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Study on clinical and etiological profile of patients presenting with hyponatremia in NMCH, Patna

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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 objectives: To delineate the clinical profile and causes of hyponatremia in patients admitted in the medicine ward, N.M.C.H, Patna.
Material and Methods: This study was conducted on 50 patients admitted in medicine ward of tertiary care teaching hospital of Patna, Bihar from February 2019 to July 2019. Patients older than 18 years with serum sodium less than 135mEq/L were included in the study. Detailed history, clinical examination and all necessary investigations were done accordingly.
Type of study: Prospective study with detail history taking and clinical examination.
Statistical Analysis: Statistical analysis was done by using MS Excel 2007.
Results: In the present study 64% were male, and 90% of patients was older than 45 years. Out of all patients 84% were symptomatic, out of which 19% had mild, 35.8% had moderate & 45.2% had severe hyponatremia.. Most common cause was under nutrition (18%) and most common symptom was altered sensorium in 42% of patients. Interestingly 12% cases of hyponatremia gave history of salt restriction.
Conclusion: Hyponatremia is commonly encountered electrolyte imbalance in hospitalized patients mostly in tropical countries like India. It can mimic stroke. Most common cause being under nutrition followed by SIADH. Restricted salt intake advised by physicians is also an important factor of it.

Keywords: hyponatremia, serum sodium, hypovolemia, coma, electrolytes, diuretics, salt intake

Introduction

Hyponatremia is a common electrolyte abnormality in hospitalized patients [1, 2]. Incidence varies from 1% to 40% [1, 10]. Despite the awareness on hyponatremia since mid-20th century, this common disorder is still incompletely understood in many basic areas, due to its association with a wide range of underlying causes, multiple etiologies and differing pathophysiological mechanisms [3, 9].

Hyponatremia is defined as serum sodium concentration of less than 135mmol/L. It can be sub divided into mild hyponatremia (130-134mmol/L), moderate hyponatremia (120-129mmol/L) and severe hyponatremia (<120 mmol/L) [18]. Mild hyponatremia is found in as many as 15-30% of hospitalized patients or in the institutionalized elderly [8].

Clinically, hyponatremia is often unrecognized when it is mild or when it develops gradually. But severe hyponatremia (serum sodium <120 mmol/L), is associated with substantial morbidity and can be life threatening [4]. Also, moderate to severe hyponatremia bears a substantial associated morbidity and mortality [5]. It is common in the elderly, mainly owing to impaired water and electrolyte balance in response to diet, drugs and environmental changes [5, 6].

Hyponatremia occurs due to disruption of sodium and water homeostasis, normally maintained by complex multisystem physiological mechanisms. Hyponatremia is subdivided into three groups, depending on clinical history and volume status, like hypovolemic, euvolemic, and hypervolemic.

In hypovolemic hyponatremia, hypovolemia leads to increased circulating levels of arginine vasopressin hormone (AVP), which helps to maintain blood pressure via vascular and baroreceptor V1A receptors and increase water reabsorption via renal V2 receptors; activation of V2 receptor can lead to hyponatremia in setting of increased free water intake. Common causes are diuretic use, vomiting, diarrhea, pancreatitis, burns, mineralocorticoid deficiency, salt losing nephropathy, ketonuria and cerebral salt wasting syndrome.

In euvolemic hyponatremia, glucocorticoid deficiency, hypothyroidism, stress, drugs, syndrome of inappropriate antidiuretic hormone secretion are causes.

In hypervolemic hyponatremia there is increase in total Na+ and Cl- that is accompanied by a proportionately greater increase in total body water, leading to reduced plasma sodium concentration.

Common causes are acute or chronic renal failure, nephrotic syndrome, cardiac failure, cirrhosis of liver.

The clinical presentation has a wide spectrum, varying from asymptomatic to very lethal presentation as seizures and coma. Unfortunately, hyponatremia is also often iatrogenic.

The initial CNS response to acute hyponatremia is an increase in interstitial pressure, leading to shunting of ECF and solutes from the interstitial space into the cerebrospinal fluid and then on into the systemic circulation. This is

accompanied by an efflux of the major intracellular ions, Na^+, K^+, and Cl^- from brain cells resulting in cellular swelling as a consequence of water movement down the osmotic gradient from the hypotonic ECF to ICF.

