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Frequency of Hyponatremia in Intensive Care Unit

Ayesha Bashir[1], Sohail Nasir[2], Hafiza Sidra[3], Faizan Asad[1], Hira Rizwan Butt[1], Tariq Mahmood[4]

[1]Department of Medicine, Ghurki Trust Teaching Hospital, Lahore, Pakistan
[2]Department of Medicine, Lahore Medical and Dental College, Lahore, Pakistan
[3]University of Health Sciences, Lahore, Pakistan
[4]Department of Surgery, Niazi Medical and Dental College, Sargodha, Pakistan

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Correspondence to: Ayesha Bashir, Department of Medicine, Ghurki Trust Teaching Hospital, Lahore, Pakistan. Email: bashirayesha96@gmail.com

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ABSTRACT

Background: Hyponatremia is often a common and overlooked complication in ICU. There is scarcity of data reporting in our setup. We aimed to find the frequency of hyponatremia in ICU patients. **Methodology:** It was a cross-sectional study conducted at Ghurki Trust Teaching Hospital, for a duration of 6 months in intensive care unit of the hospital. 150 patients were included as per inclusion and exclusion criteria. All the data about age, gender and co-morbidities was recorded on a Performa. The presence or absence of hyponatremia was also noted. All the collected data. **Results:** The mean age of the patient was 62.06 ± 9.80 years.100 (66.7%) were male and 50 (33.3%) were females. The frequency of hyponatremia came out to be 24% (36 patients). Hyponatremia was significantly associated with age greater than 60 years but was not associated with diabetes and hypertension. **Conclusion:** The frequency of hyponatremia in ICU patients is significantly high. Its prevalence is related with age of the patient. A larger multicenter study to explore other contributing factors is recommended.

INTRODUCTION

Hyponatremia, defined as a serum sodium concentration ([Na+]) <135 mmol/L, is the most common electrolyte disorder encountered in clinical practice.[1] Hyponatremia is a common electrolyte derangement in the setting of the intensive care unit. Life-threatening neurological complications may arise not only in case of a severe (<120 mmol/L) and acute fall of plasma sodium levels, but may also stem from overly rapid correction of hyponatremia. Additionally, even mild hyponatremia carries a poor short-term and long-term prognosis across a wide range of conditions.[2, 3]

Hyponatremia is a common problem in critical care patients and is associated with increased duration of hospital stay and increased morbidity and mortality.[4] Critically ill patients admitted to the intensive care unit (ICU) are particularly vulnerable to hyponatremia due to the nature of the disease leading to ICU admission as well as iatrogenic intervention.[5] The prevalence of hyponatremia in the intensive care unit (ICU) has been reported to be as high as 30% to 40%. Previous studies have found hyponatremia at ICU admission in up to 14% of patients in unselected groups; patients with hyponatremia were at elevated risk of mortality vs normonatremic patients.[4]

A study conducted in Peshawar reported that hyponatremia was detected in 21.6% cases admitted to ICU.[6] Another study, done in Peshawar, hyponatremia was detected in 30% cases admitted to ICU.[7] While in Australia, hyponatremia (plasma sodium <135 mmol/L) was present in 39.4% of patients, with mild (130-135 mmol/L), moderate (126-129 mmol/L) and severe (<126 mmol/L) hyponatremia being present in 25.2%, 10.7% and 3.6% respectively.[8] Hyponatremia is a frequently encountered electrolyte disorder in hospitalized patients. Controversies still exist over the relationship between hyponatremia and its outcomes in hospitalized patients.[1]

Rationale of this study is to determine the frequency of hyponatremia in patients admitted in ICU due to critical condition. Though literature, we observed that hyponatremia is prevalent in ICU admitted patients. But different studies showed varied data about occurrence of hyponatremia in ICU admitted patients. Therefore, there is a need to conduct a study to get evidence for local setting and implement screening and diagnosing protocol for early detection of hyponatremia among ICU admitted

patients to prevent complications that may lead to mortality and morbidity due to lack of serum sodium level in body. This will help us to get updated evidence and in future, we will implement findings of this study in local setting.

Objective

To determine the frequency of hyponatremia in patients admitted in intensive care unit due to critical condition.

Operational Definition

Critical condition: It is defined as admission of patients in medical intensive care unit

Hyponatremia: It will be labeled if serum sodium level <135 mEq/L during admission in ICU

MATERIAL AND METHODS

This was a prospective cross-sectional study that took place in the Medicine Department of Ghurki Trust Teaching Hospital, Lahore from 4th September, 2024 to 15th March, 2025. The hospital is a major tertiary care referral center that serves both urban and rural populations in Punjab, Pakistan. The Institutional Review Board (CPSP/REU/MED- 2021-080-18636) granted ethical approval. Using WHO calculator, sample size of 150 cases is calculated with 95% confidence level, 7% margin of error and percentage of hyponatremia i.e. 21.6% in ICU admitted patients.[6] All the patients were enrolled using Non-probability, consecutive sampling technique. All the patients of any age and gender admitted to intensive care unit of the hospital with critical illness were included in the study. Only those patients who received intravascular fluids regardless of pathology were excluded from the study.

