Original Article

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Association of Severity of Hyponatraemia with SOFA and APACHE II Scores in Critically ill Diabetics: A Cross-sectional Study

Internal Medicine Section

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ABSTRACT

Introduction: Hyponatraemia, the most common dysnatraemia in the critically ill, is an independent predictor of mortality, morbidity and poor clinical outcomes. It poses a significant challenge, as both severe hyponatraemia and its management can have lethal consequences. This holds true in diabetic patients as well, where mechanisms other than hyperglycemia contribute to low serum sodium levels, immune dysregulation, and where HbA1c itself is an independent predictor of all-cause mortality. Sequential Organ Failure Assessment (SOFA) and Acute Physiology and Chronic Health Evaluation II (APACHE II) scores are well-established scoring systems that predict and stratify mortality in critically ill patients. The severity of hyponatraemia, defined by corrected sodium levels, may predict poor clinical outcomes in critically ill diabetic patients.

Aim: To assess the association between the severity of hyponatraemia on admission and SOFA and APACHE II scores in critically ill diabetic patients within the first 24 hours of admission.

Materials and Methods: This cross-sectional study was conducted at Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune, Maharashtra, India from March 2023 to February 2025 with a sample size of 100 using purposive sampling. All critically ill patients admitted to the intensive care units with a history of diabetes mellitus (any type) were assessed for hyponatraemia (Na+ <135 mEq/L) on admission, corrected for hyperglycemia. A detailed history, physical examination and routine and study-specific investigations were performed. The SOFA and APACHE II scores were calculated from the worst values within the first 24 hours of admission. The data were assessed for normality and correlations were examined between the study parameters.

Results: The mean age of participants was 44.09±11.3 years, with an approximately equal sex distribution; 50% were aged 45-60 years. The mean duration of diabetes was 6.5±5.3 years, predominantly between 1-5 years. Mild, moderate and severe hyponatraemia were observed in 47%, 36%, and 17% of cases, respectively, with mean SOFA and APACHE II scores of 4.77±3.68 and 12.5±8.8. Kruskal-Wallis analysis showed significant differences across hyponatraemia severity for both SOFA and APACHE II scores, with post hoc analyses indicating significant differences for APACHE II across all groups; SOFA scores were significantly higher in moderate and severe hyponatraemia compared with mild hyponatraemia. Corrected sodium levels significantly predicted both disease severity and organ dysfunction severity.

Conclusion: There was a significant rise in the SOFA scores from mild to moderate hyponatraemia, but no significant difference between moderate and severe hyponatraemia patients. APACHE II scores significantly increased across all levels of worsening hyponatraemia severity, indicating the contribution of the extent of hyponatraemia to the overall disease severity but a weaker association with severity of organ dysfunction.

Keywords: Intensive care units, Mortality, Organ failure, Risk assessment, Syndrome of inappropriate antidiuretic hormone secretion

INTRODUCTION

Hyponatraemia is the most common electrolyte derangement in hospitalised patients and is seen frequently in the Intensive Care Unit (ICU) [1]. Its incidence or prevalence is underestimated because serum sodium levels are not regularly measured in a significant portion of at-risk patients [2]. It is usually a reflection of disorderly water balance rather than salt balance. It reflects a relative surplus of total body water relative to extracellular sodium. It is defined as a plasma sodium concentration (Na+) <135 mEq/L. The prevalence of hyponatraemia in ICU patients has been found to be around 30% [3,4]. This carries a risk of in-hospital mortality of more than 30-50% higher than that of patients with normal sodium levels, with severe hyponatraemia (Na+ <125 mEq/L) being an independent predictor of mortality and poor outcomes in the critically ill [5,6]. The basis of hyponatraemia is multifactorial, frequently due to poor oral intake, gastrointestinal losses, or an inability to effectively excrete excess water, with impaired free water excretion being the most common cause [5]. Both hyponatraemia and its treatment can be associated with considerable morbidity and mortality [7].

