

A Prospective Study on Hyponatremia in Intensive Care Unit (ICU) Patients

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Abstract:

Background: Hyponatremia is a commonly seen electrolyte disturbance in hospitalized patients and it affects 3.4% to 39.4% of patients. Hyponatremia can cause morbidity and mortality. The present study is undertaken to find the patients with hyponatremia in ICU admission and associated co-morbid conditions.

Materials and methods: This prospective study was conducted at Department of General Medicine, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bengaluru. A total of 70 patients with critically illness admitted in ICU were included with serum sodium levels <135mEq/L. The age of the patients range from 30 to 70 years of both sexes. Venous blood sample, 3mL was collected and serum sample separated. The separated serum sample used for the estimation of sodium by Vitros-350 dry chemistry fully autoanalyzer.

Results: In the present study, 46 (65.71%) were with severe hyponatremia, 18 (25.71%) were with moderate hyponatremia, 6 (8.51%) were with mild hyponatremia. IHD (11.42%), T2DM and HTN (15.71) were the most commonly associated co-morbid conditions. And 10% were with fever, HTN and seizures were observed in 8.57%, T2DM, general weakness, cirrhosis of liver, malaria, pneumonia, encephalopathy observed in 5.71%, sepsis was in 2.85% and other disease conditions in 8.51%.

Conclusion: The present study results indicates that, hyponatremia is a common electrolyte abnormality in ICU admissions. IHD, type 2 diabetes melitus and hypertension are the associated co-morbid conditions and it predisposed the patients to hyponatremia. Hyponatremia may increases the morbidity and mortality if not evaluated and treated correctly.

Keywords: Hyponatremia, Syndrome of inappropriate antidiuretic hormone secretion (SIADH), Type 2 Diabetes Mellitus, Hypertension

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I. Introduction

Hyponatremia is defined as reduced serum sodium levels <135 mEq/L, the most commonly seen electrolyte disturbance in hospitalized patients worldwide and occasionally seen in outpatients [1]. Approximately, 3.4 to 39.4% patients are affected by hyponatremia in hospital admissions and even it is higher in ICU setups [2]. Hyponatremia resulting from the impairment of solute-free water excretion is commonly accompanied by portal hypertension [3]. Hyponatremia as well as hypernatremia can cause morbidity and mortality depending on the severity of onset. Hyponatremia symptoms encompass a broad spectrum of clinical presentations, from cognitive deficiencies to life threatening neurologic symptoms attributable to cerebral edema and also nausea, headache, vomiting, malaise to lethargy, decreased level of consciousness, can also lead to seizures and then death (depending on magnitude and severity of onset). [4-6].

Studies have reported that, the commonest cause for hyponatremia is the syndrome of inappropriate antidiuretic hormone (SIADH) [7, 8]. However, diuretic therapy, congestive cardiac failure and hepatic diseases also causes this disease [9]. Treatment of hyponatremia depends on the duration of hyponatremia and volume status of patients. If hyponatremia, is not treated properly causes serious neurologic sequel and it is important to recognize because of potential morbidity and mortality [10]. In Indian population, few studies reported hyponatremia in ICU patients. Hence, the present study is undertaken to find the patients with hyponatremia in ICU admission and associated co-morbid conditions.

II. Materials And Methods

This prospective study was conducted at Department of General Medicine, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bengaluru, karnataka. After obtaining the Institutional Ethical Committee approval and informed consent, the study subjects were included. In this, a total of 70 patients with critically illness admitted in ICU were included with serum sodium levels <135mEq/L. The age of the patients range from 30 to 70 years of both sexes. Detailed clinical and physical examination was done for all the subjects. Under aseptic condition, 3mL venous blood sample was collected and waited for 30 minutes, centrifuged at 3000 rps and seperated the serum sample. The seperated serum sample used for the estimation of sodium by Vitros-350 dry chemistry fully autoanalyzer. Serum sodium levels <135 mEq/L considered as hyponatremia, 131-134mEq/L as mild hyponatremia, 126-130 mEq/L as moderate hyponatremia and ≤125 mEq/L as severe hyponatremia. The data was entered into microsoft office Excel. Results were expressed in percentage.

III. Results

In the present study, 70 patients with serum sodium levels <135 mEq/L were included. Among them 32 were males, 38 were females. Among them, 46 (65.71%) were with severe hyponatremia, 18 (25.71%) were with moderate hyponatremia, 6 (8.51%) were with mild hyponatremia as illustrated in table 1 and figure 1. Among the study subjects, 11 (15.71%) were with both T2DM and HTN, 8 (11.42%) were with IHD, 7 (10%) were with fever, HTN and seizures were observed in 6 (8.57%), T2DM, general weakness, cirrhosis of liver, malaria, pneumonia, encephalopathy observed in 4 (5.71%), sepsis was in 2 (2.85%) and other disease conditions in 6 (8.51%) as illustread in table 2 and figure 2. The symptoms observed were drowsiness, lethergy, decreased level of consciousness, irrealent talk, malaise, headache etc.

