

PREVALENCE OF HYPONATREMIA IN ICU PATIENTS AT PAF HOSPITAL MUSHAF

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ABSTRACT:

Objectives: To find the prevalence of hyponatremia in ICU patients at PAF Hospital Mushaf, Pakistan.

Materials and Methods: A total of 165 eligible patients were enrolled from the Department of Medicine, PAF Hospital Mushaf, Sargodha, after obtaining informed consent from patients or their attendants. Data were collected prospectively from ICU patients using a structured proforma after ethical approval. Demographic, clinical, laboratory, and outcome data were recorded from patient records, with serum sodium measured routinely. Data were collected by trained researchers, anonymized, and analyzed using SPSS version 25.

Results: Among the 165 participants, the mean age was 53.18 ± 12.66 years, with 89 (53.9%) males and 76 (46.1%) females. The largest age group was 61–70 years (35.2%), followed by 51–60 years (29.7%). Hypertension was present in 37.0% and diabetes mellitus in 30.3% of participants. Hyponatremia was observed in 55 (33.3%) patients, while 110 (66.7%) had normal sodium levels. No statistically significant association was found between hyponatremia and age ($p=0.65$), gender ($p=0.43$), educational level ($p=0.13$), hypertension ($p=0.64$), or diabetes mellitus ($p=0.54$). Among patients with hyponatremia, 58.2% were male, 29.1% were aged 51–60 years, 29.1% were aged 61–70 years, 34.5% had hypertension, and 27.3% had diabetes mellitus.

Conclusion: It was concluded that among patients admitted to the intensive care unit, hyponatremia was relatively common. It is advised to do additional extensive multicenter research to investigate the relationship between hyponatremia and different clinical and demographic characteristics..

KEYWORDS: Hyponatremia, ICU patients, diabetes mellitus

INTRODUCTION:

Hyponatremia, characterized by serum sodium levels <135 mmol/L, is a most prevalent electrolyte derangement in critically ill patients, conferring substantial morbidity and mortality risk.(1-3) Its incidence in the ICU is multifactorial, influenced by illness severity, comorbidities, and therapeutic maneuvers.(4) Even mild hyponatremia can exacerbate disease progression and complicate management in ICU patients, who often present with fragile physiological reserves.(5) The reported prevalence of hyponatremia in ICU populations varies between 15% and 30%, attributable to heterogeneity in patient demographics, diagnostic criteria, and underlying etiologies.(6) Both community-acquired and hospital-acquired hyponatremia occur, emphasizing the need for vigilant monitoring and proactive intervention to mitigate adverse outcomes in this vulnerable population.(7)

Hyponatremia can be categorized based on serum osmolality into hypotonic, isotonic, and hypertonic types.(8) Hypotonic hyponatremia is most common, with subtypes including hypovolemic, euvoletic, and hypervolemic forms, each with distinct pathophysiological mechanisms.(9) Hypovolemic hyponatremia often results from excessive sodium and water losses, such as gastrointestinal losses or diuretic use.(10) Euvoletic hyponatremia is frequently associated with SIADH, stress, medications, or neurological disorders. Hypervolemic hyponatremia is typically linked to conditions like heart failure, liver cirrhosis, or kidney disease, where water retention dilutes serum sodium levels.(11) The pathophysiology involves altered sodium and water homeostasis, driven by hormonal imbalances, aggressive fluid management, and certain medications like opioids, vasopressin, antipsychotic.(12) Clinical manifestations depend on severity and onset rate, with acute hyponatremia causing neurological symptoms like confusion, seizures, and coma, and chronic hyponatremia presenting with subtle symptoms like fatigue and nausea.(13) Hyponatremia in ICU patients is concerning due to its association with prolonged mechanical ventilation, extended hospital stays, and increased mortality risk. Management remains challenging.(13) Requiring individualized treatment strategies that address the underlying cause while carefully correcting serum sodium levels to avoid complications like osmotic demyelination syndrome.

The rationale of this study arise from substantial clinical impact of hyponatremia on critically ill patients, who frequently experience increased morbidity, prolonged hospitalization, and elevated mortality risk. Despite its high prevalence, hyponatremia often remains underdiagnosed or suboptimally managed in ICU populations, owing to its complex and multifactorial etiologies. Elucidating the prevalence, underlying causes and clinical outcomes of hyponatremia in ICU settings is essential for informing prompt and efficacious therapeutic strategies.

Objective: To find the prevalence of hyponatremia in ICU patients at PAF Hospital Mushaf, Pakistan.

MATERIALS AND METHODS:

Study Design: Descriptive cross-sectional

Study setting: Department of Medicine, PAF Hospital Mushaf Sargodha.

