

Study of Evaluation of Prevalence of Hyponatremia Among Elderly Population

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ABSTRACT

Background: The present study was conducted for assessing the prevalence of hyponatremia among elderly population.

Materials & methods: A total of 400 subjects of more than 60 years of age were screened during the study period. Blood samples were obtained from all the patients. All the samples were sent to laboratory where serum sodium levels were evaluated using auto-analyzer. Hyponatremia was defined as serum sodium < 136 mEq/L. grading of hyponatremia was further done as Mild hyponatremia: Serum sodium between 130 and 135 mEq/L, Moderate hyponatremia: Serum sodium between 125 and 129 mEq/L, and severe hyponatremia: Serum sodium less than 125 mEq/L. Comorbidities were recorded separately. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS Software.

Results: Out of the 400 subjects, hyponatremia was found to be present in 104. Hence; overall prevalence of hyponatremia was 26 percent. While evaluating the results by univariate analysis, it was seen that increasing age, history of hospitalization and presence of diabetes were found to be significant risk factors for occurrence of hyponatremia. Among these 104 patients with hyponatremia, 54 patients were having

mild hyponatremia, 39 patients were having moderate hyponatremia and remaining 11 patients were having severe hyponatremia.

Conclusion: Hyponatremia is common in elderly patients. Hence; timely monitoring of serum sodium levels with age should be done.


Key words: Sodium, Hyponatremia, Elderly.

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INTRODUCTION

Sodium is essential for cellular homeostasis and physiological function. Excess dietary sodium has been linked to elevations in blood pressure (BP). Salt-sensitivity of BP varies widely, but certain subgroups tend to be more salt-sensitive. The mechanisms underlying sodium-induced increases in BP are not completely understood, but may involve alterations in renal function, fluid volume, fluid regulatory hormones, the vasculature, cardiac function, and the autonomic nervous system.¹⁻³ Given the presence of added salt in a wide range of commonly used food products, a clinically relevant food deficit of sodium is extremely unlikely in healthy individuals. Indeed, a deficiency of sodium does not occur under normal conditions even with diets very low in sodium. In contrast, an excess of sodium in food is common to most populations worldwide, because of both the salt added to

products during food processing and the widespread habit of adding additional amounts of salt in food preparation in the kitchen and at the table. This excess is a recognized causative factor of hypertension and cardiovascular diseases (CVDs) and also contributes to the development of chronic kidney disease, gastric cancer, calcium nephrolithiasis, and osteoporosis.^{4, 5} Hyponatremia is often discovered incidentally on routine blood testing. It is classically divided into mild (130–134 mmol/l), moderate (125–129 mmol/l) and severe (<125 mmol/l). Symptoms attributable to hyponatremia are caused chiefly by excessive entry of water into brain cells and include malaise, headache, nausea and confusion.^{6, 7} Hence; the present study was conducted for assessing the prevalence of hyponatremia among elderly population.

MATERIALS & METHODS

The present study was conducted in Department of General Medicine, Ayaan Institute of Medical Sciences, Kanakamamidi Village, Moinabad Mandal, Rangareddy, Telangana (India) for assessing the prevalence of hyponatremia among elderly population. A total of 400 subjects of more than 60 years of age were screened during the study period. Complete demographic and clinical details of all the patients was obtained. Complete medical details in relation to past medical problems, medications and hospitalizations were also recorded. Blood samples were obtained from all the patients. All the samples were sent to

laboratory where serum sodium levels were evaluated using auto-analyzer. Hyponatremia was defined as serum sodium < 136 mEq/L. grading of hyponatremia was further done as Mild hyponatremia: Serum sodium between 130 and 135 mEq/L, Moderate hyponatremia: Serum sodium between 125 and 129 mEq/L, and severe hyponatremia: Serum sodium less than 125 mEq/L. Comorbidities were recorded separately. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS Software. Univariate analysis was done for evaluation of level of significance.

Table 1: Prevalence of hyponatremia

Hyponatremia	Number	Percentage
Present	104	26
Absent	296	74
Total	400	100

Table 2: Univariate analysis

Variable	95 % CI	p-value
Age	-0.568 to 1.776	0.001 (Significant)
Gender	-0.311 to 0.325	0.096
Diabetes	-0.956 to 1.845	0.001 (Significant)
Hypertension	-0.215 to 0.295	0.782
History of hospitalization	-0.862 to 1.821	0.041 (Significant)

RESULTS

A total of 400 subjects with age of more than 60 years were analyzed. Mean sodium levels were found to be 141.3 mEq/L. Out of the 400 subjects, hyponatremia was found to be present in 104. Hence; overall prevalence of hyponatremia was 26 percent. While evaluating the results by univariate analysis, it was seen that increasing age, history of hospitalization and presence of diabetes were found to be significant risk factors for occurrence of hyponatremia. Among these 104 patients with hyponatremia, 54 patients were having mild hyponatremia, 39 patients were having moderate hyponatremia and remaining 11 patients were having severe hyponatremia.

