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"CLINICAL PROFILE, MANAGEMENT AND OUTCOME OF PATIENTS WITH HYPONATREMIA PRESENTED TO TERTIARY CARE HOSPITAL"

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Dr. Mahmadisha Khatri Third year Resident, DNB Family medicine, Sterling Hospital, Ahmedabad

Dr. Sudhendu Patel Head Of Department, Department of DNB Family Medicine, Sterling Hospital, Ahmedabad

Dr. Vidhi Shah Assistant Professor, Department of Family Medicine, Sterling Hospital Ahmedabad

ABSTRACT

Background: Hyponatremia is the most common electrolyte abnormality in hospitalized patients and is frequently encountered in the intensive care setting. In the present study, we aim to assess the causes and clinical outcomes of patients admitted to our inpatient ward and intensive care unit (ICUs) with hyponatremia. **Methods:** This prospective observation study was conducted in the Department of Family Medicine at a tertiary care hospital in Ahmedabad. In this study, all the patients aged more than 18 years, irrespective of gender admitted to our department and diagnosed with hyponatremia (serum sodium < 135 mmol/L) were included. **Results:** The most common presenting complaint was abnormal behavior (41.3%), 21.7% were drowsy, Syndrome of inappropriate antidiuretic hormone (SIADH) was the most common cause, 44.1% had severe hyponatremia, 44.1% were hypervolemic, and 23.1% stayed in ICU for more than 5 days. Mortality rate was 20.2% and was not associated with severity of hyponatremia, though it was high in patients with severe hyponatremia. Older age group, female gender, past medical history of hypertension, unconscious state at presentation, presenting complaints of abnormal behavior, edema on examination and ICU stay more than 5 days was significantly associated with mortality among hyponatremia patients. **Conclusion:** Careful history and physical examination should be conducted so as to determine the time of onset and severity of symptoms. Patients with severe hyponatremia should be monitored closely in ICU.

KEYWORDS

Hyponatremia; Mortality; Intensive Care Unit; Prognosis.

INTRODUCTION:

Hyponatremia is the most common electrolyte abnormality seen in hospital admissions worldwide. It is defined as serum sodium level <135 mEq/L. The proportion of hyponatremia is even higher in the ICU setting. The serum sodium level is determined by the relationship of total body exchangeable sodium with total body water. Hyponatremia develops due to primary sodium deficit, primary water excess, or a combination of these conditions. Diagnosis requires recognition of sometimes subtle neurological symptoms, evaluation of volume status, and analysis of serum and urine sodium levels and osmolality. Appropriate treatment rendered in a timely manner can result in complete recovery in many cases. Hyponatremia that develops after admission to the ICU can increase mortality. In India, hyponatremia is the most common electrolyte disorder ranging from 5.2 to 28.8% in hospitalized patients.

The symptoms of acute hypotonic hyponatremia, present for less than 48 hours, are attributable to edema of brain cells. Symptoms in mild hyponatremia are nausea, vomiting, and headache. As sodium levels decrease, symptoms include altered mental status, seizures, obtundation, coma, and death The clinical manifestations of chronic hyponatremia, or hyponatremia, that exists for at least 48 hours, are disorientation, lethargy, dysarthria, gait disturbances, and rarely seizure. Mild chronic hyponatremia can be asymptomatic due to osmotic adaptation that reduces edema in brain cells over time; however, gait and attention impairments along with an increased incidence of falls may be subtle manifestations. Correction of chronic hyponatremia can lead to osmotic demyelination syndrome (ODS). This occurs most commonly with severe hyponatremia (serum sodium <120 mEq/L) when serum sodium has been corrected too quickly.

It is important to rule out pseudohyponatremia due to hyperglycemia and hyperlipidemia. Urine sodium, serum and urine electrolytes are important basic investigations to arrive at the aetiology of hyponatremia. Hypovolemic hyponatremia is associated with clinical symptoms and signs of volume depletion. Hyponatremia without signs of volume depletion or overload is classified as euvolemic hyponatremia. Patients with clinically detected increased ECF volume are classified as hypervolemic hyponatremia. The/treatment of hyponatremia depends on the duration of hyponatremia and volume status of the patients. There are numerous studies which have tried to establish the common causes of hyponatremia among hospitalized patients. However, very few have assessed the factors associated with clinical disposition and final outcomes of such patients. Indian scientific literature is short of studies on evaluation of the clinical impact of association of the two conditions. In light of this, we aimed to study the common causes, clinical features, treatments given and outcomes of patients diagnosed and admitted with hyponatremia in tertiary care hospital.

AIMS & OBJECTIVES:

To study the common causes, clinical features, treatments given and outcomes of patients diagnosed and admitted with hyponatremia in tertiary care hospital. To determine the mortality and length of hospital stay in patients who had hyponatremia at the time of admission.

