International Journal of Advances in Medicine
Chandregowda et al. Int J Adv Med. 2021 Mar;8(3):390-394
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: https://dx.doi.org/10.18203/2349-3933.ijam20210594

Original Research Article

Study of clinical profile of hyponatremia in elderly patients admitted to medical wards at Mandya institute of medical sciences, Mandya

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Received: 09 December 2020
Revised: 14 February 2021
Accepted: 15 February 2021

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ABSTRACT

Background: Hyponatremia is the most common electrolyte disturbance in geriatric age group owing to impaired ability to maintain water and electrolyte homeostasis and it contributes to substantial morbidity and mortality. The etiology is multifactorial. Hyponatremia may be euvolemic, hypovolemic or hypervolemic with euvolemic being the most common and most of the patients presents with nonspecific symptoms. As aggressive or inappropriate therapy of hyponatraemia can be more harmful than the condition itself, clinicians should be familiar with the diagnosis and management of various forms of hyponatraemia in order to deliver precise management. The aim is to assess the clinical profile of hyponatremia in medically ill patients, its etiology and associated morbidity and mortality.
Methods: This study was a hospital based retrospective cross sectional observational study involving 150 patients aged ≥60 years presenting with signs and symptoms of hyponatremia confirmed by lab investigations (plasma sodium <135 meq/l) admitted to medical ward of tertiary care hospital of MIMS, Mandya from April 2019 to March 2020.
Results: The most frequent symptom of presentation was nausea and vomiting (38.66%) and most of the patients had a euvolemic hydration status.
Conclusions: The study thus focus the need for appropriate and timely diagnosis for reducing the associated morbidity and mortality associated with hyponatremia.

Keywords: Hyponatremia, Elderly osmolality, Euvolemia, SIADH

INTRODUCTION

Disorders of sodium and water metabolism are common in hospitalized patients and are occasionally encountered in outpatients. Both hyponatremia and hypernatremia can cause substantial morbidity and mortality. Hyponatremia is defined as a serum sodium concentration of <135 mEq per L.[1] Morbidity results from rapid correction of hyponatremia and high mortality rates usually occur in the context of hospitalized patients.[2] Hyponatremia is observed in almost 50% of geriatric admissions in most clinical settings. The prevalence of hyponatremia in elderly population is estimated to be between 18% and 22.3% by previous studies.[3] It was observed that many patients with hyponatremia had been advised low salt intake by the treating physician as a part of the treatment for hypertension or even diabetes, or were on liquid feeds.[4] Other causes of Hyponatremia are acute water intoxication, GI loss of sodium, SIADH, Medications (most common cause is inadvertent use of diuretics).[2] SIADH, a common cause of hyponatremia, is associated with many clinical conditions. These include neoplasia, central nervous system (CNS) disorders, drugs and pulmonary diseases.[5] Tuberculosis (TB), one of the common illnesses in developing countries like India, can present with various clinical manifestations including

nonspecific symptoms of hyponatremia. TB can induce hyponatremia via several 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.[5] 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.[5] Timely diagnosis and adequate correction are the key to improved neurological status and reduced morbidity and mortality. The present study was conducted to assess the clinical profile and etiology of clinically significant hyponatremia, which can aid in the treatment of patients and hence prevent further morbidity and mortality.

METHODS

A 1 year cross sectional observational study was conducted, including 150 patients ≥60 years with documented hyponatremia (serum sodium <135meq/l) admitted in MIMS, Mandya from April 2019 to March 2020. Institutional ethical committee clearance was obtained before conducting the study. Written consent from all the participants was obtained before data collection.

A detailed clinical history, physical examination, all routine investigations like complete hemogram, urine routine, blood sugar, renal function tests, liver function tests, serum electrolytes, serum osmolality, urine sodium and urine osmolality, sputum culture, chest X ray, CSF analysis and neuroimaging were done.

Sodium concentrations were measured on the Dimension RxL Max Integrated chemistry System. The normal range of the Laboratory value for sodium is 135-145 mmol/L. Serum and urine osmolality was measured on Osmometer 800 CL. The normal range for serum and urine osmolality is 275-293 mOsm/Kg H2O and 500-850 mOsm/Kg H2O respectively.

Volume status of the patients assessed and distributed into three categories i.e. euvolemic, hypervolemic, hypovolemic.

Hyponatraemia classified based on serum and urine sodium, serum and urine osmolality into Hyponatremia with a high plasma osmolality is caused by hyperglycemia, mannitol infusion, while a normal plasma osmolality indicates pseudohyponatremia (secondary to Hyperlipidemia or Hyperproteinemia). The urinary sodium concentration helps in diagnosing patients with low plasma osmolality. High urinary sodium concentration in the presence of low plasma osmolality can be caused by renal disorders, endocrine deficiencies, SIADH and medications.

