



### **Study of hyponatremia in hospitalized patients**

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#### **Abstract**

**Introduction:** Hyponatremia is the most common electrolyte disorder among hospitalized patients and has been associated with increased mortality. Hyponatremia occurs in a broad spectrum of patients who are asymptomatic or critically ill. Prompt recognition and optimal management of hyponatremia in hospitalized patients may reduce in-hospital mortality and symptom severity.

**Material and Methods:** 100 patients were selected for study. Out of which 50 were admitted with already hyponatremia and the other 50 developed hyponatremia after being hospitalized. A cross section study was done. In the hospital, blood samples were taken and serum electrolytes were done in biochemistry lab. The records were followed up for patients with hyponatremia and values repeated once for confirmation.

**Results:** 67% patients were symptomatic while 33% were asymptomatic. Out of those 67% symptomatic patients 8% were severely hyponatremic, 38% were moderately hyponatremic while 21% were mild hyponatraemic. 60% patients were euvolemic, 21% were hypovolemic, and 19% were hypervolemic.

**Conclusion:** Neurological symptoms are common in hyponatremia patients. SIADH was the most common cause of hyponatremia in the present study representing 39% of cases. Drugs, especially diuretics, are a common cause of hyponatremia. Early detection and intervention can reduce the mortality.

**Keywords:** SIDHA, Lethargy, Seizures

### **Introduction**

Hyponatremia is the most common electrolyte disorder among hospitalized patients and has been associated with increased mortality. Hyponatremia is defined as a serum sodium concentration ( $\text{Na}^+$ ) less than  $135 \text{ mEq/L}$ <sup>1-4</sup>.

Serum sodium levels and serum osmolality are normally maintained under precise control by homeostatic mechanisms involving thirst, anti-diuretic hormone and the renal handling of filtered sodium. Hyponatremia occurs in a broad spectrum of patients who are asymptomatic or critically ill.

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 patient's 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<sup>5-8</sup>.

### **Material and methods**

Patients who were admitted in various medicine wards over a period of one year were taken up for study considering the inclusion and exclusion criteria.

#### **Inclusion criteria**

- 50 Patients admitted with already hyponatraemic state.
- 50 Patients developing hyponatraemia after being hospitalized.

#### **Exclusion criteria**

- Analysis of plasma osmolality, total protein, triglyceride and cholesterol concentrations to exclude pseudo hyponatraemia.
- Patients at OPD level.

The lab values of serum sodium of all patients was studied from which incidence of hyponatremia was calculated. Out of these hyponatremic patients, a sample size of 100 patients were randomly selected by simple random sampling, from the table of random numbers satisfying the inclusion criteria.

As a routine blood sample were taken in hospital and serum electrolytes analysis were done in central biochemistry laboratory. The records were followed up for patients with hyponatremia and values repeated once for confirmation.

## **Results**

The total number of hospital admission in medical wards was 15,426 and serum sodium estimates was done for 10,335 patients. The number of patients with hyponatremia less than 130 mmol/L was about 1984 patients (19.19%). The number of patients with severe hyponatremia with serum sodium less than 120 mmol/L was 754 patients (7.3%). Mean age of patients admitted was 62.46 years. Youngest age was 18 years old. The oldest age was 88 years.

67 patients had some neurological symptoms of hyponatremia due to cerebral edema like nausea, vomiting, giddiness and altered sensorium. 14 patients presented with seizures. SIADH was the most common cause of hyponatremia in the present study representing 39% of cases. Drugs, especially diuretics, are a common cause of hyponatremia.

The lower the sodium value, the higher the incidence of symptomatic hyponatremia. Ninety patients improved, eight patients died and two patients deteriorated / discharged against medical advice.

The incidence of symptomatic hyponatremia is more with lowering sodium levels which is statistically significant ( $p < 0.001$ ). All patients with severe hyponatremia had symptoms.

## **Discussion**

The incidence was 6.9% in the study done by Hochman<sup>9</sup>. It was the most commonly ordered investigation among inpatients. During the period of the present study serum sodium was done in 67% of admitted patients having incidence of hyponatremia was (19.2%).

The present study included patients with serum sodium less than 130 mEq/L. There were 57 males and 43 females with ratio of 1.32:1. In general, in our hospital population, there were more males than females. Hence,

this slight increase in males was not very significant. This ratio was more or less constant in all age groups. But no conclusion was made on this difference in incidence.

In the present study, hyponatremia was seen more commonly in patients above 45 years than in younger patients. The ratio between numbers of patients above 45 years in comparison of below 45 years 8.09:1. Similar trend was also observed by Hochman<sup>9</sup> Vurgese in their study. The mean age in the present study was 62.46 years which was comparable to studies by Anderson<sup>10</sup> where the mean age was 58 years and study done by Vuurgese<sup>9</sup> where the mean age was  $57.05 + 2SD$ .

The various factors responsible for hyponatremia in elderly are decreased glomerular filtration rate, impaired ability of kidney to conserve sodium, increased release of arginine vasopressin to a given osmotic stimulus, various drugs taken by them, decreasing appetite and concomitant illnesses.

