ORIGINAL RESEARCH PAPER

Volume-8 | Issue-4 | April-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CLINICAL, ETIOLOGICAL AND EPIDEMIOLOGICAL PROFILE OF ELDERLY (>= 60 YEARS) PATIENTS ADMITTED WITH HYPONATREMIA: A SINGLE CENTRE STUDY

General Medicine

Swayang Sudha Panda — Senior Resident , Dept Of Medicine, Rajendra Institute Of Medical Sciences, Ranchi

Malyaban Das — Junior Resident, Dept Of Medicine, Rajendra Institute Of Medical Sciences, Ranchi

Prajit Mazumdar* — Junior Resident, Dept Of Medicine, Rajendra Institute Of Medical Sciences, Ranchi *Corresponding Author

Sushil Kachap — Professor, Dept Of Medicine, Rajendra Institute Of Medical Sciences, Ranchi

Rajendra Prasad satapathy — Resident, Dept Of Cardiology, SCB Medical College Cuttack

ABSTRACT

Introduction: Hyponatremia, the most frequent electrolyte derangement identified among hospitalized patients, is associated with worsened outcomes in patients with pneumonia, heart failure and other disorders. In this study we will try to assess different etiological, clinical and epidemiological parameters relater to hyponatremia.

Materials and methods: Elderly patients (60 yrs and older) admitted in medical ICU between 1st of April,2017 and 31st of October 2018 with hyponatremia were assessed in this study and the diagnostic criteria was-

Hyponatremia: Serum Sodium level < 135 mMol/L

Severe Hyponatremia: Serum Sodium < 125 mMol/l

Results: The most common cause of hyponatremia was siadh, followed by renal loss, drug induced, gi loss and others. At the time of admission 60% were euvolemic,27% were hypervolemic and 13% were dehydrated. Among the patients studied 13 patient had serum sodium levels of less than 105 mmol/l, 26 patients had serum sodium level of 105-115 mmol/l and 61 patients had serum sodium levels of 115-125 mmol/l. Among the groups of hyponatremia based on their volume status and on comparison of their relation to outcome, it was seen that there was no significant difference between the groups with regard to outcome and type of hyponatremia.

Conclusion: In this study the commonest cause of hyponatremia was due to SIADH (30%) followed by renal causes (23%), then drugs (21%) of which diuretics form a major chunk, Of these etiologies the worrisome cause is Drug induced hyponatremia, as a major chunk of drugs that cause hyponatremia are diuretics. Though JNC VII recommends diuretics as the first line drug for treatment of hypertension, a word of caution should be maintained while prescribing diuretics in the elderly and when required doses should be modified according to body weight and should begin with the lowest dose

KEYWORDS

hyponatremia , SIADH, serum osmolality, urine osmolality

I-INTRODUCTION

Disorders of sodium and water metabolism are common in hospitalized patient and are occasionally encountered in outpatient. Both hyponatremia and hypernatremia can cause substantial morbidity and mortality[1]. Its improper treatment can add to problems as well. Serum sodium concentration and serum osmolarity maintained under precise control by homeostatic mechanisms involving thirst, antidiutetic hormone and renal handling of filtered sodium.

Hyponatremia, the most frequent electrolyte derangement identified among hospitalized patients, is associated with worsened outcomes in patients with pneumonia, heart failure and other disorders.

Within a community, hyponatremia is seen in 3 to 4% of patients seen in primary health care and as well as in emercency department but about 1.5% of patients presenting to emercency department have serum sodium level of less than 125meq/L . It occurs in up to 30 to 40% of all hospitalised patients. Incidence of hyponatremia is equal in males and females and increasing age is a strong independent risk factor for hyponatremia.

About 40%of the body's sodium is contained in bone. Approximately 2-5% occurs within organs and cells and the remaining 55% is in blood plasma and other extracellular fluids. The amount of sodium in blood plasma is typically 140mmol/L, a much higher than is found in intracellular sodium (about 5 mmol/L). This asymmetric distribution of sodium ions is essential for human life as it is responsible for proper nerve conduction, the passage of various nutrients into cells, and the maintenance of blood pressure.