DISCUSSION

Hyponatremia is the commonest electrolyte imbalance encountered in clinical practice. It is associated with multiple poor clinical outcomes including increased mortality, increased length of hospital stay and institutionalization. Hyponatremia occurs due to disruption of sodium and water homeostasis, normally maintained by complex multi-system physiological mechanisms. It represents an excess of water relative to sodium, though both sodium and total body water may be increased, normal or diminished.^{7, 8} It is also one of the commonest electrolyte imbalances encountered in clinical practice. It is associated with multiple poor clinical outcomes including falls, fractures, increased length of hospital stay, institutionalization and mortality. Prevalence is known to increase in frail patient groups, such as elderly, hospitalized, peri-operative patients with a fracture.^{8- 10} Hence; the present study was conducted for assessing the prevalence of hyponatremia among elderly population.

A total of 400 subjects with age of more than 60 years were analyzed. Mean sodium levels were found to be 141.3 mEq/L. Out of the 400 subjects, hyponatremia was found to be present in 104. Hence; overall prevalence of hyponatremia was 26 percent. Cumming, K et al established prevalence, incidence and etiology of hyponatremia in elderly patients with fragility fractures (EPFF). 127/212 (60%) EPFF were recruited (mean age 79 yrs, 78% female). Two participants withdrew mid-study. Of those not recruited, 66 had incapacity to consent and 19 refused participation. Point prevalence of hyponatremia on admission was 13.4% and a further 12.6% developed hyponatremia during admission. Hypovolemic hyponatremia was predominant (70%). 73% of cases were multi-factorial in etiology. The commonest potentially causative factors in cases of hyponatremia were thiazide diuretics (76%), dehydration (70%), proton pump inhibitors (70%), SIADH (27%) and mirtazapine (15%). Hyponatremia is highly prevalent in EPFF, seen in 26% of cases.¹¹

Hyponatremia is the most frequent electrolyte disorder both in hospitalized patients and in community subjects. Elderly patients represent a high-risk group for the occurrence of hyponatremia because age is a strong independent risk factor for hyponatremia. Furthermore, the symptomatology of acute hyponatremia (developed in <48 h) such as nausea, vomiting, headache, stupor, coma and seizures, as well as manifestations (even mild) associated with chronic hyponatremia, such as fatigue, cognitive impairment, gait deficits, falls, adverse effects on bone quality (eg, osteoporosis) and fractures, are more frequent and severe in elderly patients.^{12- 15}

In the present study, while evaluating the results by univariate analysis, it was seen that increasing age, history of hospitalization and presence of diabetes were found to be significant risk factors for occurrence of hyponatremia. Among these 104 patients with hyponatremia, 54 patients were having mild hyponatremia, 39 patients were having moderate hyponatremia and remaining 11 patients were having severe hyponatremia. Hyponatraemia complicates a wide range of clinical entities but is especially prevalent in older people. The overall prevalence in the hospital population is about 15% [Upadhyay et al. 2006] but is much higher in certain vulnerable populations, such as admissions to acute geriatric medicine, where hyponatraemia is observed in almost half of all cases [Hoyle et al. 2006]. Chronic hyponatraemia is present in 18% of nursing home residents [Miller et al. 1995]. The reasons for the higher prevalence in old age relate to increased prevalence of comorbidity, high rates of prescribing of drugs known to cause hyponatraemia and ageing-related changes to homeostatic mechanisms.¹⁶⁻¹⁸

The incidence, risk factors, etiology, and associations of hyponatremia in community-dwelling elderly with geriatric morbidity and mortality was assessed in a study conducted by Ganguli A et al. The study population (n = 608) had a mean age of 84.3 ± 9.3 years and was largely female (77.1%) and African-American (89.5%). Mean follow-up was 41.5 months. Frailty was seen in 44.4%. Incidence of all-cause mortality was 26.9%. Initial hyponatremia occurred in 8.71% (n = 53), and persistent hyponatremia (> 6 months of low serum sodium) in 4.1% (n = 25) of the study population. The major causes of hyponatremia included multiple potential causes, idiopathic syndrome of inappropriate antidiuretic hormone (SIADH) and medications (thiazides and selective serotonin reuptake inhibitor (SSRI)). Primary outcome was independently associated with frailty (Odds ratio (OR) of 2.33) and persistent but not initial hyponatremia (OR 3.52). Secondary outcome was independently associated with age > 75 years (OR 2.88) and Afro-American race (OR 2.09) only but not to frailty or hyponatremia.¹⁹

CONCLUSION

Hyponatremia is common in elderly patients. Hence; timely monitoring of serum sodium levels with age should be done.

