Original Article

Patterns And Clinical Correlates Of Hyponatraemia Among Medical Admissions In A Tertiary Hospital In North-Western Nigeria

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ABSTRACT
Hyponatraemia is the most common electrolyte disorder among hospitalized patients and is associated with adverse clinical outcomes. However, data on its prevalence and clinical characteristics among general medical admissions in Nigeria remain limited. The objective was to determine the prevalence, severity, biochemical patterns, and associated clinical conditions of hyponatraemia among patients admitted into the medical wards of Ahmadu Bello University Teaching Hospital (ABUTH), Zaria. This was a hospital-based cross-sectional study involving 199 adult patients admitted into the medical wards of ABUTH, Zaria. Demographic, clinical, and laboratory data were extracted from medical records. Hyponatraemia was defined as serum sodium concentration <135 mmol/L and classified by severity, serum osmolality, and volume status. Binary logistic regression analysis was used to assess associations between selected variables and hyponatraemia. Statistical significance was set at $p<0.05$. Hyponatraemia was identified in 12 patients, giving a prevalence of 6.0%. The mean age of the study population was 52.03 ± 17.35 years, with females accounting for 58.8%. Most cases of hyponatraemia were mild (75.0%), while moderate and severe forms accounted for 8.3% and 16.7% respectively. Isotonic hyponatraemia was the most common biochemical subtype (58.3%), and the majority of affected patients were euvolaemic (58.3%). Sepsis (25.0%), tuberculosis (16.7%), and chronic kidney disease (16.7%) were the most frequent diagnoses among hyponatraemic patients. Age ≥65 years, sepsis, and chronic kidney disease were not independently associated with hyponatraemia. In conclusion, Hyponatraemia occurred in a small but clinically relevant proportion of medical admissions at ABUTH, Zaria. It was predominantly mild, euvolaemic, and commonly associated with infectious and chronic systemic illnesses. Routine electrolyte monitoring remains essential for early detection and appropriate management.

Keywords: Hyponatraemia; Medical admissions; Nigeria; Zaria

INTRODUCTION
Hyponatraemia, defined as a plasma sodium concentration of less than 135 mmol/L, is the most frequently encountered electrolyte abnormality among hospitalized patients and constitutes a significant clinical problem due to its association with increased morbidity, prolonged hospital stay, healthcare costs, and mortality[1,2]. It commonly results from disturbances in water balance and antidiuretic hormone regulation, including the syndrome of inappropriate antidiuretic hormone secretion (SIADH), volume disorders, heart failure, chronic kidney disease, liver disease, and infections[3,4].

The reported prevalence of hyponatraemia among general medical inpatients varies widely, ranging from approximately 10% to over 30%, depending on the population studied and diagnostic criteria used[5–7]. Elderly patients and those with multiple comorbidities are particularly vulnerable. Several observational studies and systematic reviews have demonstrated that even mild hyponatraemia is independently associated with adverse outcomes, including increased length of hospital stay, falls, fractures, need for intensive care, and mortality[8,9].

Despite its clinical relevance, data on hyponatraemia among hospitalized patients in sub-Saharan Africa remain limited. In Nigeria, most available studies focus on selected disease populations rather than unselected medical admissions. Understanding the prevalence, severity, biochemical patterns, and associated clinical conditions of hyponatraemia in this setting is essential for

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improving early recognition and management.

This study therefore aimed to determine the prevalence, severity, types, and associated clinical factors of hyponatraemia among adult patients admitted into the medical wards of Ahmadu Bello University Teaching Hospital (ABUTH), Zaria.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based cross-sectional study conducted among adult patients admitted into the medical wards of Ahmadu Bello University Teaching Hospital, Zaria, a major tertiary referral centre in north-western Nigeria.

Study Population

Consecutive adult patients (≥18 years) admitted during the study period with documented serum sodium measurements were included in the analysis. Patients with incomplete laboratory records were excluded.

Data Collection

Demographic, clinical, and laboratory data were obtained from patients' medical records. Information collected included age, sex, primary diagnosis, serum sodium concentration, serum osmolality (where available), and clinical assessment of volume status.

Definitions

Hyponatraemia was defined as serum sodium concentration <135 mmol/L.[1,5] Severity was classified as:

- Mild: 130–134 mmol/L
- Moderate: 125–129 mmol/L
- Severe: <125 mmol/L[6]

Hyponatraemia was further classified based on serum osmolality into hypotonic, isotonic, or hypertonic types. Volume status was clinically categorized as euvolaemic or hypervolaemic. Sodium levels were adjusted appropriately for hyperglycaemia.

Statistical Analysis

Data were analyzed using Statistical Package for Social Science (SPSS) version 25. Continuous variables were summarized as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Binary logistic regression analysis was performed to assess associations between selected variables (age ≥65 years, sepsis, and chronic kidney disease) and hyponatraemia. Odds ratios (OR) with 95% confidence intervals (CI) were reported, and a p-value <0.05 was considered statistically significant.