This disorder is almost always the result of an increase in circulating AVP and/or increased renal sensitivity to AVP, combined with an intake of free water; a notable exception is hyponatremia due to low solute intake (see below). The underlying pathophysiology for the exaggerated or "inappropriate" AVP response differs in patients with hyponatremia as a function of their ECFV.

The etiology of hyponatremia should be considered under the categories of hypovolemic hyponatremia and euvolemic hyponatremia based on the hydration status of the individual.

Hypovolemic hyponatremia arises when total body sodium is decreased out of proportion to decrease in total body water. In this situation relative degree of water retention is responsible for low serum sodium concentration. The non-osmotic release of AVP triggered by fall in intravascular volume or pressure overrides the suppressive signals prompted by osmoreceptors that detect hypoosmolarity. Here the preservation of volume and defence of pressure takes precedence over maintenance of tonicity.

Euvolemic hyponatremia results from an increase in total body water without change in body sodium. This form of hyponatremia is commonly encountered in hospitalized patient has a variety of potential causes that share a common underlying physiology- AVP release that is unregulated and unprovoked by osmotic or non-osmotic stimuli. It may occur due to glucocorticoid deficiency, Hypothyroidism, Stress, Drugs, Syndrome of inappropriate antidiuretic hormone secretion (SIADH).The most well recognized in this aspect is SIADH In this study we will try to assess different etiological, clinical and epidemiological parameters relater to hyponatremia.

II-MATERIALS AND METHODS:

Source of data: Elderly patients (60 yrs and older) admitted in medical ICU between 1st of April,2017 and 31st of October 2018 with hyponatremia were assessed in this study.

The following data will be collected-

a) Required routine/ specific investigations relevant to evaluate as per the admission diagnosis.
b) Serum Sodium levels – At admission, every day during rapid correction/symptomatic period, then as and when indicated.
c) In patients who fulfill the selection of severe hyponatremia (serum Sodium ≤ 125 mMol/L) will undergo the following investigation before treatment-

1) Serum Osmolality
2) Urine Osmolality
3) Urine spot Sodium
4) Serum Cortisol level – where indicated
5) Serum T3, T4, TSH – where indicated
6) Imaging studies – as relevant to the admission diagnosis.

Inclusion Criteria :

1) Patients who are above the age of 60 yrs
2) Patients admitted to Medical ICU
3) Serum sodium less than 135 mMol/L

Diagnostic criteria:

Hyponatremia: Serum Sodium level ≤ 135 mMol/L
Severe Hyponatremia: Serum Sodium ≤ 125 mMol/l

Microsoft excel was used for data tabulation and IBM spss v. 18 was used for data analysis.

III-RESULTS:

Among 100 patients who presented with hyponatremia 55 patients (55%) were female and and 45 patient were male (45%) were males which indicates a preponderance of severe hyponatremia in females patients.

In this study the gender distribution is as follows(Table I):

Table I- gender distribution in the study

SEX	FREQUENCY
FEMALE	55
MALE	45
TOTAL	100

The age distribution of the patients included in the study were as follows(Table II)-

Table II- The age distribution of the patients included in the study

AGE DISTRIBUTION		percent
20-40 yrs	11	11
40-60 yrs	24	24
60-80 yrs	49	49
80-100 yrs	16	16

In the patients studies the common co-morbid diseases were as follows. The commonest being HTN followed by DM, renal failure and IHD (Table III)-

Table III-comorbid diseases in the study

CO-MORBIDITY	NO OF PATIENT
HTN	56
DM	42
RENAL FAILURE	26
IHD	17
CLD	4

In this study 81 patients had CNS symptoms for which CT scan did not reveal any structural abnormality attributable to the cns symptoms, so these cns symptoms were attributed to hyponatremia. The cns symptoms with which the patient presented are as follows (Table IV)-

Table IV-CNS symptoms in patients

CNS SYMPTOMS	NO OF PATIENT
LETHARGY	36
DROWSY+ IRRELEVANT TALK	34
DROWSY+SLOW RESPONSE	33
HEADACHE	9
SEIZURE	5
UNRESPONSIVE	7
CONFUSION	4