Acute hyponatremic encephalopathy occurs when these volume regulatory mechanisms are overwhelmed by a rapid decrease in tonicity, resulting in acute cerebral edema. While persistent, chronic hyponatremia results in an efflux of organic osmolytes (creatinine, betaine, glutamate, myoinositol, and taurine) from brain cells; this response reduces intracellular osmolality and the osmotic gradient favoring water entry and leading to brain edema [7].

Hyponatremia is also an important predicator of mortality in heart failure, cirrhosis and acute pancreatitis.

Clinical management of hyponatremia is based on diagnosing and treating the underlying cause and restoring salt and water balance. Accurate determination of etiology of hyponatremia is notoriously challenging. However, early recognition and management drastically alters prognosis.

Nalanda Medical College Hospital is a major hub for treatment of all speciality in Eastern Patna, Raghopur, Hajipur, and other adjoining areas. It also provides service to patients from its neighboring states like Jharkhand, West Bengal and even neighbouring country like Nepal. No previous study has been conducted on this topic in this area. This study will assess the numerous patients of hyponatremia presenting to NMCH, and attempt to clarify the likely etiologies in this part of India.

Aims and Objectives

To find out the various etiologies of hyponatremia in patients admitted in the Medicine Department of Nalanda Medical College and Hospital, Patna.

Materials and Methods

Study setting and Design

The study was conducted in Department of Medicine, Nalanda Medical College, Patna, Bihar from February 2019 to July 2019 on 50 cases after approval by the Institutional Ethical Committee. The present study was a hospital based prospective observational study.

Inclusion criteria

Patients age >18 years with serum sodium level < 135meq/l.

Exclusion criteria

1. Overcorrected hypernatremia
2. Patients with hyperlipidemia
3. Hyperproteinemia
4. Patients not willing to participate in the study were excluded from study.

Method of collection of data

All patients fulfilling the inclusion and exclusion criteria were explained about the purpose of the study. A written informed consent was obtained from the patients. A detailed history and physical examination was done in all included patients as per a pre-determined proforma. History specially included nutrition, intake of diuretics and decreased salt intake (self/ advised by physician). Routine laboratory investigations including complete blood count, kidney function test, random blood sugar, serum sodium, serum potassium, urine sodium, liver function test and where indicated lipid profile, thyroid stimulating hormone, serum cortisol level in selected cases and other investigations to find out the etiology.

Statistical Analysis

Collected data was compiled and tabulated using MS Excel 2007.

Results

In present study, out of 50 patients 64% were males and 36% were females. Patients were between 18 to 80 years. Out of total patients 84% were symptomatic. Maximum number of symptomatic cases (80%) were of age group ≥ 61years, with 93% patients older than 45 years of age. Out of the symptomatic patients due to hyponatremia mild, moderate and severe hyponatremia was found in 19%, 35.8% and 45.2% cases respectively [Table-1].

Lethargy, drowsiness with slow response and irrelevant talk were the common presenting symptoms in our study. Since the CT scan done for these patients showed no structural abnormality, these symptoms were attributed to hyponatremia. Other symptoms were headache, hiccups, malaise/lethargy, & many were asymptomatic. Some of these patients also presented with other non-CNS symptoms such as pain abdomen, decreased appetite which could not be accounted by hyponatremia.

Neurological symptoms like altered sensorium was present in 42% cases, while seizures were present in 12%, 4% presented with coma & 2% with acute dystonia [Table-2]. 6% patients presented with resistant hyponatremia requiring recurrent hospitalisation. The most common underlying predisposing factor was under nutrition (18%) [Figure-1]. Most common comorbid condition was hypertension (62%), followed by diabetes mellitus (36%). History of salt restriction was found in 12% patients.

Mortality

In this study of 50 patients there were 7 deaths, all which occurred in patients with severe hyponatremia (serum sodium < 120 mEq / L), stroke being the commonest etiology (accounting for 4 deaths).

