the Euvolemic patients were symptomatic ( $P < 0.05$ ). 43% patients were euvolemic, 38% patients were hypervolemic and 19% patients were hypovolemic in the Study by Baji et al.<sup>11</sup> Bhattacharjee et al<sup>17</sup> study reported that Patients with euvolemia were observed to have more severe symptoms of hyponatremia compared to the other groups.

In majority of the patients (43%), more than 1 method of correction was used in the present study. Among 31% of the patients, 3% saline was used for correction. In Study by Jain et al<sup>10</sup> 71% patients received NS, 44% patients were given oral sodium chloride supplementation, 41% patients were given hypertonic (3%) saline (3% NS), 37% patients were on fluid restriction, and 26% patients received loop diuretics Mortality in the present study was 8%. The mortality didn't show correlation with severity of hyponatremia (p.value 0.125). in Jain et al<sup>10</sup> study the overall mortality among patients of hyponatremia, was 20% and 23.5% among patients with profound hyponatremia. Shanmugasundaram et al<sup>14</sup> study reported a mortality 2.1% in patients with severe hyponatremia. Mortality was not directly related to hyponatremia but to the severity of the underlying medical condition in the patients.

## CONCLUSION

Symptomatic hyponatremia is common among the hospitalized patients. Neurological symptoms are common in hyponatremia patients. SIADH and euvolemic hyponatremia formed the largest subgroup in the study. Drugs, especially diuretics, are a common cause of hyponatremia. A relatively large number of patients had endocrine abnormalities (thyroid, adrenal and pituitary). The mortality was about 10%. It was mainly due to underlying primary diseases. Older age groups had more incidence of hyponatremia. Symptoms of hyponatremia increased with severity of hyponatremia.

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