Duration of the study: The study was conducted from Dec 2025 to March 2026.

Sampling Technique:

Non-probability Consecutive sampling.

Sample size: A sample size of 165 patients is estimated using population proportion of 30% and confidence interval of 7.

Selection criteria:

Inclusion criteria:

- Adult ICU patients aged ≥ 18 years of both genders.
- Patients with at least two documented serum sodium levels during their ICU stay.

Exclusion criteria:

- Incomplete medical records or missing laboratory data.
- Patients admitted for less than 24 hours.
- Patients with pseudohyponatremia.

Methods: Data were collected after obtaining permission from the hospital's ethical committee. The data were collected prospectively from ICU patients using a structured proforma designed specifically for the study. The proforma captured detailed information regarding patient demographics, including age, gender, and primary clinical diagnosis. Serum sodium levels were measured through routine laboratory testing using an automated biochemical analyzer, and the results were recorded at the time of admission and throughout the ICU stay. Additional clinical information, including the length of ICU stay, comorbidities, requirement for mechanical ventilation, and patient outcomes (discharge or death), was obtained from the medical records. Data collection was performed by trained researchers under the supervision of the principal investigator to ensure accuracy and consistency. All collected data were anonymized to maintain patient confidentiality and were securely stored for subsequent analysis. The SPSS version 25 was used to enter and analyze the gathered data.

RESULTS: Among the 165 participants, the mean age was 53.18 ± 12.66 years. Of the participants, 89 (53.9%) were male and 76 (46.1%) were female. Regarding age distribution, 10 (6.1%) participants were aged 20–30 years, 24 (14.5%) were aged 31–40 years, 23 (13.9%) were aged 41–50 years, 49 (29.7%) were aged 51–60 years, 58 (35.2%) were aged 61–70 years, and 1 (0.6%) was aged >70 years. Regarding educational level, 31 (18.8%) participants were illiterate, 42 (25.5%) had primary education, 23 (13.9%) had secondary education, 56 (33.9%) had higher education, and 13 (7.9%) were graduates or above. Hypertension was present in 61 (37.0%) participants, while 50 (30.3%) had diabetes mellitus (Table 1). Out of total enrolled participants, hyponatremia was present in 55 (33.3%) patients, whereas 110 (66.7%) patients did not have hyponatremia (Table 2).

Table 1: Baseline Demographic and Clinical Characteristics (n=165)

Variables	
Age (Years)	53.18± 12.66
Gender	
Male	89(53.9%)
Female	76(46.1%)
Age Groups	
20-30 years	10(6.1%)
31-40 years	24(14.5%)
41-50 years	23(13.9%)
51-60 years	49(29.7%)
61-70 years	58(35.2%)
>70 years	1(0.6%)

Educational level	
Illiterate	31(18.8%)
Primary	42(25.5%)
Secondary	23(13.9%)
High	56(33.9%)
Graduate or Above	13(7.9%)
Hypertension	61(37.0%)
Diabetes Mellitus	50(30.3%)

Table 1: Frequency of Hyponatremia (n=165)

Variables	no (%)
Hyponatremia	
Yes	55(33.3%)
No	110(66.7%)

Among the 165 participants, no statistically significant association was observed between hyponatremia and age group ($p=0.65$), gender ($p=0.43$), educational level ($p=0.13$), hypertension ($p=0.64$), or diabetes mellitus ($p=0.54$). Hyponatremia was present in 55 participants, of whom 32 (58.2%) were male and 23 (41.8%) were female. The highest proportion of hyponatremia was observed among participants aged 51–60 years and 61–70 years, with 16 (29.1%) participants in each group. Among those with hyponatremia, 19 (34.5%) had hypertension and 15 (27.3%) had diabetes mellitus. Overall, the findings indicated that none of the assessed demographic or clinical characteristics had a statistically significant association with hyponatremia (Table 3).

Table 2: Stratification of Hyponatremia on the basis of Demographic and Clinical Characteristics (n=165)

Variables	Hyponatremia		P-Value
	YES	NO	
Age Groups			
20-30 years	4(7.3%)	6(5.5%)	0.65
31-40 years	11(20.0%)	13(11.8%)	
41-50 years	8(14.5%)	15(13.6%)	
51-60 years	16(29.1%)	33(30.0%)	
61-70 years	16(29.1%)	42 (38.2%)	
>70 years	0(0.0%)	1(0.9%)	
Gender			
Male	32(58.2%)	57(51.8%)	0.43
Female	23(41.8%)	53(48.2%)	
Educational level			
Illiterate	8(14.5%)	23(20.9%)	0.13
Primary	18(32.7%)	24 (21.8%)	
Secondary	10(18.2%)	13(11.8%)	
High	13(23.6%)	43(39.1%)	
Graduate or Above	6(10.9%)	7(6.4%)	
Hypertension			
Yes	19(34.5%)	42(38.2%)	0.64
No	36(65.5%)	68(61.8%)	
Diabetes Mellitus			
Yes	15(27.3%)	35(31.8%)	0.54
No	40(72.7%)	75(68.2%)	