REFERENCES

1. Cannon WB. Organization for physiological homeostasis. *Physiol Rev.* 1929;9:399–431.
2. Bernstein AM, Willett WC. Trends in 24-h urinary sodium excretion in the United States, 1957-2003: a systematic review. *Am J Clin Nutr.* 2010;92:1172–80.
3. Kawasaki T, Delea CS, Bartter FC, et al. The effect of high-sodium and low-sodium intakes on blood pressure and other related variables in human subjects with idiopathic hypertension. *Am J Med.* 1978;64:193–8.
4. Chua M., Hoyle G.E., Soiza R.L. Prognostic implications of hyponatremia in elderly hospitalized patients. *Arch. Gerontol. Geriatr.* 2007;45:253–258.
5. Soiza R.L., Hoyle G.E., Chua M.P.W. Electrolyte and salt disturbances in older people: Causes, management and implications. *Rev. Clin. Gerontol.* 2008;18:143–158.

6. Renneboog B., Musch W., Vandemergel X., Manto M.U., Decaux G. Mild Chronic Hyponatremia Is Associated with Falls, Unsteadiness, and Attention Deficits. *Am. J. Med.* 2006;119
7. Chung HM, Kluge R, Schrier RW, Anderson RJ. Postoperative Hyponatremia. A Prospective Study. *Surv Anesthesiol* 1986; 30: 292.
8. Verbalis JG, Goldsmith SR, Greenberg A, Schrier RW, Sterns RH. Hyponatremia Treatment Guidelines 2007: Expert Panel Recommendations. *Am J Med* 2007; 120: S1–S21.
9. Cumming K., Hoyle G.E., Hutchison J.D., Soiza R.L. Prevalence, incidence and etiology of hyponatremia in elderly patients with fragility fractures. *PLoS One.* 2014;9:e88272.
10. Rosholm J., Nybo H., Andersen Ranberg K., Himmelstrup B., Skjelbo E., Christensen K., Gram L.F. Hyponatraemia in Very Old Nonhospitalised People: Association with Drug Use. *Drugs Aging.* 2002;19:685–693.
11. Cumming, K., Hoyle, G. E., Hutchison, J. D., & Soiza, R. L. Prevalence, incidence and etiology of hyponatremia in elderly patients with fragility fractures. *PloS one* 2014; 9(2), e88272.
12. Renneboog B, Musch W, Vandemergel X, Manto MU, Decaux G. Mild chronic hyponatremia is associated with falls, unsteadiness, and attention deficits. *Am J Med.* 2006;119(1):71.e1–8.
13. Hoorn EJ, Rivadeneira F, van Meurs JB, et al. Mild hyponatremia as a risk factor for fractures: the Rotterdam Study. *J Bone Miner Res.* 2011;26(8):1822–28.
14. Renneboog B, Sattar L, Decaux G. Attention and postural balance are much more affected in older than in younger adults with mild or moderate chronic hyponatremia. *Eur J Intern Med.* 2017;41:e25–e26.
15. Gosch M, Joosten-Gstrein B, Heppner HJ, Lechleitner M. Hyponatremia in geriatric inpatient patients: effects on results of a comprehensive geriatric assessment. *Gerontology.* 2012;58(5):430–40.
16. Upadhyay A., Jaber B.L., Madias N.E. Incidence and prevalence of hyponatremia. *Am J Med* 2006; 119: S30–S35.
17. Hoyle G.E., Chua M., Soiza R.L. Prevalence of hyponatremia in elderly patients. *J Am Geriatr Soc* 2006; 54: 1473.
18. Miller M., Morley J.E., Rubenstein L.Z. Hyponatremia in a nursing home population. *J Am Geriatr Soc* 1995; 43: 1410–13.
19. Ganguli A, Mascarenhas RC, Jamshed N, Tefera E, Veis JH. Hyponatremia: incidence, risk factors, and consequences in the elderly in a home-based primary care program. *Clin Nephrol.* 2015;84(2):75-85. doi:10.5414/CN108453

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