

Hyponatremia in Elderly – Its Prevalence, Aetiology and Outcome.

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ABSTRACT

Background: The most common electrolyte disorder in geriatric age group is hyponatremia thought to be responsible for increased mortality. Lack of data on the prevalence, etiology and outcome of hyponatremia in the elderly from the state of Uttarakhand led us to investigate the same on the elderly hospitalised in a tertiary care hospital in the state of Uttarakhand. **Aims and Objectives:** The purpose of the study was to find out the prevalence of hyponatremia in geriatric population, its etiology and outcome in elderly population. **Methods:** This cross sectional observational study was carried on 526 elderly patients admitted in a tertiary care hospital over a period of 1-year. Demographic, clinical and outcome data of the elderly patients with hyponatremia was collected and efforts were made to elicit its etiology. **Results:** 240 of 526 elderly hospitalized were found to have hyponatremia; 136 (56.6%) were females. Diuretics were found to be the most common cause of hyponatremia, detected in 82 (34.2%) patients, of whom 28(27.1%) were hypovolemic and 54(56.8%) hypervolemic. Other potential causes of hyponatremia included respiratory infections (n=57, 23.7%), chronic liver disease (n=34, 14.1%), syndrome of inappropriate anti-diuretic hormone SIADH (n=10,4.1%), malignancy (8.2%), low sodium diet (n=10,4.1%) and congestive heart failure (n=22,9.2%). Diabetes mellitus (33.7%) and hypertension (27.9%) were the most common co-morbidities associated with hyponatremia. Severe neurological manifestations were detected only in 25(10.4%) while the majority was asymptomatic or had minor symptoms pertaining to hyponatremia. Seventeen (7.1%) patients with moderate (n=12) and severe (n=5) hyponatremia succumbed. **Conclusion:** Hyponatremia is the major electrolyte disorder of the elderly, specially the females. It contributes to morbidity and mortality, however, the severity of hyponatremia is not related to an increase in mortality.

Keywords: Hyponatremia, Elderly, SIADH, Diuretics, Mortality.

INTRODUCTION

Hyponatremia (serum sodium less than 135 mEq/l) is the most common dyselectrolytemia in the geriatric age group^[1] and 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.^[2-4]

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It is categorized as mild (131-135 mmol/l), moderate (121-130 mmol/l), and severe (116-120 mmol/l) and the clinical presentation of patients with hyponatremia varies from mild symptoms like lethargy and malaise to severe neurological manifestations like seizures, altered sensorium and irrelevant talking.^[2] Management of hyponatremia

is etiology-specific and the initial step is the assessment of volume status of the patient which is often challenging especially in elderly frail patients. Common causes of hyponatremia in geriatric hospitalized patients include drugs (thiazide and loop diuretics, proton pump inhibitors, non steroidal anti-inflammatory agents), co-existing morbidities (congestive cardiac failure, chronic kidney disease, chronic liver disease, respiratory infections, volume overload and dehydration etc.^[5-10] The most important cause of euvolemic hyponatremia in the elderly is Syndrome of Inappropriate Anti-diuretic Hormone (SIADH) often over diagnosed as the elderly are often dehydrated.^[11] With the increase in the proportion of the population that is nearing the age of 60 years or above, paucity of data on major health issues in local population plague proper planning and management. We undertook this study to investigate the prevalence of hyponatremia, its etiology and hyponatremia related outcome in the elderly patients admitted to a tertiary care hospital in the north Indian state of Uttarakhand.