Table 1: Distribution of symptomatic patients according to age

Age Group	Altered Sensorium	Seizures	Hiccups	Vomiting	Others	Total
18-30	0	0	0	1	0	1
31-45	0	1	0	1	0	2
46-60	2	1	0	1	1	5
≥ 61	19	5	1	4	5	34
Total	21	7	1	7	6	42

Table 2: Correlation between symptoms and severity of hyponatremia

Symptoms	Mild (%) (130-134)	Moderate (%) (120-129)	Severe (%) (≤120)	Total (%)
Asymptomatic	5 (62.5%)	2 (25%)	1 (12.5%)	8 (16%)
Vomiting	4 (57.2%)	2 (28.6%)	1 (14.2%)	7 (14%)
Hiccups	0	1 (100%)	0	1 (2%)
Seizure	0	3 (42.8%)	4 (57.2%)	7 (14%)
Altered Sensorium	0	7 (33.3%)	14 (66.6%)	21 (42%)
Coma	0	0	2 (100%)	2 (4%)
Acute Dystonia	0	0	1 (100%)	1 (2%)
Others	1 (33.3%)	1 (33.3%)	1 (33.3%)	3 (6%)
Total	11	17	22	50

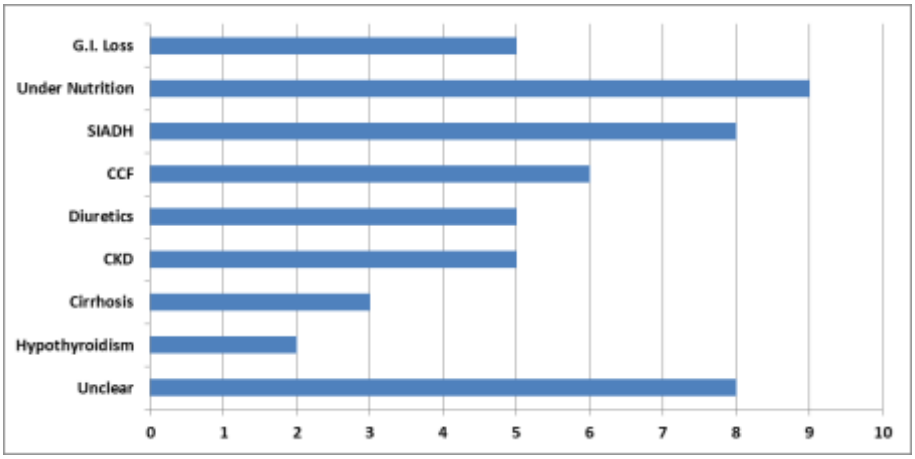

Fig 1: Distribution of patients according to diagnosis

Discussion

Hyponatremia is a common electrolyte abnormality seen in adult hospitalized patients mostly elderly, malnourished, ignored & destitute patients. Studies on etiological profile of hyponatremia are scarce, especially from this part of India. This study was conducted with idea to find out clinical profile and various etiologies of hyponatremia from Eastern Patna and adjoining areas.

In present study there were 68% males and 32% females. This trend was found may be due to more male admission in the hospital, comparative to study by Patni *et al.* [9] (74% male, 26% female). 93% symptomatic patients with hyponatremia were above 45 years of age. Hochman *et al.* [11] and Vurgese *et al.* [12] also observed similar trend that elderly patients were more prone to hyponatremia.

Among neurological symptoms altered sensorium (44%) was most common symptom, and seizures were present in 12% patients similar to studies of Agrawal SM *et al.* [14] (42%), Rao MY *et al.* [15] (33%) and Nandkumar *et al.* [16] (53.2%), who found drowsiness as most common neurological symptom. Among gastrointestinal symptoms nausea and vomiting were the most common similar to study of Farooqui M *et al.* [13] (51.42%), and Agrawal SM *et al.* [14] (54%).

In present study Under nutrition (18%) was the most common etiological factor, followed by SIADH (16%) as second most common cause. Studies by V. Padma *et al.* [17], Rao MY *et al.* [15] (30%) and Patni *et al.* [9] (44%) have found SIADH as the commonest cause in the elderly.

Common comorbid conditions were hypertension (62%) followed by diabetes mellitus (36%). Out of 31 hypertensive patients 18 patients were on diuretics, similar trend was observed by Baji PP *et al.* [10].

Salt restricted diet was found in 6 patients among symptomatic patients (14.2%)

Conclusion

Hyponatremia is commonly encountered electrolyte imbalance in hospitalized patients. Hyponatemia can mimic stroke as many patients with moderate & severe hyponatremia presented in altered sensorium.

There is increased risk of hyponatremia with increasing age, under nutrition, 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.

Ours being a tropical country, there is significant loss of sodium in sweating. Patients on anti-hypertensive & diuretics should undergo regular check-up of serum electrolyes. Since morbidity and mortality is significantly higher in patients with hyponatremia, so timely correction is necessary in such patients.

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