Review Of Literature:

In one of the largest comprehensive studies, Hawkins evaluated 120,137 Singapore patients for the prevalence of hyponatremia in both the hospital and community. Within the community, he noted hyponatremia in about 4–7 % of the patients presenting to a primary care clinic. A similar number of hyponatremic patients are seen in the emergency department (ED), but one-third of these patients (1.4 % of total) have a plasma sodium <125 mEq/L which is ten times higher than what Hawkins reported in the community. This higher frequency of moderate hyponatremia correlates with a sicker population as two-thirds of the patients in the ED have hypovolemic hyponatremia due to gastrointestinal losses.

In the hospital setting, hyponatremia is more prevalent and severe. A number of studies show that about 30–40 % of all hospitalized patients have some degree of mild hyponatremia. These studies suggest that mild hyponatremia is common in hospitalized patients, but there is a question of the actual incidence, as sodium measurements are missing in as many as half of the patients that may be at risk for developing hyponatremia.

Even with this discrepancy in sodium measurements, moderate hyponatremia is encountered in 2–6 % of patients depending on the cut-off level. About half of these patients have hyponatremia on admission while the other half developed it during their hospitalization. When it comes to severe hyponatremia, Hawkins noted that 1.2 % of all patients had serum sodium <116 mmol/L while Anderson et al. and others have reported a plasma sodium <120 mEq/L in about 0.5 % of the patients on admission. Although this prevalence is low, again, it is about ten times higher than what is seen in the community.

Two large population-based studies evaluated patients aged 55 and older and showed a frequency of mild hyponatremia of less than 10%. There was a higher frequency of diuretic use in the hyponatremic

groups compared to the controls. Miller et al looked at hyponatremia in a nursing home population, aged 60 years and older, via a retrospective record review and prospective study.

METHODS:

Study Design: Prospective observational study.
Study Duration: One year.
Study Site: Sterling hospital, Ahmedabad.
Study Population: Patients with low serum sodium.
Sample Size: 143 consecutive eligible patients

Inclusion Criteria:

1) Patients with serum sodium level < 135mEq/L at the time of admission either in the indoor ward or ICU of our hospital.
2) Patients with age > 18 years and giving a valid consent.

Exclusion Criteria:

1) Patients less than 18 years of age.
2) Pregnant patients

Statistical Analysis:

The analysis included profiling of patients on different demographic, laboratory and clinical parameters. Quantitative data were described as means and standard deviations and qualitative data were described as frequency distribution. Based on the final outcome, patient sample was divided as died and discharged. Comparison of various patient variables between patients who died and who were discharged were done using statistical analysis. Quantitative data were analyzed using student's t test for normal continuous data or Mann-Whitney test for not normal continuous data. Categorical data were compared between died and discharged patients using the $\chi 2$ test or Fisher's exact test. A two-sided p-value less than 0.05 was considered statistically significant. All analysis were done using SPSS software, version 24.0.

RESULT:

Of the 7475 patients admitted during the study period, 736 (9.84%) had hyponatremia. Of these, 143 patients gave consent and were included in the study. 29 patients of these patients (20.2%) expired.

Table 1. Causes Of Hyponatremia

Cause of Hyponatremia	Frequency	Percentage
SIADH	93	65
Renal failure	16	11.2
Severe sepsis	12	8.4
Trauma	10	7.0
Hypothyroidism	5	3.5
Thiazide diuretics	4	2.8
Liver failure	3	2.1
Total	143	100

Table 2. Causes Of Siadh

Cause of SIADH	Frequency	Percent
Infection	55	38.5
Cerebrovascular disease	31	21.7
Stress	4	2.8
Cancer (SCC of lung, pancreatic cancer)	3	2.1
Total	93	100

