

CLINICAL PROFILE AND AETIOLOGY OF SEVERE HYPONATRAEMIA IN A TERTIARY CARE HOSPITAL OF SOUTH INDIA

Thomas Antony¹, Nayyar Iqbal², Sudhagar Mookkappan³, Aneesh Basheer⁴, Govindarajan Dhandapani⁵

¹Resident, Department of General Medicine, Pondicherry Institute of Medical Sciences, Pondicherry.

²Assistant Professor, Department of General Medicine, Pondicherry Institute of Medical Sciences, Pondicherry.

³Associate Professor, Department of General Medicine, Pondicherry Institute of Medical Sciences, Pondicherry.

⁴Associate Professor, Department of General Medicine, Pondicherry Institute of Medical Sciences, Pondicherry.

⁵Professor, Department of General Medicine, Chettinad Hospital and Research Institute, Chennai.

ABSTRACT

BACKGROUND

Hyponatraemia is one of the commonest electrolyte abnormalities among admitted patients. It is also the commonest electrolyte abnormality associated with morbidity and mortality. Hence, we aimed to study the clinical and aetiological profile of patients admitted with severe hyponatraemia in Pondicherry Institute of Medical Sciences, Pondicherry.

MATERIALS AND METHODS

A prospective observational study conducted at tertiary care hospital in South India during last 18 months. All patients above age of 18 presenting with serum sodium less than or equal to 125 mEq/L were included in the study. Detailed medical and surgical history was recorded. Routine investigation like complete haemogram, renal function test, serum electrolytes, thyroid function test, serum cortisol and urine spot sodium and osmolality were done. Descriptive variables were expressed in mean and standard deviations. They were compared using Mann-Whitney U test and χ^2 test.

RESULTS

89 patients presented with serum sodium of less than 135 mEq/L out of which 50 patients had serum sodium level of less than 125 mEq/L. The patients with serum sodium level of less than 125 mEq/L were included in the study. 56% were males and 44% were females. More than 50% of the patients were above the age of 60. Mean sodium level at admission was 115 mEq/L. 64% of the patients were euvoalaemic at admission while 24% were hypervolaemic. Syndrome of Inappropriate Antidiuretic Hormone (SIADH) was the commonest cause for hyponatraemia (18%) and thiazide diuretics use was the second most common cause (12%). One death due to hyponatraemia was recorded during our study. There was no association of severity of hyponatraemia and symptoms ($p > 0.05$).

CONCLUSION

Hyponatraemia is common among elderly. SIADH is the commonest cause for hyponatraemia among the admitted patients. Chronic hyponatraemia may have a weak association with serum sodium and symptoms.

KEYWORDS

Severe Hyponatraemia, Elderly, Syndrome of Inappropriate Antidiuretic Hormone.

HOW TO CITE THIS ARTICLE: Antony T, Iqbal N, Mookkappan S, et al. Clinical profile and aetiology of severe hyponatraemia in a tertiary care hospital of South India. J. Evid. Based Med. Healthc. 2017; 4(21), 1172-1175. DOI: 10.18410/jebmh/2017/231

BACKGROUND

The commonest electrolyte abnormalities encountered among hospitalised patients is hyponatraemia. Its prevalence is about 15 to 30% among all the electrolyte abnormalities in hospitalised patients.¹ Hyponatraemia is not a disease rather it is a manifestation of various

disorders. It is a disorder of water balance. It is defined as serum sodium level less than 135 mEq/L. Clinical manifestations of hyponatraemia are related to osmotic water shift leading to increased intracellular fluid accumulation, neuronal swelling and cerebral oedema.² Volume status and urine osmolality is classified into three categories - Euvoalaemic, hypovolaemic and hypervolaemic.³ The clinical manifestations varies from asymptomatic state to coma. The common symptoms in case of severe hyponatraemia (serum sodium below 125 mEq/L) include headache, lethargy, confusion and obtundation. Seizure and coma may occur if serum sodium level falls acutely below 120 mEq/L.⁴ In view of limited data available from South India, this study was conducted in a tertiary care hospital to determine the clinical manifestations of hyponatraemia and also to establish the aetiological factors for hyponatraemia.

Financial or Other, Competing Interest: None.

Submission 06-02-2017, Peer Review 13-02-2017,

Acceptance 02-03-2017, Published 10-03-2017.

Corresponding Author:

Dr. Nayyar Iqbal,

Assistant Professor, Department of General Medicine,

Pondicherry Institute of Medical Sciences,

Kalpet, Puducherry-605014.