Diabetes mellitus is the most frequently encountered endocrine disease in the critically ill, characterised by persistent hyperglycaemia and associated with a constellation of metabolic complications, including frequent dysnatremias, systemic complications and immune dysfunction, which increases the likelihood of infections in the critically ill [8]. Hyponatraemia is a consequence of multiple aetiologies in diabetes alone. Elevated blood glucose levels increase serum osmolality, causing water to shift into the intravascular compartment and leading to dilutional Hyponatraemia [9]; correction for this is described by the Hillier formula (Hillier TA et al.,) [10], which estimates about a 2.4 mmol/L decrease in sodium for every 100 mg/dL rise in glucose [10]. Liamis G et al., found an incidence of 7.7% of true hyponatraemia in a population with diabetes mellitus [11]. High blood glucose and ketones themselves can cause osmotic diuresis [12,13]. Other mechanisms, such as drugs, altered Antidiuretic Hormone (ADH) metabolism, delayed gastric emptying and severe metabolic acidosis, have been implicated [14,15].

Critical illness is defined as a “state of ill health with vital organ dysfunction, a high risk of imminent death if care is not provided,

and the potential for reversibility" (Kayambankadzanja RK et al.,) [16], often presenting with haemodynamic instability and the need for pharmacological or mechanical support to poorly functioning or failing organs [17]. The severity of critical illness can be determined objectively by the SOFA and APACHE II scores. SOFA scores help quantify the severity of organ dysfunction and the risk of in-hospital mortality for that admission [18,19]. Even small changes in SOFA scores correlate with a persistent trend in mortality [20]. The APACHE II score, best recognised for prognostication of the severity of an acute critical illness, incorporates three components—acute physiology, age and chronic health evaluation—with a maximum score of 71 [21]. SOFA and APACHE II have sensitivities of 90.1% and 89.9% and specificities of 97.6% and 96.6%, respectively [21], and patients with an APACHE II score >17 after three days have been shown to have a high risk of mortality (Tian Y et al.,) [22].

Hyponatraemia is a well-documented predictor of poor outcomes in ICU populations [5,6]. While several studies have established the prevalence and prognostic implications of hyponatraemia in critically ill patients, data regarding the association between varying degrees of hyponatraemia severity and validated critical illness scores (SOFA and APACHE II), especially in diabetic patients, remain limited, as HbA1c has been considered an independent predictor of poor clinical outcomes [3,5]. Existing research focuses primarily on general ICU cohorts, often overlooking diabetic-specific pathophysiology, including translocational and osmotic hyponatraemia, and HbA1c-linked outcomes, as well as comparative insights between SOFA and APACHE II scores [9-11,14]. Thus, this study aimed to understand the association between the severity of hyponatraemia and the SOFA and APACHE II scores in critically ill diabetic patients within 24 hours of admission.

MATERIALS AND METHODS

This cross-sectional study was conducted from March 2023 to February 2025 in the intensive and critical care units of Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune, Maharashtra, India with 100 critically ill diabetic patients enrolled using purposive sampling. Institutional Ethics Committee approval was obtained (IEC No: IESC/PGS/2023/04), and informed consent was taken from the patients or their legal guardians before inclusion.

Inclusion criteria: Patients admitted to the ICU with a known history of diabetes mellitus of any type and a corrected serum sodium (Na+) level of <135 mEq/L on admission were included in the study.

The severity of hyponatraemia by serum sodium levels was classified as Mild (130-135 mEq/L), Moderate (125-130 mEq/L), and Severe/Profound (<125 mEq/L) (Spasovski et al.,) [23].

Exclusion criteria: Individuals in whom sodium was not assessed on admission or prior treatment for hyponatraemia, pregnancy, psychiatric illness, or polytrauma were excluded from the study.

Sample size: Sample size estimation was based on a reported prevalence of hyponatraemia of approximately 21% in ICU patients, as per a descriptive cross-sectional study by Parajuli et al., [24]. Using a 95% confidence level and a 7% margin of error, the minimum sample size calculated with Cochran's formula [25] was 112. A final sample size of 100 patients was obtained due to feasibility, sampling limitations, and exclusions.