Based on serum sodium concentration hyponatremia was classified as mild, moderate and severe with serum sodium 121 – 130mEq/L, 111 – 120mEq/L and less than or equal to 110mEq/L respectively. The degree of hyponatremia could more or less predict the symptoms of hyponatremia. Some patients with serum sodium greater than 120mEq/L had neurological symptoms like drowsiness. But the patients with serum sodium less than or equal to 110mEq/L showed severe neurological symptoms like seizures and unconsciousness.

In the study by Hochman<sup>9</sup> et al, there were 39% patients with mild hyponatremia and rest 61% had moderate to severe hyponatremia. The presence or absence of symptoms and severity was more related to rapidity of fall of serum sodium rather than the amount of fall. The elderly patients with chronic hyponatremia can tolerate

lower levels of hyponatremia without any symptoms. Hence, we concluded that the more severe the hyponatremia and the rapid fall of sodium, the more severe are symptoms. While analyzing history, 33% patients were only symptomatic and 67% were with neurological symptoms.

In the study by Hochman et al<sup>9</sup> 43.4% patients were asymptomatic, 39.9% had mild symptoms and 16.7% patients had severe neurological symptoms like stupor and coma. The mean serum sodium for asymptomatic patients was 120.26 and symptomatic was 116.88mEq/L<sup>11-14</sup>.

Patients with euvoemia were more symptomatic and had more severe symptoms of hyponatremia compared to the other groups. The average serum sodium was 117mEq/L. Out of the total 67 symptomatic patients, 47 (70.14%) patients were having euvoemia, 7 (10.44%) patients had hypervolemia and 13 (19.40%) patients had hypovolemia.

On the whole, SIADH was the most common cause of hyponatremia in the present study representing 39% of cases. In other studies by Hochman<sup>9</sup>, SIADH represented 28.3% of cases, 34% in the study by Anderson<sup>10</sup> and 34.8% in the study by Vurgese<sup>15</sup>.

### Conclusion

Neurological symptoms are common in hyponatremia patients. SIADH was the most common cause of hyponatremia in the present study representing 39% of cases. Drugs, especially diuretics, are a common cause of hyponatremia. 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.

### References

1. Yeates KE, Singer M, Morton AR. Salt and Water: a

simple approach to hyponatremia. *CMAJ* 2004; 170(3): 365 – 9.

2. Gone NE, Kandemire N, Sen Y, Yordam N, Hyponatremia can be a presenting finding of multiple pituitary hormone deficiency in children: report of a case and review of literature. *Clin Pediatr* 2005; 44: 623 – 628.

3. Bhananker SM, Paek R, Vavilala MS. Water intoxication and symptomatic hyponatremia after outpatient surgery. *Anesth Analg* 2004; 98: 1294 – 6.

4. Coenraad MJ, Meinders AE, Vandenbroucke JP, Frolich M, Taal JCW, Bolk JH. Causes of hyponatremia in the departments of internal medicine and neurosurgery. *European Journal of Internal Medicine* 2003; 14: 302 – 309.

5. Douglas I. Hyponatremia: Why it matters, how it presents, how we can manage it. *Cleveland Clinic Journal of Medicine* 2006; 73: S4 – S12.

6. Berl T. Treating hyponatremia; damned if we do and damned if we don't. *Kidney Int* 1990; 37(3): 1006 – 18.

7. Arinzon Z, Feldman J, Jarchowsky J, Fidelman Z, Krasnyansky I, Adunsky A comparative study of the syndrome of inappropriate antidiuretic hormone secretion in community-dwelling patients and nursing home residents. *Aging Clin Exp Res* 2003; 15: 6 – 11.

8. Janicic N, Verbalis JG. Evaluation and management of hypo-osmolality in hospitalized patients. *Endocrinol Metab Clin North Am* 2003; 32: 459 – 481.

9. Hochman I, Cabili S, Peer G. Hyponatremia in internal medicine ward patients: cause, treatment and prognosis. *Isr J Med Sci* 1989;25:73-6.

10. Anderson RJ, Chung HM, Kluge R, Schrier RW. Hyponatremia: a prospective analysis of its epidemiology and the pathogenetic role of vasopressin. *Ann Intern*

Med 1985; 102: 164 – 168.

11. Mulloy AL, Caruana RJ. Hyponatremia emergencies. Med Clin North Am 1995;79(1): 155–68.

12. Miller M, Morley JE, Rubenstein LZ. Hyponatremia in a nursing home population. J Am Geriatr Soc 1995; 43(12): 1410–3.

13. Misra SC, Mansharamani GG. Hyponatremia in elderly hospital in-patients. Br J Clin Pract 1989; 43(8): 295–6.

14. Goldenstein. Idiopathic SIADH possible to advancing age. Ann Intern Med 1983; 99: 185–8.

15. Vurgese TA, Radhakrishnan, Mapkar. Frequency and etiology of hyponatremia in adult hospitalised patients in medical wards of a general hospital in Kuwait. Kuwait medical journal 2006;38(3):211-213

### **Legend Figures**

Table 1:

Volume Status (n = 100)	Symptomatic	Asymptomatic	P value
Euvolemia	47	13	P<0.05
Hypervolemia	7	12	P = 0.46
Hypovolemia	13	8	P = 0.21

Symptoms – level of hyponatremia.

Table 2

Range (n=10)	Symptomatic	Asymptomatic	P value
<110	8	0	<0.001
110 – 120	38	16	<0.05
120 – 130	21	17	0.32