E-mail: drinayyar@gmail.com

DOI: 10.18410/jebmh/2017/231



MATERIALS AND METHODS

89 adult patients with serum sodium less than 135 mEq/L were admitted in the last 18 months out of which 50 patients had serum sodium less than 125 mEq/L. Hence, 50 consecutive patients with serum sodium less than 125mEq/L were included in the study. Detailed history including symptoms of hyponatraemia like nausea, headache, lethargy, confusion, seizures and altered sensorium were recorded. Past medical history, drug history and examination findings were noted. Volume status of the patients was assessed clinically and patients were classified into euvolaemic, hypovolaemic and hypervolaemic. Routine blood investigations including complete blood count, renal function tests, serum electrolytes, liver function tests, thyroid function tests, serum osmolality (calculated), serum cortisol, urine spot sodium and osmolality were done. Chest radiograph, 2D echocardiography and CT scan of brain were done in selected patients. All patients were treated for hyponatraemia according to hospital protocol. The following diagnostic criteria were applied for Syndrome of Inappropriate Antidiuretic Hormone (SIADH)⁵:

1. Decreased serum osmolality (<275 mOsmol/kg);
2. Urine osmolality >100 mOsmol/kg;
3. Clinical euvolaemia;
4. Urine sodium >40 mmol/L;
5. Normal thyroid and adrenal function;
6. No renal disease;
7. No recent use of diuretics.

Ethical committee approval and patient's consent were obtained before proceeding with the study.

Statistical Analysis

Statistical analysis was done using SPSS 17. Descriptive variables were expressed using the mean, standard deviation and the median for range and interquartile range. Differences between the means of continuous variables were compared using Mann-Whitney U test and those of categorical variables were compared with the χ^2 test. Levels of significance were expressed as p values.

RESULTS

Fifty consecutive patients with serum sodium of less than 125 mEq/L were included in the study. The mean age of the patients was 65 years with a range of 35 to 46 years. 56% of the patients were males. Mean serum sodium level at admission was 115.5 ± 14.5 mEq/L. 64% of the patients were euvolaemic, while 24% and 12% were hypervolaemic and hypovolaemic, respectively (Table 1).

All the patients presented with lethargy (Figure 1). Other common symptoms were nausea (80%), confusion (26%) and headache (6%) (Table 1). The association of

serum sodium and severity of hyponatraemia were also analysed. There was no significant association were detected between the symptoms and severity of hyponatraemia, ($p>0.05$) (Table 2).

Among the causes of hyponatraemia, SIADH (18%) were the most common cause. The most common underlying cause for SIADH was cerebrovascular accident (44%) followed by pneumonia (22%). Second most common cause was the use of thiazide diuretics. Hypothyroidism and adrenal insufficiency was found in 10% and 4% of the patients, respectively. Hypovolaemia was noted among 6 (12%). 5 out of 6 patients had vomiting associated with nausea and one patient had diabetic ketoacidosis. Hypervolaemia was noted in 12 (24%) of the patients. Most common cause for hypervolaemia was chronic kidney disease. In eight patients, cause for hyponatraemia was unidentified. One death was recorded in a patient with diabetic ketoacidosis (Table 3).

Characteristics	Number of Patients
Age (yrs.)	
<40	1 (2%)
41-50	7 (14%)
51-60	6 (12%)
61-70	19 (38%)
71-80	15 (30%)
>80	2 (4%)
Sex	
Male	28 (56%)
Female	22 (44%)
Volume status	
Euvolaemic	32 (64%)
Hypervolaemic	12 (24%)
Hypovolaemic	6 (12%)
Plasma Osmolality	
Hypoosmolar	32 (64%)
Normoosmolar	12 (24%)
Hyperosmolar	6 (12%)
Symptoms	
Lethargy	50 (100%)
Nausea	40 (80%)
Confusion	13 (26%)
Headache	3 (6%)
Hiccups	2 (4%)
Seizures	1 (2%)
Death	1(2%)

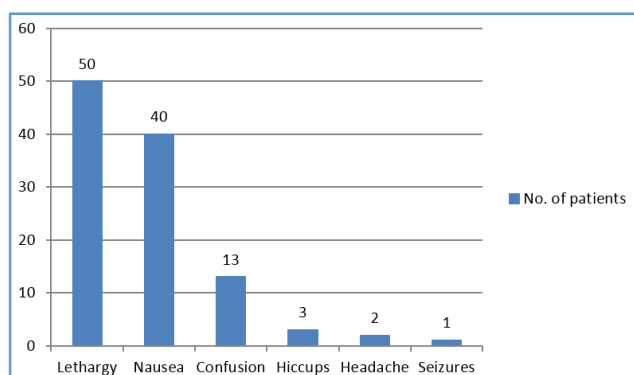
Table 1. Clinico-Epidemiological Characteristics of Hyponatraemic Patients (n=50)

