ORIGINAL ARTICLE

A Study of the Clinicoetiological Profile of Hyponatremia in Patients in a Tertiary Care Hospital

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Abstract

Background: Hyponatremia is a common and important electrolyte imbalance seen both in isolation and more commonly, as a complication of other medical illnesses. With a wide spectrum of presentations, the prognostic implications are grave and far-reaching if not addressed meticulously. Despite the knowledge of hyponatremia since the mid-20th century, data on the prevalence and clinical profile of hyponatremia are scarce, to say the least, from the Indian subcontinent. We took up this hospital-based observational study to explore the clinicoetiological profile of hyponatremia.

Results: Mean serum sodium level was 122.24 ± 6.10. Most of the patients had severe hyponatremia (63.3%). The most common cause of hyponatremia, as well as severe and euvolemic hyponatremia, was syndrome of inappropriate antidiuretic hormone secretion (SIADH) (21.9%). Most patients with SIADH had tubercular meningitis (TBM). The most common type of hyponatremia was hypovolemic hyponatremia (42.4%), of which sepsis was the most common cause.

Conclusion: Further prospective studies are required as hyponatremia remains incompletely understood in many basic areas because of its association with a plethora of underlying disease states, its causation by multiple etiologies with differing pathophysiological mechanisms, and marked differences in symptomatology and clinical outcomes based on the acuteness or chronicity of hyponatremia; also, optimal treatment strategies have not been well defined for these reasons.

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Introduction

Hyponatremia, defined as a serum sodium level of less than 135 mmol/L, is a common electrolyte abnormality in hospitalized patients.[1,2] Based on the serum osmolality, hyponatremia is typed into pseudo-/normo-osmolal/isotonic, translocational/hyperosmolal/hypertonic and true/hypo-osmolal/hypotonic hyponatremia. True hyponatremia is further classified as euvolemic, hypervolemic, and hypovolemic.[3–5] As per available literature, most of the patients have euvolemia (59.5%), followed by hypervolemia (23.4%) and hypovolemia (17%). Syndrome of inappropriate antidiuretic hormone secretion (SIADH) is widely assumed to be the most common cause of euvolemic hyponatremia, but sometimes it may be overdiagnosed, particularly in dehydrated elderly patients.[6–8]

The clinical presentation of hyponatremia has a wide spectrum, varying from asymptomatic patients to those having seizures and coma.[9] Unless addressed meticulously, the prognostic implications are grave and far-reaching.[10] Timely diagnosis and treatment are the keys to improved overall health status and reduced hospital stay. Determining the cause of hyponatremia is challenging in clinical practice. The present study was undertaken to assess the clinical profile and etiology of clinically significant hyponatremia to aid in the treatment of patients and prevent further morbidity.

Methodology

It was a hospital-based prospective type of observational study conducted over 2 years in 210 patients with hyponatremia (Na < 135 mEq/L) more than 18 years of age, admitted in internal medicine wards and Medical ICUs of SMS Medical College, Jaipur, after approval by the Institutional Review Board of SMS Medical College, Jaipur. Patients with hyperlipidemia, hyperglycemia, and paraproteinemia, as well as those receiving mannitol, were excluded. Serum osmolality was calculated for every patient, and based on the history, physical examination, and laboratory parameters, they were classified into hypervolemic, hypovolemic, and euvolemic. Clinically euvolemic patients were evaluated for SIADH according to Bartter and Schwartz criteria. Patients were followed up for the duration of their hospital stay in medical wards and ICUs. The etiology, clinical features, and prognosis of a given patient were studied in the context of their association with serum sodium levels.

Results

The mean age of our study population was 52.75 ± 16.97 years. The 51–70 years age group had the highest prevalence (41.9%) of hyponatremia. 28.57% of the patients in the 51–70 years age group had severe hyponatremia (Table 1). 73.3% and 33.8% of the study population were males and smokers, respectively. The mean sodium level was 122.24 ± 6.10. Most of the patients had severe hyponatremia (63.3%). Moderate and mild hyponatremia were present in 30% and 6.2% of the patients, respectively. In our study, as the age increased, the severity of hyponatremia increased.

