Original Article

A Study on Clinical Profile of Euvolemic Hyponatremia in Elderly Hospitalized patient

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How to cite this article: Dumpa Pavankumar, Anish Reddy P, Shivanaduni Srinivas et. al. A Study on Clinical Profile of Euvolemic Hyponatremia in Elderly Hospitalized patient. Indian Journal of Public Health Research and Development / Vol. 16 No. 2, April-June 2025.

Abstract

Background and Aim: The study aims to delineate the clinical characteristics and management challenges of euvolemic hyponatremia in the elderly hospitalized population, with a focus on improving patient outcomes through better understanding and treatment of this condition.

Materials and Methods: This study was done on patients, who were admitted to Chalmeda Anand Rao Institute of Medical Sciences Hospital, Karimnagar during a period of 2 years. A total of 50 patients with Euvolemic Hyponatremia (29 male, 21 female) were studied.

Results: Among 50 patients, 29 are male, accounting for 58%of the cases, while 21 are female, making up the remaining 42%. This indicates that euvolemic hyponatremia is more prevalent in males compared to females. Euvolemic hyponatremia in elderly hospitalized patients reveals that the highest incidence occurs in the 71-80 years age group, which accounts for 50% of the cases, the prevalence decreases with age, with the 61-70 years group comprising 44% of the patients, and > 80 years groups each representing 6% of the total. Syndrome of inappropriate antidiuretic hormone secretion (SIADH) is a cause in 18% of patients, with drug-induced hyponatremia and hypothyroidism affecting 16% and 14%, respectively.

Conclusion: This study offers a comprehensive examination of the clinical profile of euvolemic hyponatremia in elderly hospitalized patients. The most common symptoms of lethargy, dizziness, underscore the need for vigilant monitoring, particularly given that asymptomatic cases are frequent. The identification of SIADH, drug-induced hyponatremia, and hypothyroidism as common underlying causes emphasizes the necessity of thorough diagnostic evaluation.

Keywords: Euvolemia, Hyponatremia, SIADH, elderly hospitalized patients

Introduction

Hyponatremia, characterized by a plasma sodium content of less than 135 mEq/L, is the most common electrolyte observed in hospitalized patients, with a particularly high prevalence among the elderly

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Submission date: August 12, 2024 **Acceptance date**: October 3, 2024 **Published date: March 11, 2025**

due to their impaired ability to maintain water and electrolyte homeostasis.[1] Euvolemic hyponatremia, where patients do not exhibit signs of dehydration or over hydration, is frequently encountered in clinical practice and is often associated with the syndrome of inappropriate antidiuretic hormone secretion (SIADH), hypothyroidism, or adrenalin sufficiency.[2]

Epidemiology, Hyponatremia is most common electrolyte problem in patients who are admitted to hospital with a frequency ranging from 20-35%. This phenomenon is especially prevalence among older population because they have limited access to food and drink, use many medicines and have multiple coexisting medical conditions. This study focuses on immediate outcomes and does not provide data on long term prognosis.

The clinical manifestations of hyponatremia are diverse and can range from asymptomatic to severe neurological symptoms, which can lead to increased morbidity and mortality if not managed appropriately. [3] Interestingly, while euvolemic hyponatremia is the most common type of hyponatremia in hospitalized patients, its diagnosis and management remain challenging due to the variety of underlying etiologies and the potential for non specific clinical presentations.[4] Appropriate management and close monitoring to improve outcomes and reduce mortality. The study found that lower GCS scores were assess with higher mortality rates. Moreover, the condition has been linked to an increased risk of fall in the elderly, highlighting the need for targeted prevention strategies.[5] The introduction of new drugs such as lixivaptan, a selective vasopressin V2-receptor antagonist, has shown promise in safely correcting serum sodium concentrations, indicating advancements in treatment options. [6]

The study aim was to assess the clinical profile of euvolemic hyponatremia in elderly hospitalized patients.

Materials and Methods

Study Design

The Study design was a Prospective observational study.

Study Centre:

The study was conducted at Department of General Medicine, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar.

Study Duration:

The study duration was 2 years.

Inclusion Criteria:

- Subjects age > 60 years
- Gender
- Patients admitted to MICU
- Hypertension
- Diabetes mellitus

Exclusion Criteria:

- Patients aged <60 years
- Patients with hypovolemic hyponatremia (vomiting, diarrhoea)
- Patients with hypervolemic hyponatremia (CCF,CKD,CLD)

Ethical Approval

This study protocol was approved by the Institute Ethical Committee, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar (Ref.No.CAIMS/IEC/PH/049/dated: 3.9.2022).

Statistical Analysis

SPSS (version 29.0) program was used to input and analyse data. The qualitative data were described in terms of numbers and percentages. Descriptive statistics will be used to summarize will be analysed using appropriate statistical methods. Sub group analyses may be performed based on demographic or clinical characteristics. The obtained results were considered significant at the 95% level.