Study Procedure

Clinical data included the patient's history, physical examination, and routine and study-specific investigations. Serum sodium was estimated by an indirect Ion-Selective Electrode (ISE) method and corrected for hyperglycemia using the Hillier formula (Hillier et al.,) [10]. HbA1c was estimated by High-Performance Liquid Chromatography (HPLC).

The SOFA score and APACHE II score were calculated retrospectively from data collected within the first 24 hours of admission, taking the worst values of each parameter for the calculation. The SOFA score incorporates six organ systems (respiratory, cardiovascular, hepatic, coagulation, renal and neurologic), with total scores ranging from 0 to 24. These scores were categorised into groups corresponding to estimated mortality rates as described by Ferreira FL et al., [26]. The APACHE II score assesses the severity of an acute critical illness by three major components—acute physiology, age, and chronic health—with scores ranging from 0 to 71, stratified into groups according to predicted mortality risk (Knaus et al.,) [27]. Both scoring systems were used to stratify the study population by disease severity and to correlate with the severity of hyponatraemia.

STATISTICAL ANALYSIS

The obtained data were tabulated in MS Excel, and statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 16.0. Continuous and categorical variables were described as mean±standard deviation and percentages, respectively. Data were tested for normality using the Shapiro-Wilk test. Because the distributions were non Gaussian, a Kruskal-Wallis test was used to compare the values across hyponatraemia severity groups, followed by post hoc analysis with the Dwass-Steele-Critchlow-Fligner (DSCF) test. A multiple linear regression analysis was performed to identify independent predictors of SOFA and APACHE II scores. Predictor variables included corrected serum sodium, HbA1c, age and duration of diabetes. This was followed by an ordinal logistic regression with hyponatraemia severity (mild, moderate, severe) as the dependent variable and HbA1c, age and duration of diabetes as predictors.

RESULTS

Of the 100 patients in the study, the mean age was 44.09±11.30 years (CI: 41.85-46.33), with a 1:1 male-to-female ratio, and 50% were in the 45-60 years age group. The mean age was 43.72±10.98 years (CI: 40.50-46.95) in the mild group, 41.47±11.34 years (CI: 37.64-45.31) in the moderate group, and 50.65±10.04 years (CI: 45.49-55.81) in the severe hyponatraemia group. Based on corrected serum sodium levels, 47% had mild Hyponatraemia (131.60±1.14; CI: 131.26-131.93), 36% had moderate Hyponatraemia (127.47±1.59; CI: 126.93-128.01), and 17% had severe hyponatraemia (118.47±4.49; CI: 116.16-120.78). The mean duration of diabetes was 6.5±5.3 years, with 50% having diabetes for 1-5 years. The mean HbA1c was 8.59±1.53%, with 17% having <7%, 50% between 7-9%, and 33% >9%. Additional co-morbidities were present in 62 patients, the most common being hypertension (46%, n=46) [Table/Fig-1]. The mean SOFA score was 4.77±3.69 (CI: 4.04-5.50), with a mean of 8.29±3.22 (CI: 6.64-9.95) in the severe group, 5.56±3.57 (CI: 4.35-6.76) in the moderate group, and 2.89±2.70 (CI: 2.10-3.69) in the mild group. The mean APACHE II score was 12.50±8.88 (CI: 10.74-14.26), with group-wise means of 7.23±5.63 (CI: 5.58-8.89) in mild, 14.14±7.87 (CI: 11.48-16.80) in moderate, and 23.59±6.58 (CI: 20.21-26.97) in severe hyponatraemia.