Hypovolemic hyponatremia, seen in 42.4% of the patients, was the most common type of hyponatremia (Table 2). Lethargy was the most common presenting complaint, seen in 32.8% of the patients, followed by nausea and vomiting, seen in 31.4% of the patients. Under the severe category, drowsiness, vomiting, and seizures were the most common complaints. Central nervous system (CNS) manifestations were more common in the severe category (Table 3).

Hypertension, seen in 22.4% of patients, was the most common comorbidity associated with hyponatremia. The single most common cause of hyponatremia and severe hyponatremia in our study was SIADH, seen in 21.9% and 27.06% of the patients, respectively (Table 4). Tubercular meningitis (TBM) was found in 44.4% of the patients, making it the most common cause of SIADH, followed by drug-induced SIADH (13.8%). SIADH was also found to be the most common cause of euvolemic hyponatremia. Sepsis followed by acute gastroenteritis was the commonest cause of hypovolemic hyponatremia. In our study, 46.19% of the patients were treated with water restriction, making it the most common

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Table 1: Distribution of age of the study population according to serum sodium levels

Severity		*Age distribution (years)*			
		10–30	*31–50*	*51–70*	*71–90*
Mild (130–134 mEq/L)	No. of patients	5	1	6	0
	Percentage	2.38	0.48	2.86	0.00
Moderate (125–129 mEq/L)	No. of patients	4	28	21	11
	Percentage	1.90	13.33	10.00	5.24
Severe (<125 mEq/L)	No. of patients	16	43	60	14
	Percentage	7.62	20.48	28.57	6.67

Table 2: Classification of hyponatremia based on volume status

Volume status	*No. of patients*	*Percentage*
Euvolemic	50	23.8
Hypovolemic	89	42.4
Hypervolemic	71	33.8
Total	210	100

Table 3: Correlation of symptoms and severity of hyponatremia

Presenting complaints	*Mild (130–134 mEq/L)*		*Moderate (125–129 mEq/L)*		*Severe (<125 mEq/L)*	
	No. of patients	*Percentage*	*No. of patients*	*Percentage*	*No. of patients*	*Percentage*
Loss of consciousness	0	0.0	0	0.0	8	3.8
Lethargy	6	2.9	32	15.2	31	14.8
Drowsiness	1	0.5	6	2.9	45	21.4
Confusion	0	0.0	5	2.4	20	9.5
Headache	3	1.4	4	1.9	18	8.6
Seizure	0	0.0	0	0.0	32	15.2
Nausea	5	2.4	31	14.8	30	14.3
Vomiting	5	2.4	9	4.3	42	20.0
Diarrhea	6	2.9	0	0.0	4	1.9
Others	1	0.5	21	10.0	15	7.1

Table 4: Distribution of patients according to etiology of hyponatremia

Single etiology of hyponatremia	*No. of patients*	*Percentage*
Syndrome of inappropriate antidiuretic hormone secretion	46	21.9
Sepsis	39	18.57
Chronic liver disease	28	13.33
Chronic kidney disease	25	11.9
Congestive heart failure	22	10.48
Diuretics	20	9.52
Acute gastroenteritis	17	8.1
Severe dengue	15	7.14
Scrub typhus	10	4.76
Bacterial meningitis	7	3.33
Hypothyroidism	6	2.86

Table 5: Outcome of the study population in different categories of hyponatremia

	Mild (130–134 mEq/L)		*Moderate (125–129 mEq/L)*		*Severe (<125 mEq/L)*	
Outcome	*No. of patients*	*Percentage*	*No. of patients*	*Percentage*	*No. of patients*	*Percentage*
Death	2	0.9	6	2.8	21	10
Survival	11	5.2	58	27.6	112	53.3

