



CLINICAL AND ETIOLOGICAL STUDY OF HYPONATREMIA IN PATIENTS ADMITTED IN RESPIRATORY INTENSIVE CARE UNIT IN A TERTIARY CARE HOSPITAL

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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 evaluate the causes and clinical presentation of hyponatremia in patients admitted in Respiratory Intensive Care unit. Material and methods: This study was conducted on 100 patients admitted in respiratory Intensive Care Unit of tertiary care from jan-sept, 2022. Patients older than 14 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 61% were male, Out of all patients 80% were symptomatic, out of which altered sensorium was the commonest symptom(40%). Most common cause was SIADH (52%) and most common symptom was altered sensorium in 40% of patients. Severe hyponatremia was associated with upto 63% of mortality while mild cases had 0.8%. Conclusion: Hyponatremia is commonly encountered electrolyte imbalance in respiratory ICU patients mostly in temperate countries like India. Most common cause being SIADH followed by salt loosing nephropathy and CCF. It is important to diagnose and treat hyponatremia early as it has direct association with mortality.

KEYWORDS: Hyponatremia, Hypovolemia, Coma, Electrolytes, Diuretics.

INTRODUCTION

Sodium related disorders (both hyponatremia and hypernatremia) are extremely common and are associated with considerable morbidity and mortality.^[1] Despite the awareness on hyponatremia since long time, this common disorder remains in enigma due to its association with a plethora of underlying disease states and its multiple etiologies with different pathophysiological mechanisms.^[2] Hyponatremia (plasma sodium <135 mEq/L), occurs primarily due to imbalance in water homeostasis, antidiuretic hormone (ADH) regulation, and renal handling of filtered sodium. Syndrome of inappropriate ADH secretion (SIADH), one of the commonest causes of hyponatremia, is associated with many clinical conditions, like neoplasia, pneumonitis, sepsis, central nervous system (CNS) disorders, drugs and other pulmonary diseases.^[3] Tuberculosis (TB), one of the common illnesses in developing countries like India, can present with various clinical manifestations including nonspecific symptoms mechanisms such as local invasion to the adrenal gland (leading to adrenal insufficiency), local invasion of hypothalamus or pituitary gland, tubercular meningitis,

and inappropriate ADH secretion through pulmonary infections.

Timely diagnosis and treatment are the key to improved neurological status and reduced hospital stay. Determining the cause of hyponatremia is challenging in clinical practice.

The clinical presentation of severe hyponatremia ranges from mild, nonspecific symptoms, such as nausea, headache, and lethargy, to severe neurological symptoms such as seizure and coma. Various studies in literature are available for hyponatremia in admitted patients but data on clinical presentation and etiology are scarce in respiratory ICU settings, especially in those patients who develop moderate to severe hyponatremia. Management of hyponatremia depends on chiefly duration of hyponatremia and volume status of patients.

AIMS AND OBJECTIVES

To evaluate the causes and clinical presentation of hyponatremia in patients admitted in Respiratory Intensive Care unit.

MATERIAL AND METHODS

It is an observational and descriptive study.

Duration: December/2021-September/2022.

Sample size=100

Inclusion criteria

Patients >14 yrs with serum sodium <135.

Exclusion criteria

Patient not willing for study.

Patient with pseudohyponatremia, hyperosmolar hyponatremia

History: detailed history for onset, duration and progression of symptoms of hyponatremia, predisposing factors and pre-existing illness (like diabetes mellitus/hypertensive / cardiac diseases), drug history and other causes of hyponatremia.

Physical examination to look for clinical signs of hyponatremia and fluid status of patient. Routine lab investigation such as Hb, TLC, DLC, urine and serum osmolality along with sodium, serum protein, albumin, serum creatinine, bilirubin, liver enzymes in all patients. Urine routine/microscopy, thyroid profile as and when indicated.

Radiology ECG, chest x-ray will be done in all patients, while computed tomography, magnetic resonance imaging, 2D-Echo and ultrasonography as and when indicated

Approach to the patient

First, based on serum osmolality patients

Pseudo hyponatremia: (normal serum osmolality, 275-295 mOsm/kg) in high content of plasma proteins and lipid proteins

Hyperosmolar hyponatremia: (plasma osmolality >295 mOsm/kg) in hyperglycemia, mannitol administration, etc.

Patients with true hyponatremia: (Low plasma osmolality <275 mOsm/kg)

It is only these patients true hyponatremia i.e. low plasma osmolality that will be further evaluated.

Based on serum sodium level, these patients will be divided into 3 categories

- Mild hyponatremia (serum sodium 131-135mEq/L)
- Moderate hyponatremia (serum sodium 121-130mEq/L)
- Severe hyponatremia (serum sodium < 120 mEq/L).

Simultaneously patient will also be evaluated for volume and hydration status of the patient categorized on basis of clinical status and other parameters (like urine sodium,

serum lactates and IVC diameter into euvolumic, hypovolumic, and hypervolumic).

Clinical profile based on symptomatic presentation during hyponatremia

SYMPTOMS and signs will be considered under mild/moderate /severe category in terms of whether patient is asymptomatic, altered sensorium, seizure headache, arrhythmia, nausea vomiting, fatigue, or any other symptoms. We will also consider mortality occurrence in our respiratory ICU and evaluate for prevalence based on serum sodium level

Sensorium changes comprised acute confusional states, memory disturbances, stupor, delirium and/or coma in the absence of dementia, psychiatric illness and substance abuse.