Results

In elderly hospitalized patients reveals that the highest incidence occurs in the 71-80 years age group, which accounts for 50% of the cases. The prevalence decreases with age, with the 61-70 years group comprising 44% of the patients, and > 80 years groups each representing 6% of the total.

Table 1: Distribution of study subjects based on age

Age (Years)	Number of patients (N)	Percentage (%)
61-70 years	22	44%
71-80 years	25	50%
>80	3	6%
Total	50	100%

Table 2: Distribution of study subjects based on gender

Gender	Number of Patients (N)	Percentage (%)
Male	29	58%
Female	21	42%

Out of the total 50 patients, 29 are male, accounting for 58% of the cases, while 21are female, making up the remaining 42%, more prevalent in males compared to females in the studied population.

Table 3: Distribution of study subjects based on GCS score Vs Hyponatremia Severity

Hyponatremia Severity	GCS Score	Number of Patients	Percentage
Mild	>13	23	46%
Moderate	08-12	18	36%
Severe	<8	9	18%

Among the 50 patients evaluated, 46% had mild hyponatremia with a GCS score >13, Moderate hyponatremia with GCS scores between 8 and 12 was observed in 36% of the patients. Mean while, severe hyponatremia, characterized by a GCS score of < 8 was seen in 18% of the patients.

Table 4: Distribution of Subjects based on Symptoms

Symptom	Count	Percentage
Asymptomatic	20	20%
Lethargy	11	22%
Dizziness	10	20%
Abnormal behaviour	5	10%
Seizures	3	6%
Coma	1	2%

This data emphasizes that most common symptoms is lethargy (22%), followed by asymptomatic cases (20%), dizziness (20%). Abnormal behavior (10%), Seizures (6%) and coma (2%) are less common.

Table 5: Distribution of study subjects based on Diagnosis

Diagnosis	Number of Patients	Percentage
Hypothyroidism	13	26%
SIADH	18	36%
Drug-induced	15	30%
Adrenal insufficiency	1	2%
Meningitis	1	2%
Malignancy	2	4%
Total	50	100%

This break down emphasizes the diverse etiological factors contributing to hyponatremia in the studied population, with SIADH, hypothyroidism, and drug-induced causes being the most prevalent. Drugs used are fluoxetine, amtitriptyline, Antipscyotics and antiepileptics.

Table 6: Distribution of study subjects based osmolarity and sodium levels

Severity	Mean Serum Osmolarity	Mean Urinary Osmolarity	Mean Urinary Sodium
Mild	280mOsm/kg	500mOsm/kg	40mmol/L
Moderate	260mOsm/kg	450mOsm/kg	35mmol/L
Severe	240mOsm/kg	400mOsm/kg	30mmol/L

This trend indicates that as hyponatremia severity increases, serum and urinary osmolarity and sodium levels decrease, reflecting the worsening electrolyte imbalance and impaired water excretion as associated with more severe forms of hyponatremia. Daily fluid restriction < 1 liter, use of vasopressin 2 receptor selective antagonists for non-responders.

Table 7: Distribution of study subjects based on severity

Severity(n=9)	Drug Use	SIADH	Liver Failure	Recovered	Died
Severe	1	1	1	3	3

This data underscores the critical nature of severe hyponatremia, as it is associated with significant mortality despite some patients recovering.

Table 8: Distribution of study subjects based on outcome

Outcome	Number of Patients	Percentage
Recovered	43	86%
Death	7	14%

Among patients with hyponatremia, the majority, constituting 86%, experienced recovery, while 14% unfortunately succumbed to the condition. These findings underscore the importance of timely diagnosis, appropriate management, and close monitoring to improve outcomes and reduce mortality in patients with hyponatremia. Recovered patients were discharged; follow up was not done in our study.

Discussion

The clinical profile of euvolemic hyponatremia in elderly hospitalized patients is multifaceted, with various studies highlighting its prevalence, aetiology, and associated risks. Euvolemic hyponatremia, characterized by a normal fluid balance with low serum sodium levels, is the most common type of hyponatremia in hospitalized patients. The condition is particularly prevalent among the elderly due to their impaired ability to maintain water and electrolyte homeostasis, which contributes to significant morbidity and mortality. Contradictions and interesting facts emerge when considering the causes and implications of euvolemic hyponatremia. While the syndrome of inappropriate antidiuretic hormone secretion (SIADH) is a common cause, other factors such as medication use, particularly diuretics, and underlying endocrine disorders also play a role.

Notably, the study of euvolemic hyponatremia's association with falls in the elderly highlights its impact on patient safety, with mild hyponatremia being an independent risk factor for falls (Hyohdoh et al., (2023). [7] Furthermore, the introduction of new therapeutic agents like lixivaptan has shown promise in safely correcting serum sodium concentrations in euvolemic hyponatremia.