MATERIALS AND METHODS

This cross sectional observational study was conducted on consecutive adults aged more than 60 years and admitted in the Himalayan Institute of Medical Sciences, , a tertiary care hospital in the state of Uttarakhand between 2012 and 2013. Written informed consent was obtained from the patients and the institutional ethical clearance was taken. All the admitted patients were investigated for hyponatremia defined as serum sodium < 135 meq/l. Demographic, clinical and relevant laboratory data of all the above patients having hyponatremia was compiled and their volume status recorded. Ineuvoletic hyponatremic patients, SIADH was diagnosed as serum osmolality of less than 275/kg H₂O and urine osmolality of more than 100 mosm/kg H₂O. Sodium concentration was evaluated using dimension RYL Max integrated chemistry system. All patients were followed up till discharge from the hospital and outcomes were categorized as improved or expired. Statistical Analysis was done using SPSS (Statistical Package for the Social Sciences, version 19). The parameters compared included clinical signs and symptoms, volume status of the patient, co-morbidities, cause of admission and final outcome of the patients.

RESULTS

Of the 526 elderly patients hospitalized during the aforesaid period, 240(45.6%) patients had hyponatremia (serum sodium <135 mmol/l). Females constituted 56.6% of the study group and majority of the patients were in the age group of 61-70 years [Table 1] & [Figure 1]. Also the volume status of the elderly subjects with hyponatremia is demonstrated in [Table 2] & [Figure 2]. Diuretics emerged as the most common cause (n=82; 34.2%) of hyponatremia in the hospitalized elderly followed by respiratory tract infections (n=57; 23.7%). SIADH was implicated in 10(4.2%) normovolemic hyponatremic

patients. Other etiologies of hyponatremia are tabulated in [Table 2].

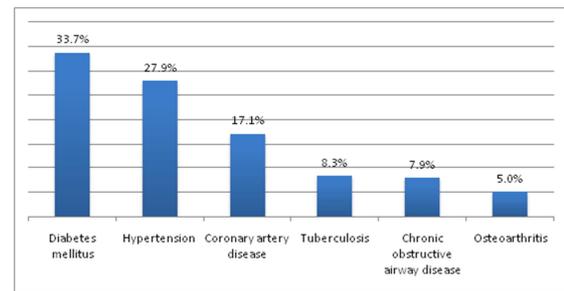


Figure 1: Co-morbidities associated with hyponatremia.

Table 1: Age and sex distribution of patients with hyponatremia (n=240).

Age group (years)	Male	Female
61 – 70	74 (30.8%)	96 (40%)
71 – 80	26 (11.8%)	34 (15.4%)
81 – 90	4 (1.8%)	2 (0.9%)
> 90	0	4 (1.8%)
Total	104 (43.33%)	136 (56.6%)

The various co-morbidities associated with hyponatremia in geriatric patients are shown in [Table 3] & [Figure 3]. Diabetes mellitus (n=81; 33.7%) and hypertension (n=67; 27.9%) were the prominent co-morbidities. One hundred (41.6%) patients with hyponatremia were asymptomatic; orthostatic hypotension (n=61; 25.4%), lethargy (n=54; 22.5%) were reported as the major clinical manifestations. Only 25(10.4%) patients had severe neurological features in the form of altered behaviour and seizures. Seventeen (7.1%) patients succumbed, of which only 5(29.4%) had severe hyponatremia (serum sodium<120meq/l).

Table 3: Impact of severity of hyponatremia on the patient outcome (n=240).

Level of hyponatremia (Serum sodium mEq/L)	Dead N=17 (7.1%)	Improved N=223 (92.9%)
Mild (131-135)	0	135 (60.5%)
Moderate (121-130)	12 (70.6%)	55 (24.67%)
Severe < 120	5 (29.4%)	33 (14.8%)

Table 2: Etiologies of hyponatremia in the elderly according to the volume status.