Serum Sodium (mEq/L)	Lethargy	Nausea	Hiccups	Headache	Confusion	Seizures
Less than 100	2	1	0	0	1	0
101 to 110	10	10	1	1	4	1
111 to 120	23	15	1	1	4	0
121 to 125	15	13	0	2	3	0
Chi-square test	Cannot be Computed	6.502	1.593	0.979	2.294	3.78
P-value		0.090	0.661	0.806	0.514	0.286

Table 2. Association Between Symptoms of Hyponatraemia and Serum Sodium Levels (n=50)

Aetiology	Number of Patients
SIADH	9 (18%)
CVA	4 (44%)
Pneumonia	2 (22%)
TB meningitis	1 (11%)
Disseminated TB	1 (11%)
Carcinoma prostate	1 (11%)
Diuretics	8 (16%)
Thiazides	6 (75%)
Loop diuretic	2 (25%)
Endocrine	7 (14%)
Hypothyroidism	5 (10%)
Adrenal insufficiency	2 (4%)
CCF	4 (8%)
Cirrhosis of liver	3 (6%)
Chronic kidney disease	5 (10%)
GI loss	5 (10%)
Hyperglycaemia	1 (2%)
Unidentified	8 (16%)

Table 3. Aetiology of Hyponatraemia (n=50)



Number of Patients with Presenting Symptoms (n=50)

DISCUSSION

Hyponatraemia is one of the commonest electrolyte abnormalities encountered among hospitalised patients. It is seen mainly in elderly population.⁶ In our study, the mean age of presentation was 65 years, similar to a study conducted by Anpalahan et al.⁷ The hyponatraemia in the elderly is mainly due to age-related physiological changes in the function of kidneys and other comorbid conditions. Fliers et al⁸ showed that daily water intake of even 1500 mL may lead to hyponatraemia in elderly. A study done by Palindungan et al⁹ showed elderly had prevalence ratio 2.43 for developing hyponatraemia than young individuals.

The prevalence of hyponatraemia was more among males as compared to females in our study. Various other

studies from northern India have also shown the same trend.^{6,10} Although, a study by Clayton et al¹¹ and Zieschang et al¹² showed that hyponatraemia was more common in elderly female.

Lethargy was a universal symptom in our study. 80% of patients had nausea and 4% had hiccups. A study by George et al¹³ found strong and independent association between hyponatraemia and hiccups. Seizure is another common manifestation of severe hyponatraemia.¹⁴ In our study, 13 patients had serum sodium less than 110 mEq/L and only one patient presented with seizures. In contrast to other studies where serious manifestations like seizures are associated with very low serum sodium, we found no significant ($p > 0.05$) association between the serum level of sodium and symptoms. This may be due to chronic hyponatraemia in our study population. The symptoms of hyponatraemia are due to cerebral oedema and severity depends upon the rapidity of onset and absolute decrease in serum sodium.

Most common type of hyponatraemia in our study was euvoalaemic (64%). This is in the agreement with the studies done by Natkunamet al¹⁵ and Mittal et al.⁷ In both the studies, 70% and 61% of the patients were euvoalaemic, respectively. In a study by Chen et al,¹⁶ hypovolaemic hyponatraemia was most common. In our study, we recorded on 6 patients with hypovolaemia. Although, clinical assessment of volume status has limited sensitivity and specificity in assessing the extracellular fluid volume in hyponatraemic patients.¹⁷ This would have underestimated the number of patients with hypovolaemia or overestimated the number of euvoalaemic hyponatraemia. This could be one of the limitations of our study.

SIADH was the commonest cause for hyponatraemia in our study. Cerebrovascular accident was the commonest underlying disorders causing SIADH followed by lower respiratory tract infection. This is similar to results of study done by Rao et al.¹⁴ Though, 64% (32) of the patients had hypo osmolar euvoalaemic hyponatraemia, only 9 of them fulfilled the criteria of SIADH. We believe that the most of the patients with unidentified cause may have SIADH.

Diuretic usage (16%) was second most common cause for hyponatraemia in our study. Six patients were on thiazide diuretic and two were on loop diuretic. Many other studies have also reported diuretic as one of the major causes of hyponatraemia.^{18,19} Loop diuretics are infrequently associated with hyponatraemia as compared to thiazide diuretics especially in the elderly population.²⁰

Hence, thiazide diuretics should be used cautiously in hypertensive elderly patients.