Table 3. Correlation Of Patient Outcome With Various Factors

	PATIENT OUTCOME		
	DEATH	DISCHARGE	TOTAL
AGE GROUP			
Up to 40	5 (17.20%)	17 (14.90%)	22 (15.40%)
41 to 60	0 (0.00%)	41 (36.00%)	41 (28.70%)
More than 60	24 (82.80%)	56 (49.10%)	80 (55.90%)
Total	29(100.00%)	114 (100.00%)	143(100.00%)
GENDER			
Female	24(82.80%)	19(16.17%)	43(30.1%)
Male	5(17.2%)	95(83.3%)	100(69.9%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
PAST MEDICAL HISTORY			
Diabetes mellitus	22(75.9%)	72(63.20%)	94(65.70%)
Hypertension	16(55.20%)	28(24.60%)	44(30.82%)
Liver disease	0 (0.00%)	19(16.70%)	19(13.30%)
Hypothyroidism	3(10.30%)	3(2.60%)	6 (4.20%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
LEVEL OF CONSCIOUSNESS			
Conscious	12 (41.40%)	93(81.60%)	10573.41%)
Drowsy	11(37.90%)	20(17.50%)	31(21.70%)
Unconscious	6(20.70%)	1(0.90%)	7(4.90%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
VOLUME STATUS			
Euvolemic	7(24.10%)	36(31.60%)	43(30.10%)
Hypervolemic	17(58.60%)	46(40.40%)	63(44.10%)
Hypovolemic	5(17.20%)	32(28.10%)	37(25.90%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
SEVERITY OF HYPONATREMIA			
Mild	3(10.30%)	18(15.80%)	21(14.70%)
Moderate	11(37.90%)	49(42.10%)	59(41.30%)
Severe	15(51.70%)	48(42.10%)	63(44.10%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
PRESENTING COMPLAINTS			
Lethargy	0(0.00%)	30(26.30%)	30(21.00%)
Abnormal behaviour	18(62.10%)	41(36.00%)	59(41.30%)
Postural dizziness	11(37.90%)	21(18.40%)	32(22.40%)
Seizure	4(13.80%)	0(0.00%)	4(2.80%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
EXAMINATION FINDINGS			
Oedema	9(31.00%)	9(7.90%)	18(12.60%)
Dehydration	5(17.20%)	29(25.40%)	34(23.80%)
Shock	0(0.00%)	5(4.40%)	5(3.50%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
SERUM CREATININE (mg/dl)			
Less than 1	13(44.80%)	44(38.60%)	57(39.90%)
1 to 2	9(31.00%)	42(36.80%)	51(35.70%)
More than 2	7(24.10%)	28(24.60%)	35(24.50%)
Total	29(100.00%)	114(100.00%)	143(100.00%)
TREATMENT GIVEN			
3% saline	6(40.00%)	20(41.67%)	26(41.27%)
Diuretics	0(0.00%)	4(8.33%)	4(6.35%)
Fluid restriction	3(20.00%)	3(6.25%)	6(9.52%)
Normal saline	3(20.00%)	13(27.08%)	16(25.40%)
Steroids	2(13.33%)	2(4.17%)	4(6.35%)
Vaptans	1(6.67%)	6(12.50%)	7(11.11%)
Total	15(100.00%)	48(100.00%)	63(100.00%)
LENGTH OF ICU STAY			
More than 5 days	25(86.20%)	8(7.00%)	33(23.10%)
Up to 5 days	4(13.80%)	106(93.00%)	110(76.90%)
Total	29(100.00%)	114(100.00%)	143(100.00%)

DISCUSSION:

In this study, 20.2% (29/143) of the patients admitted with hyponatremia expired. It was observed that 82.8% of the patients who died were aged more than 60 years., while 49.1% of the patients who were discharged were aged more than 60 years. It was observed that past medical history of hypertension was significantly more common among patients who died as compared to those who were discharged. The most common cause of hyponatremia was SIADH in our study (65%). Next most common cause was renal failure (11.2%), severe sepsis (8.4%), trauma (7%), hypothyroidism (3.5%), thiazide diuretics (2.8%), and liver failure in 2.1%. SIADH was due to infection in 38.5%, cerebrovascular disease in 21.7% stress in 2.8% and cancer in 2.1%. We observed that 14.7% had mild hyponatremia, 41.3% had moderate hyponatremia and 44.1% had severe hyponatremia. The severity of hyponatremia was not found to be significantly associated with mortality among the patients (p value = 0.59). In our study sample, 30.1% were euvolemic, 44.1% were hypervolemic and 25.9% were hypovolemic.

We did not observe a significant association between volume status and mortality among the patients. We observed that among patients with severe hyponatremia (n=63), 15 died. Among those who died, 40% were treated with 3% saline, 20% with fluid restriction, 20% with normal saline, 13.3% with steroids and 6.6% with vaptans. We observed no significant association between treatment given and final outcome of the patients. We observed that 23.1% had ICU stay for more than 5 days and rest stayed in ICU for up to 5 days. It was

observed that 86.2% of the expired patients stayed in ICU for more than 5 days, which was significantly more than that among discharged patients.

CONCLUSION:

The most common presenting complaint of our patients was abnormal behavior, and the most common cause of hyponatremia was SIADH. Mortality rate was 20.2% and was not associated with severity of hyponatremia, though it was high in patients with severe hyponatremia. Older age group, female gender, past medical history of hypertension, unconscious state at presentation, presenting complaints of abnormal behavior, edema on examination and ICU stay more than 5 days was significantly associated with mortality among hyponatremia patients.

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