Table 1: Hyponatremia among the patients

| Hyponatremia | No of patients | Percentage (%) |
|----------------------|----------------|----------------|
| Mild hyponatremia | 06 | 8.51 |
| Moderte hyponatremia | 18 | 25.71 |
| Severe hyponatremia | 46 | 65.71 |
| Total | 70 | 100 |

Fig. 1: Hyponatremia among the patients in our study

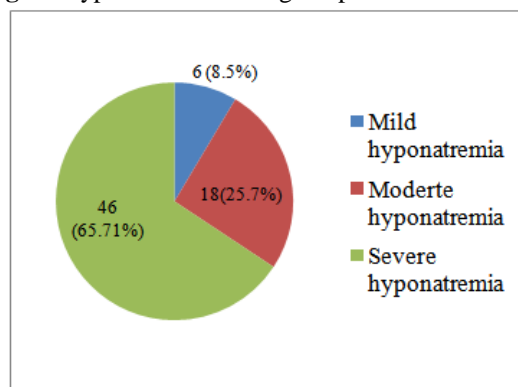
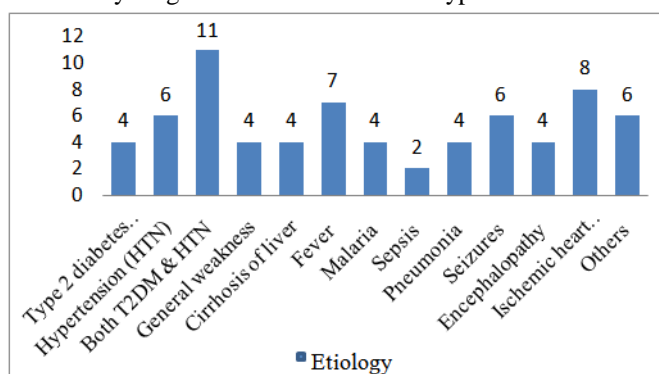


Table 2: Primary diagnosis in the patients

| Disease associated | Number of patients | Percentage (%) |
|---------------------------------|--------------------|----------------|
| Type 2 diabetes mellitus (T2DM) | 04 | 5.71 |
| Hypertension (HTN) | 06 | 8.57 |
| Both T2DM & HTN | 11 | 15.71 |
| General weakness | 04 | 5.71 |
| Cirrhosis of liver | 04 | 5.71 |
| Fever | 07 | 10 |
| Malaria | 04 | 5.71 |
| Sepsis | 02 | 2.85 |
| Pneumonia | 04 | 5.41 |
| Seizures | 06 | 8.57 |
| Encephalopathy | 04 | 5.71 |
| Ischemic heart disease (IHD) | 08 | 11.42 |
| Others | 06 | 8.57 |
| Total | 70 | 100 |

Fig. 2: Primary diagnosis/various causes of hyponatremia in our study



IV. Discussion

The present study is aimed to find the patients with hyponatremia in ICU admission and associated co-morbid conditions. Electrolyte abnormalities are commonly seen in hospitalized patients, hyponatremia is the most common electrolyte abnormality, because of the potential morbidity, mortality, economic impact on patient and health care [5]. The symptoms observed in hyponatremia patients were drowsiness, lethargy, decreased level of consciousness, irritable talk, malaise, headache etc. The female (38) patients were more than the male (32) patients in our study. Studies have reported that female gender is an important risk factor for development of severe complications. In a study by Clayton et al., reported that 60% of the cases were females in his prospective study [9]. The common causes of hyponatremia, like malaria, liver disease, type 2 diabetes mellitus, hypertension, general weakness, fever, sepsis, pneumonia, seizures, encephalopathy and IHD.

In the present study, Seizures observed only in 6% of the patients. Studies have reported that both aging and male gender confers protection against hyponatremia induced seizures, although the reasons are not known [11]. In the present study, most of the patients had multiple co-morbid condition of which hypertension and type 2 diabetes mellitus were most common. The osmotically active glucose in hyperglycemia can induce a fall in serum sodium levels by shifting water into extracellular cellular compartments from the intracellular compartments [12]. It has been reported that fall in serum sodium levels by 1.6 to 2.4 mmol/L for every 5 mmol/L rise in blood glucose levels [13]. Hyponatremic hypertensive syndrome is well known and its common association seen in patients with essential hypertension receiving diuretics. In this study, most of the patients were on thiazide or thiazide-potassium sparing diuretics and which are known to cause electrolyte imbalance [14].

Syndrome of inappropriate antidiuretic hormone secretion (SIADH), common cause of hyponatremia. Hyponatremia in SIADH, characterized by increase in total body water with decreased total body sodium [15]. In the present study, SIADH was the common cause. In a study by Clayton et al., reported that nearly half of the severe hyponatremia patients had SIADH. Laczi F. reported that SIADH was common cause of euvoletic hyponatremia in their Hungary study [16].

V. Conclusion

The present study results indicate that, hyponatremia is a common electrolyte abnormality in ICU admissions and is more prevalent in female patients. IHD, type 2 diabetes mellitus and hypertension as the associated pre-existing co-morbid conditions in majority of the patients and it predisposed the patients to hyponatremia. Hyponatremia may increase the morbidity and mortality if not evaluated and treated correctly. The main limitation of the study is small sample size. Large prospective studies are recommended.

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