Therapy with salt added diet, normal saline and hypertonic saline was started singly or in combination based on the severity of the patient's condition. Fluid restriction was started if the patient had fluid overload.

Inclusion criteria

Subjects aged ≥60 years with serum sodium <135 meq/l.

Exclusion criteria

Subjects with severe renal dysfunction. Subjects treated with mannitol and other osmotic diuretics.

Statistical analysis

Statistical analysis was performed using the software statistical package for social sciences (SPSS) version 20 (SPSS IBM (PC + version 20.0)). Data were recorded in a predesigned and pretested proforma. The collected data were entered into Microsoft Excel Worksheet. The comparison of categorical data was performed using Chi square test and Fisher's exact test and the comparison of continuous data was done using unpaired t test. P≤0.05 at 95% confidence interval was considered as statistically significant.

RESULTS

In the present study of 150 patients with hyponatremia, 52% were men and 48% were women.

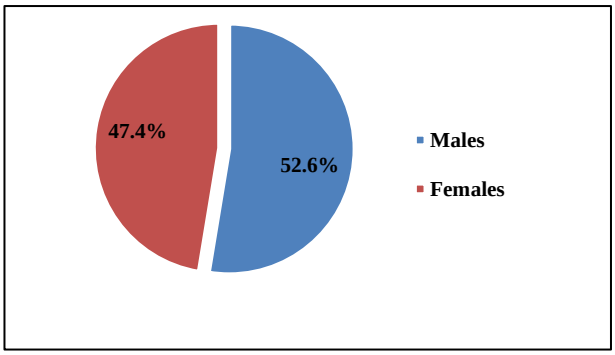

Figure 1: Distribution of patients according to gender.

The male to female ratio was 1.08:1, of which all the patients were aged ≥60 years with a mean age of 68.86 years. The most frequent presenting complaint was nausea and vomiting (38.66%) followed by lethargy (24%), confusion (16%), giddiness (8%), irritability (6%) seizures (5%) and coma (2%).

The mean sodium level was 123.09 meq/l. On the basis of hydration status, 50% of the patients were euvolemic while 36% and 14% of the patients were hypervolemic and hypovolemic, respectively. When classified according to severity, 30% had mild hyponatremia (plasma sodium 130–135 meq/l), 52% had moderate hyponatremia (plasma sodium 120–129 meq/l) and 18% had severe hyponatremia (<120 meq/l).

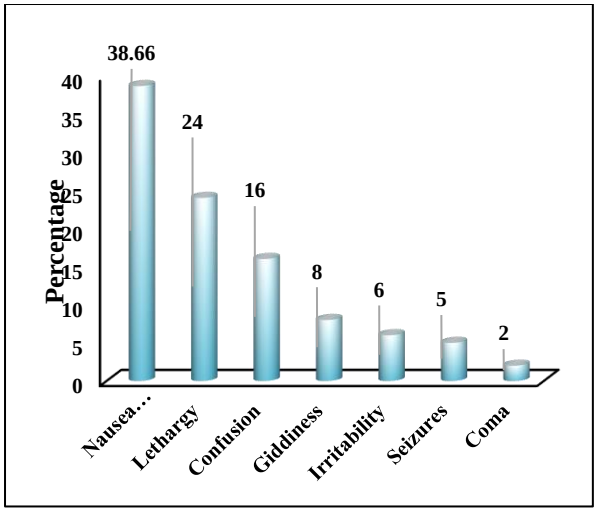

Figure 2: Symptoms attributable to hyponatremia on admission.

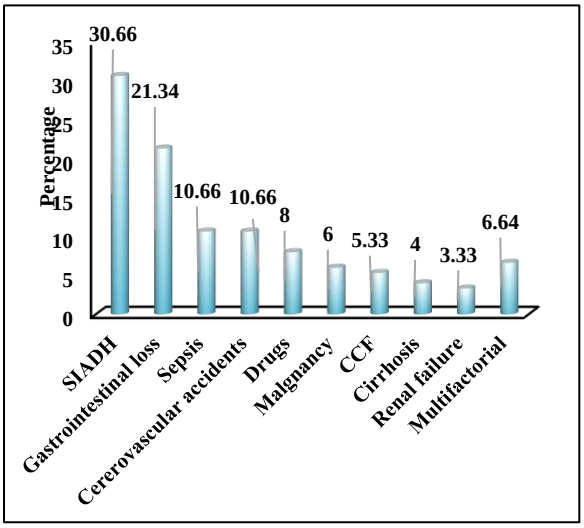

Figure 3: Etiological factors causing hyponatremia.