In this study 85 patient had non cns symptoms. These symtoms were as follows (Table V)-

Table V-non CNS symptoms

NON CNS SYMPTOMS	NO OF PATIENT
DECREASED APPETITE	38
VOMITTING	34
DIARRHOEA	17
FEVER	14
PAIN ABDOMEN	10

The hydration status of the patient at the time of admission were studied, 60% were euvolemic,27% were overloaded and 13% were dehydrated(Table VI)-

Table VI-Hydration status of patients

HYDRATION STATUS	NO OF PATIENT
NORMAL	60
OVERLOAD	27
DEHYDRATION	13

Among the patients studied 13 patient had serum sodium levels of less than 105 mmol/l, 26 patients had serum sodium level of 105-115 mmol/l and 61 patients had serum sodium levels of 115-125 mmol/l(Table VII)

Table VII-Degree of hyponatremia

DEGREE OF HYPONATREMIA (mmol/l)	NO. OF PATIENT
<105	13
105 – 115	26
>115	61

Among the groups with relation to type of hyponatremia and outcome, there was no significant difference between the groups with regard to outcome and type of hyponatremia(Table VIII) (p value = 0.48)

Table VIII- Distribution of type of hyponatremia are as follows-

Types Of Hyponatremia	Improved	Expired	Total No Of Patient
Isovolemic Hypo-osmolar	47	9	56
Hypervolemic Hypo-osmolar	20	5	25
Hypovolemic Hypo-osmolar	11	6	17
Isovolemic-iso-osmolar	1	0	1
Hypervolemic-iso-osmolar	1	0	1

p- 0.48

The cause of hyponatremia was as follows. The most common being siadh, followed by renal loss, drug induced, gi loss and others(Table IX).

Table IX-Causes of hyponatremia

Etiology	
Others(Malnutrition)	1
Cirrhosis	3
CSW	3
Endocrine	3
Cardiac	4
Drugs	21 (ATT-2, Carbamazepine-1, diutetics-18)
Renal	23
Siadh	30

IV-DISCUSSION

This study was conducted at a tertiary care referral centre. This study was undertaken keeping in view the frequent occurrence of hyponatremia and SIADH in the sick patients in medical wards.

During this study a total of 1390 sick patients admitted to the medicine ward were screened, of whom 100 patients (26.9%) were detected to have hyponatremia (< 135 mMol/L) of various degree. 45% of these patients were male and 55% were females. The mean age of the patients was 63.17±15.65 yrs with a range of 20 yrs to 100 yrs.

The sick inpatients are at a higher risk of development of electrolyte disturbance as these people have physiological changes in the function of Kidneys and they also have multiple co morbid conditions. In our study the common co morbid conditions were Hypertension (56%), Diabetes mellitus (42%), Ischemic heart disease and heart failure (17%), and renal failure (26%), other conditions being chronic liver disease, cerebrovascular disease,infectious diseases like malaria and tuberculosis.

In the present study patients with serum sodium ranged between 125-135 mMol/L. were rarely having any symptoms referable to hyponatremia.. Those patients who had serum sodium levels below 125mMol/L had varied CNS symptoms like lethargy, drowsiness with slow response or irrelevant talk, headache, disturbed sleep, confusion, seizures or unresponsiveness. All these patients were evaluated with imaging studies of brain (CT brain plain & contrast where indicated) and there was no structural lesion attributable to the CNS symptoms, so these CNS symptoms were attributed to hyponatremia. This finding is consistent with the available literature.[1,2,3]

The other common symptom in the patients with serum sodium levels <125mMol/L were vomiting, diarrhea, decreased appetite, pain abdomen and fever with sweating. These symptoms are difficult to interpret as they could be either cause or effect of hyponatremia, and are also found in other conditions without hyponatremia.

Among the patients included in the study there was slight preponderance of elderly females (55%) as compared to males (45%). There is evidence to support the idea that adaptation of the elderly female rat brain to hyponatremia is largely dependent on physical factors (i.e., brain-to-skull size ratio). The Na-K-ATPase pump is one of the major biochemical mechanisms by which the brain adapts to hyponatremia, to prevent brain edema.