Data Collection Procedure

One hundred and fifty patients fulfilling the inclusion criteria will be included in the study from ICU. Informed consent will be taken from attendants. Demographics like age, gender, preliminary diagnosis for admission, occupation, lifestyle, h/o diabetes (BSR >200 mg/dl), smoking (>5 pack years), dyslipidemia (total cholesterol>200 mg/dl), hypertension (BP≥140/90 mmHg), duration of admission (days), fluid applied (normal saline, ringer lactate) will be noted. Then blood sample will be taken in a 5cc disposable syringe and will be sent to the laboratory of the hospital for assessment of serum sodium level. Reports will be assessed and levels will be recorded. If serum sodium level will be < 135 meq/L, then hyponatremia will be labeled (as per operational definition). Patients with hyponatremia will be managed as per standard protocol. All this information will be recorded in proforma (attached).

Data Analysis

All the collected data will be entered and analyzed into SPSS version 25. Relevant test will be applied according to data. Numerical variables i.e. age, duration of admission, serum sodium level will be presented by mean ± SD. Categorical variables i.e. gender, preliminary diagnosis for admission, diabetes, dyslipidemia, smoking, anemia, hypertension, occupation, lifestyle, fluid given and hyponatremia will be presented as frequency and percentage. Data will be stratified for age, gender, duration of admission, preliminary diagnosis for admission, diabetes, dyslipidemia, smoking, hypertension, occupation, lifestyle, fluid given. Post stratification, chi-square test will be applied to compare stratified groups for hyponatremia, keeping p-value ≤0.05 as significant.

RESULTS

We included 150 patients in our study. The mean age of the patient was 62.06 ± 9.80 years.100 (66.7%) were male and 50 (33.3%) were females. The frequency of hyponatremia came out to be 24% (36 patients). Most of the patients (112) were hypertensive and 94 (62.7%) were diabetics. 56 (37.3%) patients were suffering from both the diseases. The Frequency distribution of the studied variables is shown in table 1.

Table 1

Variables		Frequency	Percentages
Gender	Male	100	66.6%
	Female	50	33.3%
Hypertension	Yes	112	74.7%
	No	38	25.3%
Diabetes	Yes	94	62.7%
	No	56	37.3%
Both (DM+ HTN)	Yes	56	37.3%
	No	94	62.7%
Hyponatreima	Yes	36	24%
	No	114	76%

Age was stratified with age above 60 years and below 60 years of age. There were 64 participants who had age less than 60 years and 86 (57.3%) were of age more than 60 years. Out of 86, 28 patients had hyponatremia whereas in younger age group, there were on 8/64 patients who had hyponatremia. This was statistically significant with a p value <0.05. Although the presence or absence of diabetes and hypertension was not found associated with hyponatremia, (p- value >0.05). The distribution of stratified variables and their association with primary end point is given in table 2.

Table 2

Variables		Hyponatremia		p _ Value
		Yes	No	
Age Strata	Less Than 60 years (64)	8	56	0.006
	More Than 60 Years (86)	28	58	
Gender	Male (100)	20	80	0.110
	Female(50)	16	34	
Hypertension	Yes (112)	26	86	0.668
	No (38)	10	28	
Diabetes	Yes (94)	23	71	0.862
	No (56)	13	43	
Both (DM+ HTN)	Yes	13	43	0.862
	No	23	71	

DISCUSSION

Hyponatremia is a serious life threatening complication especially in the settings of intensive care unit. This is often overlooked with worst outcome due to multiple co morbidities and critical condition of the patients. We aimed to address this often under reported but lethal complication.

The frequency of hyponatremia in our study was 24%. There were 36 patients in ICU who developed hyponatremia. This is comparable to many recently reported studies.[6,9,10,11] A recent study by Pritam *et al* included 344 patients admitted to ICU and found that there

were 96 (27.9%) patients who had hyponatremia. They further subdivided patients into subgroups. Subgroup analysis revealed that age was significant factor that was associated with hyponatremia. Other co-morbidities like diabetes and hypertension were not associated with primary outcome. This was consistent with our findings.

Most of the patients (112) admitted to ICU had hypertension. There were 94 patients who had diabetes mellitus. Both these co-morbidities and their presence at same time in a patient was also not found associated with hyponatremia. (p-value of >0.05). Among recent studies this has been a common observation that diabetes or hypertension has no affiliation with the development of hyponatremia. [11,12,13,14]

There were 100 males out of which 20 developed hyponatremia whereas 16 females out of 50 developed hyponatremia. This difference was not statistically significant since p- value was greater than 0.05. This was also reported by Pritam *et al* and Gurusawamy *et al.*[11,15] All the patients were stratified by age. There were 64 patients with age less than 60 years out of which only 8 patients developed hyponatremia. 86 patients were of age greater than 60 and 28 of these developed hyponatremia. p- value came to be 0.006. We found a strong correlation with stratified age. This has been a topic of discussion in literature. Many of the recent studies have supported this fact.[16,17] However, another study contradicted our result. This study stratified at early age i.e 30 years.[11]

There were certain limitations in our study. It was single center, stratified age at one point only and had limited sample size. The confounding involvement of other co-morbidities, primary diagnosis was not taken into consideration. A multicenter large study with more exploration of co-morbidities and primary diagnosis is recommended.

CONCLUSION

In intensive care units, the frequency of hyponatremia is significantly high especially in old age. This must not be overlooked and more factors contributing to it in ICU must be explored.

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