Category	Subcategory	Frequency (n)
Age-wise distribution (years)	19-44	50
	45-60	50
	Mean age±SD in years	44.09 (±11.3)
	Minimum age	19
	Maximum age	60
Sex-wise distribution	Male	50
	Female	50
Severity of hyponatraemia	Mild	47
	Moderate	36
	Severe	17

HbA1c levels	<7	17
	7-9	50
	>9	33
Duration of diabetes (in years)	1-5	50
	6-10	30
	11-15	16
	16-20	4
	Mean age±SD in years	6.5 (±5.3)
SOFA score risk groups	0-1	15
	2-3	31
	4-5	19
	6-7	12
	8-9	9
	10-11	9
	12-14	3
	>14	2
APACHE II score risk groups	0-4	39
	5-9	24
	10-14	9
	15-19	14
	20-24	5
	25-29	5
	30-34	4

[Table/Fig-1]: Demographic and clinical data of the study population.

Normality testing using the Shapiro-Wilk test confirmed a non Gaussian distribution for serum sodium, HbA1c, SOFA and APACHE II scores (p-value <0.001), justifying the use of non parametric tests [Table/Fig-2]. A Kruskal-Wallis test demonstrated a statistically significant difference in HbA1c, SOFA and APACHE II scores across hyponatraemia severity groups (p-value <0.001) [Table/Fig-3]. Post hoc analysis using the DSCF test revealed significantly higher SOFA scores in the moderate and severe groups versus the mild group (p-value <0.001), but no significant difference between the moderate and severe groups (p-value=0.088), suggesting a plateau effect. APACHE II scores showed significant incremental increases across all three severity levels (p-value <0.001 for all pairwise comparisons), indicating a linear relationship with hyponatraemia severity. HbA1c was significantly higher in the severe versus mild (p-value=0.006) and severe versus moderate (p-value=0.012) groups; no difference was observed between the mild and moderate groups (p-value=0.775) [Table/Fig-4].

Descriptives	Serum Na+ (mmol/L)	HbA1c	SOFA score	APACHE II score
Mean	128	8.48	4.77	12.5
Median	129	8.35	4	10
Standard deviation	5.15	1.37	3.69	8.88
Minimum	112	6.5	0	0
Maximum	134	12.6	15	34
Shapiro-Wilk W	0.825	0.943	0.922	0.937
Shapiro-Wilk p	<0.001	<0.001	<0.001	<0.001

[Table/Fig-2]: Distribution of sodium, HbA1C, SOFA and APACHE II.
Shapiro Wilk Test was used for normality

Severity of hyponatraemia	HbA1c {Mean±SD (95% CI)}	SOFA {Mean±SD (95% CI)}	APACHE II {Mean±SD (95% CI)}
Mild	8.33±1.10 (8.01-8.64)	2.89±2.70 (2.12-3.67)	7.23±5.63 (5.62-8.84)
Moderate	8.16±1.30 (7.73-8.58)	5.75±3.56 (4.59-6.91)	14.53±8.10 (11.88-17.17)
Severe	9.61±1.67 (8.82-10.40)	7.88±3.55 (6.19-9.57)	22.76±7.11 (19.38-26.15)
p-value	0.005	<0.001	<0.001

[Table/Fig-3]: Intergroup comparison of HbA1C, SOFA and APACHE II scores.
Kruskal Wallis test for Significance, Results are significant at p-value <0.05

DSCF test: Summary of findings			
Variable	**Mild vs Moderate**	**Mild vs Severe**	**Moderate vs Severe**
HbA1c	No difference (p=0.775)	Severe>Mild (p<0.006)	Severe>Moderate (p=0.012)
SOFA score	Moderate>Mild (p<0.001)	Severe>Mild (p<0.001)	No difference (p=0.088)
APACHE II score	Moderate>Mild (p<0.001)	Severe>Mild (p<0.001)	Severe>Moderate (p=0.004)

[Table/Fig-4]: Post-hoc analysis.
Dwass-Steel-Critchlow-Flinger Test. Results are significant at p-value <0.05