Variables	Total (n=240)	Hypovolemia n=103; 42.9%	Normovolemia n=42; 17.5%	Hypervolemia n=95; 39.6%
Low sodium diet	10(4.1%)	6(5.8%)	4(9.5%)	0
Diuretics	82(34.2%)	28(27.18%)	0	54(56.8%)
SIADH	10(4.1%)	0	10(23.8%)	0
Respiratory causes	57(23.7%)	45(43.7%)	12(28.6%)	0
Malignancy	14(5.8%)	14(13.6%)	0	0
Acute CVA	11(4.5%)	10(9.7%)	1(2.3%)	0
CLD	34(14.2%)	0	10(23.8%)	24(25.6%)
CHF	22(9.2%)	0	5(11.9%)	17 (17.9%)

DISCUSSION

Hyponatremia is the major dyselectrolytemia of the elderly and was seen in 45.6% hospitalized elderly

patients. Although the previous studies have reported the prevalence between 18-22.3%, more number of patients enrolled in our study seems to be the reason of the higher prevalence in the current study.^[12-14] Physiological changes occur with increasing age

producing water and electrolyte imbalances secondary to trivial stresses leading to hyponatremia; diagnosing the etiology and its appropriate management is a challenging task.

Hyponatremia was more common in elderly females compared to males in our study concordant with the findings of Miller M et al.^[15] Chronic hyponatremic encephalopathy was studied by Ayus JL et al in post menopausal females.^[16] Ageing is associated with brain atrophy which increases the intracranial space that facilitates the adaptation of the brain to the effect of hyponatremia especially in post menopausal women. Earlier studies showing that the effect of hyponatremia in elderly female rat brain depends mainly on brain to skull size ratios lend credence to the hypothesis. It has also been suggested that the female elderly patients do not show signs of raised intracranial pressure easily even in the presence of cerebral edema due to hyponatremia.^[22] The literature is bereft of case reports demonstrating increased susceptibility of hypertensive women to developing hyponatremia.^[18-20] Diuretics were the commonest cause of hyponatremia in our study. Sharabi et al in their study concluded that elderly females were particularly higher risk of developing diuretic induced hyponatremia^[17] the reason of which is largely unclear. However, it has been suggested that women compensate the effect of thiazide diuretics by drinking more water.^[21]

For every 5mmol/l rise in serum glucose level, there is fall in serum sodium by 1.6 to 2.4 mmol/l, as glucose is an osmotically active molecule.^[23] Diabetes mellitus was the commonest associated comorbidity, although, only 37% of the diabetics had a poor glycemic control (considered at HbA1c>7%). Three-fourth of the hypertensive patients in our study were receiving diuretics, most commonly thiazide diuretics (44.7%) that is known to precipitate hyponatremia as discussed earlier.^[21]

SIADH was found in only 4.2% patients in our study in contrast to nearly half of the patients studied by Clayton et al.^[6] A study from Israel concluded that cause of hyponatremia in elderly is multifactorial and reported SIADH in nearly 45% of patients.^[24] However, Sozio et al challenged the study on the premise that the diagnosis of SIADH is largely dependent on assessment of volume status of the patients and no marker can assess the volume status of the elderly patients reliably.^[25]

Most of the previous studies have hinted towards higher mortality due to hyponatremia ranging from 33% to 86%.^[26] In our study, only 7.1% patients succumbed which was apparently due to early diagnosis and appropriate management of these patients. There is no significant correlation between severity of hyponatremia and mortality rate in our study. Only five patients with severe hyponatremia succumbed. Nearly 60% of those who succumbed were males and it can be extrapolated that females

respond better to treatment compared to sick geriatric males. Mortality was attributed to causes such as septic shock, acute cardiac arrest, aspiration pneumonia, and malignancy in isolation or combination. Gill G et al concluded that the risk of morbidity and mortality is higher in those with severe hyponatremia when compared to normonatremic patients making a case for their better monitoring and surveillance.^[28]

The limitation of our study was that hyponatremia as an independent cause of mortality could not be ascertained and other outcome measures viz. duration and cost of hospitalization was not studied in its relation. Nevertheless, the large study group and implication of diuretics as the major cause of hyponatremia is the strength of our study. The study highlights the importance of assessing the volume status.

CONCLUSION

An early detection and correction of hyponatremia can greatly prevent unfavorable outcomes, comorbidities and mortality in both the genders of geriatric patients

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