RESULTS

Socio-demographic Characteristics

A total of 199 patients were analyzed, with a female predominance 117/199 (58.8%). The mean age was 52.03 ± 17.35 years, indicating a predominantly middle-aged to elderly population of all the patients. Most patients were aged ≥40 years, with the 60–69-year age group constituting the largest proportion (23.1%), followed by those aged ≥70 years (16.6%). For patients with hyponatraemia mean age was 46.83±17.93 years, with predominance at age groups 40-49 and 60-69. (Table 1)

Prevalence of Hyponatraemia

Hyponatraemia was present in 12/199 patients, giving a prevalence of 6.0% among the study population. (Table 1)

Severity and Type of Hyponatraemia

Most cases of hyponatraemia were mild 9/12 (75.0%), while moderate and severe forms accounted for 1/12 (8.3%) and 2/12 (16.7%) respectively. Based on serum osmolality, isotonic hyponatraemia was the most common 7/12 (58.3%), followed by hypotonic 3/12 (25.0%) and hypertonic hyponatraemia 2/12 (16.7%). The majority of hyponatraemic patients were euvolaemic 7/12 (58.3%), while 5/12 (41.7%) were hypervolaemic. (Table 3)

Underlying Diagnoses and Hyponatraemia

Among hyponatraemic patients, sepsis 3/12 (25.0%) was the most frequent associated diagnosis, followed by tuberculosis 2/12 (16.7%) and chronic kidney disease 2/12 (16.7%). Stroke and heart failure each accounted for 1/12 (8.3%) of cases. (Table 2)

Risk Factors for Hyponatraemia

Binary logistic regression analysis showed that sepsis, chronic kidney disease, and age ≥65 years were not statistically significant predictors of hyponatraemia. Although sepsis (OR = 0.300) and CKD (OR = 0.223) showed lower odds ratios, their confidence intervals crossed unity and p-values were >0.05, indicating no significant association. (Table 4)

Effect of Hyponatraemia on admission outcome

As shown in Table 5, patients with hyponatraemia did not have higher odds of hospital admission beyond one week compared with normo-natraemic patients (OR 0.857, 95% CI 0.262–2.803; p=0.798). Similarly, although mortality appeared numerically higher among hyponatraemic patients, this association did not reach statistical significance (OR 1.897, 95% CI 0.543–6.629; p=0.309). (Table 5)

Table 1: Socio -demographic characteristics of patients

Age group	Frequency (%) All patients	Frequency (%) Hyponatraemic patients
10-19	4 (2.0)	1 (8.3)
20-29	20 (10.1)	2 (16.7)
30-39	22 (11.1)	1 (8.3)
40-49	39 (19.6)	3 (25.0)
50-59	35 (17.6)	1 (8.3)
60-69	46 (23.1)	3 (25.0)
70 and above	33 (16.6)	1 (8.3)
Gender		
Male	82 (41.2)	5 (41.7)
Female	117 (58.8)	7 (58.3)

Table 2: Underlying Diagnoses of all patients and those with Hyponatraemia

Diagnosis	Frequency (%) All patients	Frequency (%) Hyponatraemic patients
Stroke	51 (25.6)	1 (8.3)
Heart failure	35 (17.6)	1 (8.3)
Sepsis	20 (10.1)	3 (25.0)
Hyperglycaemic emergency	14 (7.0)	1 (8.3)
Tuberculosis	11 (5.5)	2 (16.7)
CKD	10 (5.0)	2 (16.7)
Meningitis	7 (3.5)	0 (0.0)
CLD	6 (3.0)	0 (0.0)
DM foot	5 (2.5)	1 (8.3)
RVD	3 (1.5)	0 (0.0)
Severe malaria	3 (1.5)	0 (0.0)
AKI	3 (1.5)	0 (0.0)
SCD crises	2 (1.0)	0 (0.0)
Others	29 (14.6)	1 (8.3)
TOTAL	199 (100.0)	12 (100.0)

CKD: Chronic Kidney Disease, CLD: Chronic Liver Disease, DM: Diabetes Mellitus, RVD: Retroviral Disease, AKI: Acute Kidney Disease, SCD: Sickle Cell Disease.

Table 3: Types of Hyponatraemia

Presence of Hyponatraemia	
No	187 (94.0)
Yes	12 (6.0)
Severity of Hyponatraemia	
Mild	9 (75.0)
Moderate	1 (8.3)
Severe	2 (16.7)
Hyponatraemia based on osmolality	
Hypotonic	3 (25.0)
Isotonic	7 (58.3)
Hypertonic	2 (16.7)
Hyponatraemia based on volume status	
Euvolaemic	7 (58.3)
Hypervolaemic	5 (41.7)

Table 4: Risk factors of hyponatraemia

Variable		Hyponatraemia		Odd ratio	95% CI	P value
	Responses	**No**	**Yes**			
Age	**<65yrs**	138	9	0.939	0.244-3.609	1.000
	≥65yrs	49	3			
Sepsis	**No**	170	9	0.300	0.074-1.215	0.106
	Yes	17	3			
CKD	**No**	179	10	0.223	0.042-1.193	0.115
	Yes	8	2			