Variance Inflation Factors (VIFs) were calculated to assess multicollinearity among all predictors before multivariate analyses. All VIF values were below 2.5, indicating that each predictor had a unique contribution to the outcome [Table/Fig-5]. A multiple linear regression analysis was performed for both scores. The corrected serum sodium level was a significant negative predictor for both SOFA (β=-1.06, p-value <0.001) and APACHE II (β=-1.15, p-value=0.005) scores. Duration of diabetes showed a strong association with the SOFA score (β=0.67, p-value=0.001). In contrast, HbA1c values were not significantly associated with the SOFA score (p-value=0.050) but were significantly associated with higher APACHE II scores (β=0.38, p-value=0.006) [Table/Fig-6,7]. Ordinal logistic regression was performed with hyponatraemia severity as the dependent variable, and none of the predictors assessed were statistically significant (p-value >0.05) [Table/Fig-8].

Variable	VIF
Constant	2.321
Corrected Sodium	1.631
HbA1c	1.244
Age	1.506
Duration of diabetes	1.18

[Table/Fig-5]: Variance Inflation Factors (VIF) for linear multivariate analysis.

Predictor	β Coeff.	Standard error	95% CI	t-value	p-value
Intercept	13.6	3.29	7.07 to 20.14	4.14	<0.001
Corrected sodium	-1.06	0.23	-1.52 to -0.60	-4.61	<0.001
HbA1c (%)	-0.012	0.006	-0.025 to -0.00	-1.98	0.050
Age (years)	-0.16	0.077	-0.32 to -0.011	-2.12	0.036
Duration of diabetes (years)	0.67	0.199	0.28 to 1.07	3.39	0.001

[Table/Fig-6]: Multiple linear regression analysis for SOFA score.

Predictor	β Coeff.	Standard error	95% CI	t-value	p-value
Intercept (Constant)	23.31	5.73	11.97 to 34.65	4.07	<0.001
Corrected sodium	-1.15	0.4	-1.94 to -0.35	-2.86	0.005
HbA1c (%)	0.38	0.13	0.12 to 0.64	2.87	0.006
Age (years)	-0.097	0.14	-0.38 to 0.18	-0.69	0.493
Duration of diabetes (years)	0.67	0.36	-0.06 to 1.39	1.82	0.071

[Table/Fig-7]: Multiple linear regression analysis for APACHE II Score.

DISCUSSION

Hyponatraemia has been postulated as an independent predictor of mortality, morbidity and poor clinical outcomes in the critically

Predictor	β Coefficient	Standard error	Odds ratio (e^β)	95% CI (OR)	z-value	p-value
HbA1c (%)	-0.0024	0.0018	0.998	0.994 - 1.001	-1.37	0.171
Age (years)	0.0169	0.022	1.017	0.974 - 1.062	0.77	0.444
Duration of diabetes (years)	0.0499	0.0583	1.051	0.935 - 1.181	0.86	0.392

[Table/Fig-8]: Ordinal logistic regression analysis for the severity of hyponatraemia.

ill. The goal of the study was to determine whether hyponatraemia severity at admission played a role in predicting the severity of organ dysfunction or a higher risk of mortality in the current admission. This was achieved by relating hyponatraemia severity to the SOFA score, which indicates the severity of organ failure or dysfunction in critically ill patients, and to the APACHE II score, which provides a comprehensive estimate of disease severity and mortality risk. The findings suggested a significant difference in SOFA and APACHE II scores among different hyponatraemia severities.

The mean age was 44.09 years (±11.3), with 50% of patients in the 45-60 years age group. The predominance of older patients in the study may have influenced the outcomes. Hawkins RC, found a similar association between increasing age above 30 years and worsening hyponatraemia in admitted patients [28]. Wilkinson TJ et al., found a positive correlation between body weight and serum sodium values in the elderly, although ages above 60 years were not part of the study sample [29]. These studies demonstrated no sex predilection [28,29].