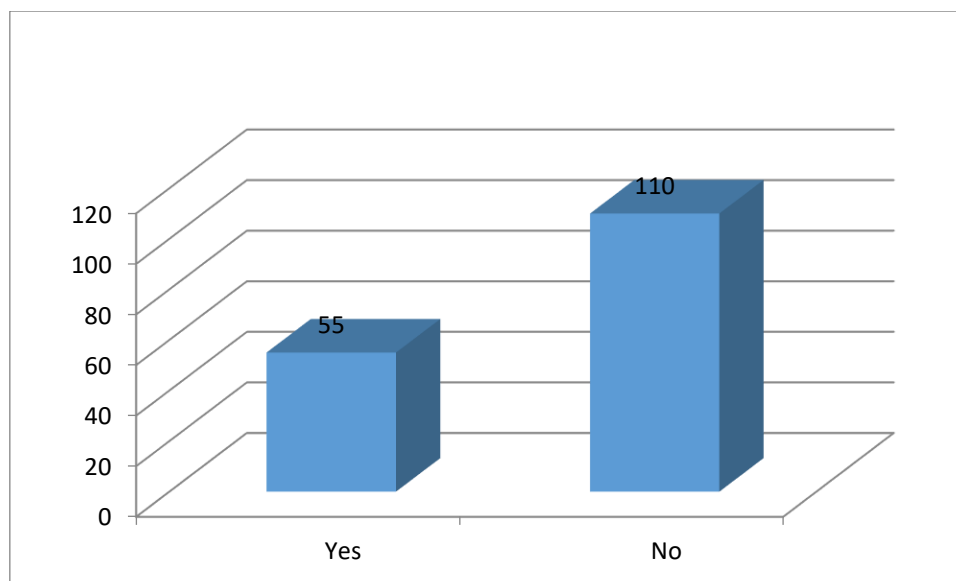


Fig 1: Frequency of patients on the basis of Hyponatremia

DISCUSSION:

Particularly in patients hospitalized to intensive care units, hyponatremia is a dangerous and potentially fatal electrolyte imbalance. In critically sick patients, when numerous comorbidities and serious underlying illnesses may further raise the likelihood of unfavorable clinical outcomes, it is frequently disregarded or underappreciated. The main of the present study was to find the prevalence of hyponatremia in ICU patients at PAF Hospital Mushaf, Pakistan. In the present study there were 55(33.3%) patients in ICU who developed hyponatremia. The need of early detection and routine monitoring of serum sodium levels in critically ill patients is highlighted by this relatively high frequency. Fluid changes, changed ADH secretion, renal impairment, medicines, and comorbidities are some of the factors that might contribute to the development of hyponatremia. Our study was supported by the study finding of Chandrakala et al.(14) in which they stated that hyponatremia was noted in 31.1% patients. Another study by Rajesh et al.(15) stated that frequency of hyponatremia on ICU admission was 34.3%. A number of other previous studies also supported the finding of the present study.(7, 16, 17)

There was no statistically significant correlation ($p = 0.65$) between the incidence of hyponatremia and age in this investigation. The 51–60 and 61–70 age groups had the highest percentages of hyponatremia patients, however there was no statistically significant difference between these age groups. This implies that a number of clinical and physiological factors probably had an impact on the incidence of hyponatremia in this patient group rather than age alone. Regarding sex, there was no significant association ($p=0.43$). There were 23 (41.8%) female patients and 32 (58.2%) male patients with hyponatremia. Since the observed difference was not statistically significant, the larger percentage of males may be the result of the research population's makeup and should not be taken as proof of a sex-specific risk factor.

According to the current study, almost one-third of the patients had hyponatremia. Despite the very high prevalence, there was no discernible correlation with age, sex, education level, hypertension, or diabetes mellitus. This implies that hyponatremia in critically ill individuals is probably caused by multiple factors. Thus, early detection of possible risk factors and close monitoring of serum electrolytes continue to be crucial aspects of critical care.

CONCLUSION:

It was concluded that among patients admitted to the intensive care unit, hyponatremia was relatively common. Even tho the current investigation found no statistically significant correlation between type 2 diabetes mellitus and hypertension, these comorbidities may be a factor in salt balance disruptions. It is advised to do additional extensive multicenter research to investigate the relationship between hyponatremia and different clinical and demographic characteristics.

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