Etiological classification to find out the underlying cause of hyponatremia, will be evaluated based on serum osmolality, urine osmolality, volume status and other test as appropriate based on the clinical profile of the patient.

SIADH (one of the commonest etiology) will be defined by the classic criteria by Bartter and Schwartz

RESULTS

Out of 119 patients in our study 12 patients were pseudohyponatremia and 7 were having higher osmolality, hence the study was carried out in 100 remaining patients with true hyponatremia (<275mosm/l). In our study Hyponatremia was more common in males than in females(61 vs 39).

Majority of the patients(60) had hyponatremia in range 120-130 (moderate) 13 had mild hyponatremia(130-135meq/l), while 27 had severe hyponatremia (<120meq/l). In volume status most common type of hyponatremia in this study was euvolemic (56), followed by hypovolemic (26) and hypervolemic (18).

Mortality was more in patients with severe form of hyponatremia (65%) compared to moderate(25%) and mild(0.8%).

SIADH (52) was the single most important etiology of hyponatremia. Diuretics and salt wasting nephropathy(15), were also significant causes of hyponatremia in this study. Other causes of hyponatremia were CCF (12), cerebral salt wasting (9), gastro- Intestinal loss(6), Cirrhosis of liver(4) and endocrinal (2), as shown in Table 1.

ETIOLOGY	PERCENTAGE
Syndrome of Inappropriate ADH secretion	52
Salt Loosing Nephropathy	15
Congstive Cardiac Failure	12
Cerebral Salt Wasting	9
GI-loss	6
Chronic Liver Disease	4
Endocrinal	2

Altered sensorium (46) was the single most important symptom of hyponatremia followed by vomiting (10), and seizures(9) were also significant symptoms in this study. However one fifth of patients of hyponatremia had no symptoms of hyponatremia.

DISCUSSION

Hyponatremia i.e. (Serum sodium<135) is a very common entity in medical wards and intensive care units. In our study we mainly wanted to see the clinical and etiological difference in study of respiratory critically ill patients than other ICU and ward patients. In our study males were 61 and 39 females which is similar to Rai et al.^[7], Anand Sankar et al.^[10] where it was around 65% males.

Most of the patients in our study had moderate type of

hyponatremia i.e. (120-130mmol/l) which was 60% of total patients with 27% having less than 120mmol/l while rest of patients were of category 1 i.e. 130-135mmol/l, which was similar to Oommen et al.^[7] although it varied from other studies such as Rai et al.^[8] who had maximum patients with sodium in severe hyponatremia while Patni et al.^[10] had more cases in mild-moderate range. We found that altered sensorium was the commonest clinical symptom in our study i.e. 46% followed by vomiting (10), seizures (12), as other clinical symptoms. However about 20% of patients were asymptomatic in our study, which is similar to Patni et al.^[10] Rai et al.^[8] Oommen et al.^[7] as shown in Table 2. The association between symptoms and serum sodium (Na+) was statistically insignificant with P-value of 0.5562 (P > 0.05) according to chi-square test with simulated p-value.

	Our Study	Patni et.al. ^[9]	Rai et.al. ^[7]	Nand Kr. et.al. ^[8]	Chaterjee et.al. ^[12]
Asymptomatic	20	19	38	20	48.2
Altered sensorium	46	51	43	50	43
Seizures	12	14	6	10	4.5
Vomiting	10	6	38	10	N.A
Others	22	10	7	10	N.A

This study constitutes Euvolumic hyponatremia as most common type i.e. (56) followed by hypovolemic (26) and hypervolemic (18), as shown in Table 3 this was similar to study by Nandakumar et al.^[9], study nearly half of patients (48.5%), had euvolemic hyponatremia. Less than half (39%) of the patients had hypovolemic

hyponatremia. Only one eighth (12.5%) of the patients had hypervolemic hyponatremia.^[8] Similarly Bhattacharjee et al.^[12] and Rai et al.^[8] also had euvolemic hyponatremia as most common type which is around 60%.

	Our study	Patni et.al. ^[10]	Rai et.al. ^[8]	Nand Kr. et.al. ^[7]	Chaterjee et.al. ^[13]
Euvolemic	56	49	71	48.5	50.7
Hypervolemic	18	15	27	12.5	26.9
Hypovolemic	26	36	2	39	22.4

As stated in most other studies done, SIADH (52) was the most common cause of hyponatremia in our study, though we had higher number of cases belonging to SIADH compared to other studies like Patni et al.^[10] Rai et al.^[8] who had 44% and 30% . the higher percent of cases in respiratory ICU may be accounted due to higher admissions patients with tubercular as well as non tubercular pneumonias compared to studies in other ICU other cases of SIADH includes lung cancer, sepsis, etc. we also had higher incidences of congestive cardiac failure(12) in our studies compared to others which can be attributed due to higher incidences of CCF presenting as respiratory symptoms. Other common causes were use

of diuretics and salt loosing nephropathy(15) followed by cerebral salt wasting(9). We also had lower number of cases of hyponatremia due to GI loss or CLD unlike Patni et al.^[10] and Rai^[8] et al.

The association of severity of hyponatremia with higher mortality can be established in this study ,which ranged from as high as 63% in severe hyponatremia to as low as 0.8% in patients with mild hyponatremia, however it was 25% in moderate hyponatremia

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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