In summary, euvolemic hyponatremia in elderly hospitalized patients is a common and complex condition with diverse etiologies and significant clinical implications. The condition's association with increased morbidity and mortality underscores the importance of accurate diagnosis and appropriate management. The advent of new treatments offers hope for more effective management, but the need for careful evaluation of underlying causes remains paramount. Future research should continue to explore the mechanisms and treatment strategies for euvolemic hyponatremia to improve patient outcomes. The study on the clinical profile of euvolemic hyponatremia in elderly hospitalized patients categorized participants based on the severity of their hyponatremia in to mild, moderate, and severe. In the mild category (ages 61-70), there were 10 males and 12 females, with 3 asymptomatic patients.

The study also provides a gender-based distribution of the condition, with 29 males accounting for 58% of the cases, while 21 females make up the remaining 42%. This indicates that euvolemic hyponatremia is more prevalent in males compared to females in the studied population**.** It is because more males in the sample of study. The most common symptom is lethargy (22%), followed by asymptomatic cases, dizziness.

Abnormal behaviour (10%), seizures (6%), and coma (2%) are less common. Syndrome of inappropriate antidiuretic hormone secretion (SIADH) is a cause in 18% of patients, with drug-induced hyponatremia and hypothyroid is affecting 16% and 14%, respectively. The GCS scores show that 68% of patients have a GCS > 13, indicating mild impairment, while 22% have a GCS between 8-12, and10% have a GCS<8, indicating severe impairment. Hyponatremia severity is mild in 46% of cases, moderate in 36%, and severe in 18%. Regarding volume status, 52% of patients are euvolemic, 30% are hypovolemic, and 18% are hypervolemic.

The study's outcomes for severe hyponatremia highlight the critical nature of the condition, as it is associated with significant mortality despite some patients recovering. The presence of underlying conditions such as drug use, SIADH, and may complicate the prognosis and outcomes for these patients.

The study provides data on the mean serum osmolarity, mean urinary osmolarity, and mean urinary sodium levels across different severities of hyponatremia. For mild hyponatremia, the mean serum osmolarity is 280 mOsm/kg, the mean urinary osmolarity is 500 mOsm/kg, and the meanurinarysodiumis40mmol/L. In moderate hyponatremia, these values decrease to 260 mOsm/kg for mean serum osmolarity, 450mOsm/kg for mean urinary osmolarity, and 35 mmol/L for mean urinary sodium. Severe hyponatremia shows the lowest values, with a mean serum osmolarity of 240 mOsm/kg, mean urinary osmolarity of 400 mOsm/kg, and mean urinary sodium of 30 mmol/L.

A study by Yuki Hyohdoh et al [7] explores the impact of mild hyponatremia on the incidence of in-hospital falls among elderly patients. The findings highlight the significant risks associated with even mild hyponatremia, such as increased fall rates, which underscores the importance of monitoring and managing sodium levels to prevent such adverse outcomes.

Compared to the current study, Hyohdoh et al [7] research emphasizes the broader implications of mild hyponatremia on patient safety, whereas the current study provides a detailed breakdown of demographic and clinical characteristics across different severities of hyponatremia. Lixivaptan safely and effectively corrects serum sodium concentrations in hospitalized patients with euvolemic hyponatremia by William T. Abraham et al.[8] Kidney International which investigates the efficacy of Lixivaptan in correcting serum sodium levels in patients with euvolemic hyponatremia.

The results demonstrate the drug's effectiveness in normalizing odium concentrations without significant adverse effects. The current study, by contrast, focuses more on the clinical profile and outcomes of hyponatremia rather than treatment options. Abraham et al.'s work is treatment-centric, while the current study is descriptive and diagnostic parameters.

A study of the clinical profile of hyponatremia in elderly patients admitted to medical wards by Chandregowda et al.[9] provides a comprehensive overview of hyponatremia's clinical profile in elderly patients, similar to the current study. Both studies highlight common symptoms, causes, and demographic distributions, with a focus on the elderly population. However, Chandregowda et al. [9] study may offer a broader range of patient conditions and outcomes, while the current study provides a specific focus on euvolemic hyponatremia and its severity-related characteristics.

A study by Shaik Mahezabeen et al (2023) [8] descriptive study on hyponatremia in elderly patients aligns closely with the current study in terms of objectives and scope. Both studies categorize hyponatremia by severity and analyze associated symptoms and outcomes. However, Shaik Mahezabeen et al. [8] may place more emphasis on hospital-based management practices and patient care strategies, while the current study details the statistical and clinical profile distribution.