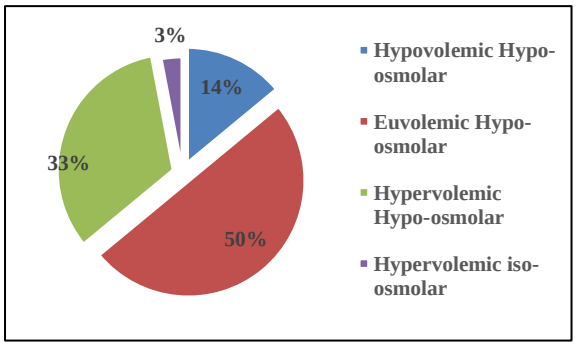

Figure 4: Distribution of patients according to types of hyponatremia.

Further, 50% of the patients had euvolemic hypoosmolar hyponatremia, 33% had hypervolemic hypoosmolar hyponatremia, 14% had hypovolemic hypoosmolar hyponatremia, and 3% had hypervolemic isoosmolar hyponatremia. While analyzing the etiology of hyponatremia, SIADH was found to be the most frequent cause of hyponatremia observed among 32% of the patients. The most common infectious etiology of SIADH was observed to be TB (62.8). The most common form of TB among patients with SIADH was tubercular meningitis (56.62%). The overall mortality among patients on our study was 11% (7% were males, 4% were females) and 63.63% among them had severe hyponatremia.

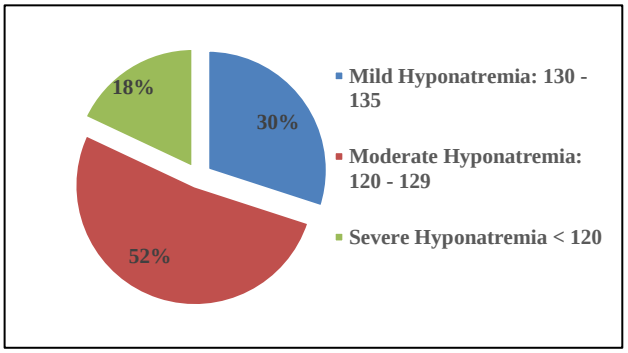

Figure 5: Distribution of patients according to severity of hyponatremia.

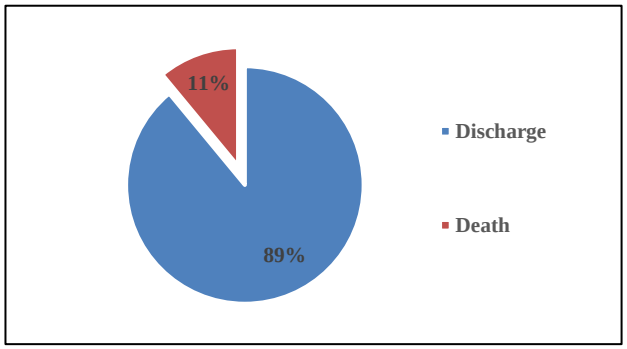

Figure 6: Distribution of patients according to outcome.

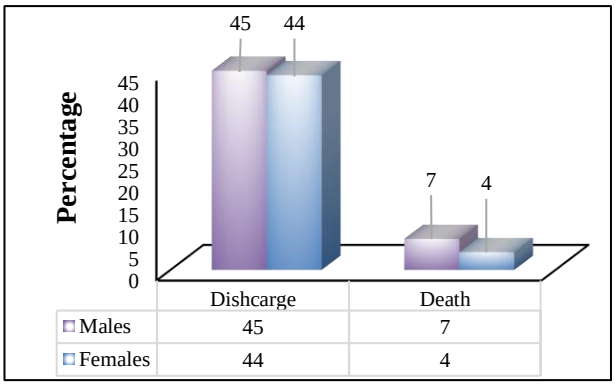

Figure 7: Distribution of patient's outcome according to gender.

DISCUSSION

In the present study, clinical profile of elderly patients aged ≥60 years admitted with diagnosis of hyponatremia

were studied. Hyponatremia of moderate to severe type causes increased inpatient mortality. The incidence of hyponatremia is higher in the elderly, owing to the impaired water and electrolyte homeostasis due to dietary and environmental variations.[6]

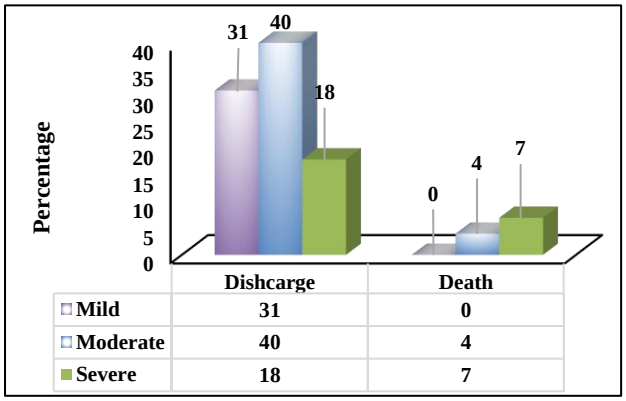

Figure 8: Distribution of patient's outcome according to severity of hyponatremia.