Data suggest that the Na-K-ATPase pump function is significantly decreased in female rats with advancing age ,thus explaining the hyponatremia in elderly females.

The reason for this age-related decrease in the sodium pump function is unclear. Factors such as the female sex hormones, which are known to inhibit the Na-K-ATPaseAs such, estrogen and progesterone would be unlikely to contribute to the age-related decrease in sodium pump function that was observed in the older age group. Additionally, if the age-dependent decrease in the sodium pump function was primarily mediated by the sex hormones, one would expect pump activity to increase with advancing age, coincident with the lower circulating levels of estrogen and progesterone. Because the Na-K-ATPase activity decreases with age, it is quite likely that other factors may play a more dominant role in elderly subjects regarding brain adaptation to hyponatremia.

Those factors, which are known to play important roles in brain adaptation to hyponatremia in postmenopausal females, include an age-related decrease in estrogen and progesterone and increased intracranial space (physical factors) due to naturally occurring age-related brain atrophy. On the basis of the results of these studies, it appears that physical factors may be the more dominant factor of the two in ensuring brain survival during hyponatremia in female subjects who are elderly. These findings suggest that even in the presence of cerebral edema, if the brain is able to swell without generating a significant increase of intracranial pressure, the prospects for patient survival may be substantially improved Studies employing magnetic resonance imaging evaluation of the brain have shown, elderly patients with severe hyponatremia (plasma sodium of ~108 mMol/l) and significant cerebral edema may exhibit only minimal symptoms of encephalopathy.

In this study the commonest cause of hyponatremia was due to SIADH (30%) followed by renal causes (23%), then drugs (21%) of which diuretics form a major chunk, Gastrointestinal loses (12%) , endocrine disorders (3%) Cardiac (3%), cerebral salt wasting (3%), cirrhosis of liver (3%) and other etiology like malnutrition (1%). Of these etiologies the worrisome cause is Drug induced hyponatremia, as a major chunk of drugs that cause hyponatremia are diuretics. Though JNC VII recommends diuretics as the first line drug for treatment of hypertension, a word of caution should be maintained while prescribing diuretics in the elderly and when required doses should be modified according to body weight and should begin with the lowest dose.

V-CONCLUSION

In this study the commonest cause of hyponatremia was due to SIADH (30%) followed by renal causes (23%), then drugs (21%) of which diuretics form a major chunk, Of these etiologies the worrisome cause is Drug induced hyponatremia, as a major chunk of drugs that cause hyponatremia are diuretics. Though JNC VII recommends diuretics as the first line drug for treatment of hypertension, a word of caution should be maintained while prescribing diuretics in the elderly and when required doses should be modified according to body weight and should begin with the lowest dose

REFERENCES

[1] Ayus J C ,Krothapalli R K, Arieff A I . Changing concepts in treatment of severe symptomatic hyponatremia: rapid correction and possible relation to central pontinemyelinolysis .Am J Med. 1985:78:897-902.
[2] Dubois G D, Arieff AI. Symptomatic hyponatremia: the case for rapid correction. In Narins R G , ed. Controversies in nephrology and hypertension. New york: Churchil Livingstone; 1984:3393-407.
[3] Richard H sterns. Severe symptomatic hyponatremia: Treatment and outcome, A study of 64 cases: Annals of internal medicine; 1987; 107: 656-664
[4] Davis, RA, Kern F, Showalter R, Sutherland E, Sinesky M, and Simon FR. Alterations of hepatic Na-K-ATPase and bile flow by estrogen: effects on liver surface membrane lipid structure and function. ProcNatlAcadSci USA 75: 4130-4134, 1978
[5] Fraser, CL, and Swanson RA. Female sex hormones inhibit volume regulation in rat brain astrocyte culture. Am J Physiol Cell Physiol 267: C909-C914, 1994[Abstract/Free Full Text].
[6] Weinstein, SP, Kostellow AB, Zeigler DH, and Morrill GA. Progesterone-induced downregulation of electrogenicNa+,K+-ATPase during the first meiotic division in amphibian oocytes. J MembrBiol 69: 41-48, 1982[Medline].