Table 5: Effect of hyponatraemia on outcome

Variable	Outcome			Odd ratio	95% CI	P value
	Days on admission					
-	**Responses**	**≤ 1 week**	**>1week**			
Hyponatraemia	**Absent**	71	116	0.857	0.262-2.803	0.798
	Present	5	7			
	Occurrence Mortality					
	Mortality	No	Yes			
Hyponatraemia	**Absent**	148	39	1.897	0.543-6.629	0.309
	Present	8	4			

DISCUSSION

The prevalence of hyponatraemia among patients admitted into the medical wards of ABUTH, Zaria, was 6.0%. Although lower than figures reported in many international studies, this prevalence remains clinically significant. Previous studies among general medical inpatients have reported higher prevalence rates ranging from 10% to 30%, reflecting differences in patient characteristics, comorbidities, and healthcare settings[5,7,8].

The majority of cases in this study were mild hyponatraemia, consistent with reports indicating that mild forms constitute most cases encountered in clinical practice[6]. However, the presence of moderate and severe hyponatraemia in a subset of patients is important, given the strong association between severe hyponatraemia and adverse neurological outcomes and mortality[7].

Euvolaemic hyponatraemia was the predominant volume status observed, suggesting a possible role of SIADH, particularly in patients with infections and systemic inflammatory conditions[3,6]. Isotonic hyponatraemia was the most common biochemical subtype, which may represent pseudohyponatraemia or dilutional effects seen in patients with hyperglycaemia or elevated plasma proteins.

Sepsis was the most frequent diagnosis among hyponatraemic patients, followed by tuberculosis and chronic kidney disease. Infections are recognized triggers of hyponatraemia through cytokine-mediated stimulation of antidiuretic hormone release and impaired renal water excretion[4,9]. Despite this, neither sepsis nor chronic kidney disease showed a statistically significant association with hyponatraemia in regression analysis. This likely reflects the small number of hyponatraemic cases, limiting the power to detect significant associations.

Age ≥65 years was also not independently associated with hyponatraemia, although elderly patients constituted a substantial proportion of admissions. This suggests that hyponatraemia in this cohort was multifactorial rather than age-dependent alone.

In this study, hyponatraemia was not significantly associated with prolonged hospital stay or in-hospital mortality. These findings contrast with several large observational studies and meta-analyses which have demonstrated that hyponatraemia, even when mild, is independently associated with increased length of hospital stay and mortality.[8,10] The lack of a statistically significant association in the present study may be explained by the relatively small number of hyponatraemic patients and the predominance of mild hyponatraemia, which has been shown to carry a lower short-term risk compared with moderate or severe forms.[11] Additionally, prompt identification and correction of electrolyte abnormalities in a tertiary care setting may have mitigated adverse outcomes. Nonetheless, the observed trend toward higher mortality underscores the clinical importance of hyponatraemia and supports continued vigilance in its early detection and management.

Overall, this study demonstrates that hyponatraemia among medical admissions in ABUTH is uncommon but clinically relevant, predominantly mild, and frequently associated with infections and chronic systemic illnesses. Routine electrolyte monitoring and early etiological evaluation remain essential to prevent complications and improve patient outcomes.

CONCLUSION

Hyponatraemia occurred in 6.0% of medical admissions at Ahmadu Bello University Teaching Hospital, Zaria. Most cases were mild, though a notable proportion presented with moderate to severe forms. It was largely euvolaemic and commonly associated with infectious and chronic systemic conditions, particularly sepsis, tuberculosis, and chronic kidney disease. No independent predictors were identified, likely reflecting the small number of affected patients. Overall, despite its relatively low prevalence, hyponatraemia remains a clinically important electrolyte disorder among hospitalized medical patients, justifying routine monitoring and timely assessment.

LIMITATIONS

This study had some limitations. First, the cross-sectional design precluded assessment of temporal relationships or causal inference between clinical conditions and hyponatraemia. Second, the small number of hyponatraemic patients limited the statistical power of regression analyses and may have contributed to the absence of significant predictors. Third, detailed evaluation of potential contributory factors such as

medication use (e.g. diuretics), fluid therapy, and serial sodium measurements was not performed. In addition, outcome measures such as length of hospital stay, neurological complications, and mortality were not assessed. Finally, being a single-centre study, the findings may not be fully generalizable to other settings.

RECOMMENDATIONS

Routine serum electrolyte monitoring should be emphasized for all medical admissions, particularly among patients with infections, renal disease, and other chronic systemic illnesses. Early identification and classification of hyponatraemia by severity, volume status, and osmolality are essential to guide appropriate management and prevent complications. Clinicians should maintain a high index of suspicion for hyponatraemia in patients with sepsis and tuberculosis, even in the absence of overt symptoms.

Further studies with larger sample sizes, multicentre design, and prospective follow-up are recommended to better elucidate risk factors, clinical outcomes, and mortality associated with hyponatraemia in Nigerian hospital settings. Incorporation of medication history and treatment-related factors would provide additional insight into modifiable contributors to hyponatraemia and inform context-specific management guidelines.

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