Most of the patients in our study were hypoosmolar (64%), but 12% of the patients were hyperosmolar. This maybe due to large number of patients were diabetics. Since, we used calculated osmolality and its determinants were sodium, glucose and urea, which are significantly altered in diabetes and renal failure.²¹

Assessment of volume status, measurement of plasma and urinary osmolality are the key steps in the management of hyponatraemia. It is important to recognise this abnormality at the earliest and to treat promptly to decrease the mortality. In a study by Zieschang et al,¹¹ mortality among elderly was high with or without delirium. Funk et al²¹ demonstrated the increasing severity from borderline to severe hyponatraemia is associated with independent mortality risk. The odds ratio for borderline, mild and severe hyponatraemia is 1.32 (1.25-1.39), 1.89 (1.71-2.09) and 1.81 (1.56-2.10), respectively. In this study, one death was recorded in a patient with diabetic ketoacidosis.

CONCLUSION

Hyponatraemia is fairly common among elderly, especially among the males. Significant number of patients suffer from hypoosmolar euvolaemic hyponatraemia. Among the causes, SIADH and thiazide diuretics are relatively common. Chronic hyponatraemia may have weak association with serum sodium and symptoms. Further study with large sample size of patients with established chronic hyponatraemia may be conducted to analyse the clinical epidemiological features of chronic hyponatraemia.

REFERENCES

- [1] Upadhyay A, Jaber BL, Madias NE. Incidence and prevalence of hyponatremia. *Am J Med* 2006;119(7 Suppl 1):S30-35.
- [2] Correia L, Ferreira R, Correia I, et al. Severe hyponatremia in older patients at admission in an internal medicine department. *Arch GerontolGeriatr* 2014;59(3):642-647.
- [3] Paniker GI, Joseph S. A prospective study on clinical profile of hyponatremia in ICU hospitalized patients. *IJBAR* 2014;5(6):297-303.
- [4] Zieschang T, Wolf M, Vellappallil T, et al. The association of hyponatremia, risk of confusional state, and mortality- a prospective controlled longitudinal study in older patients. *DtschArzteblInt* 2016;113(50):855-862.
- [5] Ellison DH, Berl T. The syndrome of inappropriate antidiuresis. *N Engl J Med* 2007;356(20):2064-2072.
- [6] Chatterjee N, Sengupta N, Das C, et al. A descriptive study of hyponatremia in a tertiary care hospital of Eastern India. *Indian J Endocrinol Metab* 2012;16(2):288-291.
- [7] Anpalahan M. Chronic idiopathic hyponatremia in older people due to syndrome of inappropriate antidiuretic hormone secretion (SIADH) possibly related to aging. *J Am Geriatr Soc* 2001;49(6):788-792.
- [8] Fliers E, Swaab DF, Pool CW, et al. The vasopressin and oxytocin neurons in the human supraoptic and paraventricular nucleus; changes with aging and in senile dementia. *Brain Res* 1985;342(1):45-53.
- [9] Siregar P. The risk of hyponatremia in the elderly compared with younger in the hospital inpatient and outpatient. *Acta Med Indones* 2011;43(3):158-161.
- [10] Mittal M, Deepshikha, Khurana H. Profile of hyponatremia in a tertiary care centre in North India. *Int J Adv Med* 2016;3(4):1011-1015.
- [11] Clayton JA, Jeune IR, Hall IP. Severe hyponatremia in medical in patients: aetiology, assessment and outcome. *QJ Med* 2006;99(8):505-511.
- [12] George J, Jeyseelan L, Peter JV. Hyponatremia and hiccups. *Natl Med J India* 1996;9(3):107-109.
- [13] Rao MY, Sudhir U, Anil TK, et al. Hospital-based descriptive study of symptomatic hyponatremia in elderly patients. *JAPI* 2010;58:667-669.
- [14] Natkunam A, ShekCC, Swaminathan R. Hyponatremia in a hospital population. *J Medicine* 1991;22(2):83-96.
- [15] Chen LK, Lin MH, Hwang SJ, et al. Hyponatremia among the institutionalized elderly in 2 long-term care facilities in Taipei. *J Chin Med Assoc* 2006;69(3):115-119.
- [16] Chung HM, Kluge R, SchrierRW, et al. Clinical assessment of extracellular fluid volume in hyponatremia. *Am J Med* 1987;83(5):905-908.
- [17] Reynolds RM, Padfield PL, Seckl JR. Disorder of sodium balance. *BMJ* 2006;332(7543):702-705.
- [18] Gerard M. Disorder of sodium balance: hyponatremia and drug use (and abuse). *BMJ* 2006;332:853.
- [19] Rodenburg EM, Hoorn EJ, Ruiters R, et al. Thiazide-associated hyponatremia: a population-based study. *Am J Kidney Dis* 2013;62(1):67-72.
- [20] Lin M, Liu SJ, Lim IT. Disorders of water imbalance. *Emerg Med Clin North Am* 2005;23(3):749-770.
- [21] Funk GC, Lindner G, Druml W, et al. Incidence and prognosis of dysnatremias present on ICU admission. *Intensive Care Med* 2010;36(2):304-311.