A study by Mahim Mittal et al[11] Insights into the profile of hyponatremia in a tertiary care setting, which may include diverse patient demographics and etiologies. The current study's focus on euvolemic hyponatremia provides a narrower scope, detailing specific clinical parameters and outcomes. Mittal et al.' [11] broader approach can complement the specific findings of the current study by providing a wider context for hyponatremia management. A study by Talia Diker-Cohen (2018) et al [12] showed that euvolemic hyponatremia induced by endocrine disorders, provided a detailed exploration of specific causes and their clinical management.

The current study complements this by offering a broader look at the clinical profile and outcomes of euvolemic hyponatremia in elderly patients, including but not limited to endocrine causes also Diker-Cohen et al.'s focus on endocrinopathy offers a more targeted analysis of one cause, enriching the current study's findings. Usmanetal [13] provide a clinicopathological profile of hyponatremia in

medical wards, which aligns with the current study's objectives. Both studies discuss symptoms, causes, and outcomes, but Usman et al. may offer a broader etiological spectrum.

The current study's detailed analysis of euvolemic hyponatremia by severity and related clinical parameters provides a focused contribution to understanding specific patient profiles and outcomes. Summary Overall, the current study complements existing literature by providing detailed demographic, clinical, and outcome data specific to euvolemic hyponatremia in elderly patients, enriching the broader context of hyponatremia research through its focus on severity-related characteristics and outcomes.

Conclusion

In conclusion, this study offers a comprehensive examination of the clinical profile of euvolemic hyponatremia in elderly hospitalized patients, contributing significantly to the existing body of knowledge on this prevalent and complex condition. The research highlights the condition's highest incidence. The most common symptoms of lethargy, dizziness, and nausea/vomiting underscore the need for vigilant monitoring, particularly given that asymptomatic cases are frequent. The identification of SIADH, drug-induced hyponatremia, and hypothyroidism as common underlying causes emphasizes the necessity of thorough diagnostic evaluation.

The study's detailed analysis of hyponatremia severity and its correlation with serum osmolarity, urinary osmolarity, and urinary sodium levels provides valuable clinical parameters for patient assessment. The findings underscore the critical nature of severe hyponatremia, given its association with significant mortality, despite some patients achieving recovery. The research suggests that the advent of new treatments like lixivaptan may revolutionize the management of euvolemic hyponatremia. Future studies can build upon these findings to advance the field further. Overall, this study underscores the complexities of euvolemic hyponatremia in elderly patients, emphasizing the need for accurate diagnosis, careful evaluation of underlying causes, and effective management strategies to improve patient outcomes.

Conflict of Intrest: Nil

Funding: Nil

References

1. Baji PP, Borkar SS. Clinico-etiological profile and outcome of hyponatremia in hospitalised adult patients. IntJ Scientific Reports. 2015; 1(7):293-8.
2. Saeed BO, Beaumont D, Handley GH, Weaver JU. Severe hyponatraemia: investigation and management in a district general hospital. J Clin Pathol. 2002; 55(12):893-6.
3. Shannon, Gabriel. Severe hyponatraemia- recognition and management. Australian Prescriber. 2011; 34:42-45.
4. Miller M, Morley JE, Rubenstein LZ. Hyponatremia in a nursing home population. J Am Geriatr Soc. 1995; 43(12):1410-3.
5. Panicker GISJ. A Prospective study on clinical profile of hyponatremiain ICU hospitalized patients. Int J Biomed Adv Res. 2014; 5(6):297-303.
6. Anderson RJ. Hospital-associated hyponatremia. Kidney Int. 1986; 29(6):1237-47.
7. Hyohdoh Y, Hiyama M, Hatakeyama Y, Okuhara Y. Effect of mild hyponatremia on in-hospital falls of elderly hospitalized patients: A retrospective, cohort study. Arch Gerontol Geriatr. 2024; 118:105315.
8. Mahezabeen Shaik, Sekhar B, Kumar G. Hospital based descriptive study of hyponatremia in elderly patients. Int J Scientific Res. 2023; 32-33.
9. Chandregowda, Mahesh K., Anagha Unnikrishnan. Study of clinical profile of hyponatremia in elderly patients admitted to medical wards at Mandya Institute of Medical Sciences, Mandya. Int J Adv Med. 202; 8(3):390-394.
10. Shaik Mahezabeen, S, Siva Sekhar B, Vijaya Kumar G. Hospital based Descriptive study of Hyponatremia in Elderly Patients. Int J Scientific Res. 2023; 12(1):32-33.
11. Mittal Mahim, Shikha, Deep Khurana Hunny. Profile of hyponatremia in a tertiary care centre in North India. Int J Ad Med. 2016; 3(4):1011-1015.
12. Diker-Cohen T, Rozen-Zvi B, Yelin D, Akirov A, Robenshtok E, Gafter-Gvili A, Shepshelovich D. Endocrinopathy-induced euvolemic hyponatremia. Int Emerg Med. 2018; 13(5):679-688.