Unless addressed meticulously, the prognostic implications are grave and far reaching.[7] In our study with 150 patients, slight male preponderance is observed. However no association could be established between severity and gender of the patients. In our study 30% (n=45) had mild hyponatremia (plasma sodium 130–135 meq/l), 52% (n=78) had moderate hyponatremia (plasma sodium 120–129 meq/l) and 18% (n=27) severe hyponatremia (<120 meq/l). Another study conducted by Chowdhury et al. among 70 patients, reported mild hyponatremia, moderate hyponatremia, and severe hyponatremia in 27.14%, 37.14%, and 35.72% of the patients, respectively.[3] Symptoms of hyponatremia range from mild (nausea, lethargy, and irritability) to severe (seizures and coma). Vomiting with or without nausea found in 58 patients (38.66%) was the most common presenting symptom followed by lethargy in 36 (24%) patients, confusion in 24 (16%) patients, giddiness in 12 (8%) patients, irritability in 9 (6%) patients, seizures in 8 (5.34%) patients and coma in 3 (2%) patients as in Figure 2. In a study by Patni et al. in Nagpur, Maharashtra, similar findings were reported with drowsiness as the most common symptom (51%), followed by vomiting (14%) and seizures (6%).8 In the present study, 86 (57.33%) patients had a history of hypertension, and 48 (32%) patients had a history of diabetes mellitus. Similar findings were reported in a study by Rao et al.[1] wherein hypertension and diabetes were the most common comorbid conditions in majority of the patients.[1] Hyponatremic hypertensive syndrome is a well known entity wherein the most common association is in patients with essential hypertension receiving diuretics, which interfere with the metabolism of a variety of electrolytes and cause electrolyte imbalance. Thiazide diuretics influence the sodium chloride cotransporter channel and also result in the nonosmotic release of vasopressin.[9] Based on the hydration status, 50% (n=75) was euvolemic while 36% (n=54) were hypervolemic followed by 14% (n=21) hypovolemic cases. Further, based on osmolality, most of the patients had euvolemic hypoosmolar hyponatremia (50%) followed by hypervolemic hypoosmolar hyponatremia (33%), hypovolemic hypoosmolar hyponatremia (14%), and very few had hypervolemic isoosmolar hyponatremia (3%). A similar pattern was reported in a study by Rao et al. wherein euvolemia (61%) followed by fluid overload (23%) and dehydration (16%) was observed. Isovolemic hypoosmolar hyponatremia was the most frequently reported type of hyponatremia.[1]

Virtually, an excess of ADH concentration, usually caused by the SIADH or depletion of effective circulating volume, is the main cause of hyponatremia.10 In spite of being the most usual etiological factor for hyponatremia in hospitalized elderly patients as well as the most common cause of euvolemic hyponatremia, SIADH is generally diagnosed by exclusion of other causes, including diuretics, renal, liver, thyroid, adrenal, and pituitary diseases.[11,12] Mortality rate in our study was found to be 11.33% (n=17) which was considerably low.

Limitations

It was a hospital based study with limited study participants. Further studies with large sample size to be undertaken to establish the risk factors.

CONCLUSION

Despite being a commonly observed electrolyte imbalance, hyponatremia is incompletely understood. Its association with a wide number of underlying disease states and its multiple etiologies with differing pathophysiological mechanisms makes diagnosis challenging for the treating physician. Our study concluded that majority of patients reported vomiting as their presenting complaint. The severity of hyponatremia is independent of age, sex and type of hyponatremia, as it is the rapidity with which hyponatremia develops that decides the clinical presentation and not just the levels of serum sodium. And majority have euvolemic hypoosmolar hyponatremia with SIADH as the predominant cause. On evaluation of SIADH, Tuberculosis was found to be the most common cause and hence alerts the need for detailed evaluation of hyponatremia as this is a curable cause. In developing nations, like India, TB is still a common health hazard, remains latent, and can often present only as symptomatic hyponatremia. Hence to conclude, treating physician should be aware of the detailed pathophysiology of hyponatremia to reach the diagnosis and timely intervention to effectively treat this potentially life threatening condition.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Chandregowda, Mahesh K, Unnikrishnan A. Study of clinical profile of hyponatremia in elderly patients admitted to medical wards at Mandya institute of medical sciences, Mandya. Int Surg J 2021;8:390-4.