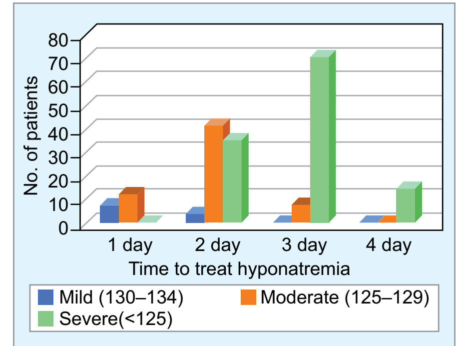

Fig. 1: Variation in time to correct hyponatremia with the severity of hyponatremia

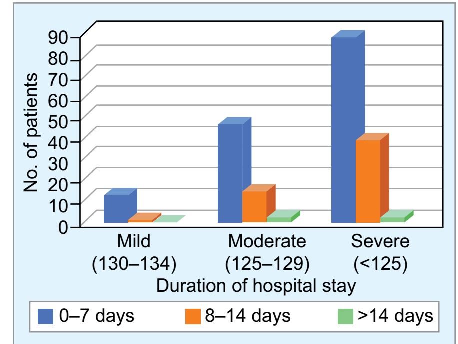

Fig. 2: Duration of hospital stay with differing severity of hyponatremia

modality for correcting hyponatremia. 3% saline was used in 36 patients, all of whom had severe hyponatremia, constituting 17.14% of the patients in the severe category. 30% of the patients in the severe category were treated with water restriction, making it the most common treatment modality used in this category. The mean time to correct hyponatremia was 2.45 ± 0.79 days. It took 3 days to correct hyponatremia in most of the patients in the severe category, while hyponatremia was corrected in 2 and 1 days in most patients in the moderate and mild categories, respectively (Fig. 1). 13.8% of the patients died in our study. Most of the deaths were seen in the severe category (Table 5). The mean duration of hospital stay was 6.8 ± 3.15 days. The majority of patients stayed in the hospital for 7 days or less, in all categories (Fig. 2).

Discussion

Hyponatremia is a common electrolyte abnormality seen in various settings and various degrees in hospitalized adult patients. Patients are more prone to develop hyponatremia with an increase in age due to the development of comorbidities such as hypertension, diabetes mellitus, cardiac failure/cardiogenic shock, chronic kidney disease (CKD), liver cirrhosis, chronic lung

pathologies, diseases of the CNS, and use of drugs such as diuretics, antidepressants, and anticonvulsants, which are known to cause or aggravate hyponatremia.

We found no significant relation between the severity of hyponatremia and age in the age group of 10–30 years. A significant relation was observed between age and severity of hyponatremia in the age groups of 31–50 years, 51–70 years and 71–90 years, with a p-value < 0.05. In our study, as the age increased, the severity of hyponatremia increased. We correlated the presenting complaints with the severity of hyponatremia. Lethargy (32.9%) was the most common symptom. Most patients with a serum sodium of less than 125 mEq/L had neurological symptoms, such as drowsiness. 13.8% of the patients died in the study. The majority of deaths were seen in the severe category. There was a statistically significant association between death and the severity of hyponatremia ($p < 0.05$). Other studies reported a mortality of 9–30%,[11,12] with no statistical difference between the serum sodium of those who survived and those who died. Thus, mortality was related more to the primary cause of illness. Their data supported that hyponatremia appears to be a marker of severity of underlying disease, which carries a poor prognosis, and the association of hyponatremia with outcome was probably not directly related.[13]

There are some limitations in our study. 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 the assessment of subsequent morbidity and quality of life in patients who were discharged. As this was a single-arm, monocentric study with a limited sample size, it is difficult to conclude a precise clinicoetiological profile and its association with different characteristics, and hence, multicenter studies having two arms with a control group in a large population are suggested for further evaluation.

Conclusion

In conclusion, this study highlights hyponatremia as a prevalent and age-related electrolyte disorder in hospitalized adults, with increasing severity and neurological symptoms correlating to older age groups and poorer outcomes, including a 13.8% mortality rate predominantly in severe cases. While hyponatremia serves as a marker of underlying disease severity rather than a direct prognostic factor, its association with lethargy and drowsiness underscores the need for prompt electrolyte correction and comorbidity management.

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