Owen JA and Campbell DG, reported lower mean sodium values in admitted patients by 5-6 mEq/L [30]. The prevalence of hyponatraemia varied across patient groups and study populations. Singh P et al., emphasised aetiology over severity of hyponatraemia in determining patient outcomes [31]. DeVita MV et al., reported a prevalence of around 30% in patients admitted to the ICU [3], and Upadhyay A et al., noted an incidence and prevalence of around 30-40% in admitted patients [2]. Funk GC et al., in a retrospective analysis of more than 151,000 ICU stays, found a mean hyponatraemia prevalence of 17.7%, of which 77.97% were mild, 15.25% moderate, and 6.78% severe [32]. Shah RP et al., observed hyponatraemia in 78.4% of patients with sepsis, with mild, moderate and severe hyponatraemia comprising 39.8%, 25% and 13.6%, respectively [33]. In this study, 47%, 36%, and 17% of patients had mild, moderate and severe hyponatraemia, respectively.

Funk GC et al., (2010) demonstrated an increasing risk of mortality that correlated positively with decreasing serum sodium levels [32]. Pillai KS et al., (2018) found higher mortality in hyponatremic critically ill patients compared to normonatremic controls [34]. Liu C et al., (2023) verified a positive correlation between HbA1c >6.5% and mortality in critically ill patients [35]. Mahmoodpoor A et al., (2016) found a doubling of mortality with each increase in HbA1c level, but this was not established with sufficient evidence in their statistical analysis [36]. Luethi N et al., (2016) demonstrated the reliability of HbA1c levels in assessing glycaemic control and guiding management in critically ill patients [37]. Cuevas Velazquez AM et al., (2023) had a similar stratification of HbA1c to this study, with HbA1c <7% (47.66%), 7-9% (29.43%) and >9% (22.92%), but could not establish a linear relationship between HbA1c levels and mortality [38]. This study had 16 patients with HbA1c <7%, 51 patients between 7-9% and 33 patients with HbA1c >9%.

Shah RP et al., determined that the SOFA score was statistically significant with respect to the degree of hyponatraemia by the Chi-square test [33]. The mean SOFA score was 4.42 (SD 2.34). Kumar S et al., found a poor correlation, though the SOFA score was higher among patients with severe hyponatraemia [39]. This study showed a mean SOFA score of 4.77 (SD 3.69). A total of 23 patients had scores above 8-9, corresponding to more than 33% mortality. The lowest SOFA score group was 0-1 (n=15) and the highest was 12-15 (n=5). SOFA scores were significantly higher in moderate and severe hyponatraemia compared with mild hyponatraemia, but there was no significant difference between moderate and severe hyponatraemia, suggesting a possible plateau of organ-dysfunction severity beyond a certain serum sodium threshold; further study is required to validate this association.

Padhi R et al., showed that hyponatremic patients had worse APACHE II scores than normonatremic patients [4]. The current study showed a mean APACHE II score of 12.5 (SD 8.88). Nine patients had a score above 25, which corresponded to a predicted mortality rate of over 30%. The lowest APACHE II score strata in the current study were 0-4 (n=39) and the highest were 30-34 (n=4). APACHE II scores increased significantly with hyponatraemia severity (mild<moderate<severe), suggesting the role of hyponatraemia in the overall disease mechanisms and disease burden.

Multicollinearity assessment using VIFs confirmed the independence of all predictor variables (age, duration of diabetes, HbA1c, corrected sodium), allowing for statistically interpretable regression models. Funk GC et al., conducted a logistic regression analysis showing odds ratios and 95% CIs for mild, moderate and severe hyponatraemia as 1.32 (1.25-1.39), 1.89 (1.71-2.09), and 1.81 (1.56-2.10), respectively, though their study also estimated the risk of mortality from hypernatremias [32]. Unlike this study, they used SAPS II and LODS for their purposes. Stelfox HT et al., demonstrated adjusted odds ratios for mortality of 1.27 (mild), 1.76 (moderate), and 2.11 (severe), evaluated similarly to this study using APACHE II scores [40]. Cox regression analysis by Liu C et al., showed an association of HbA1c below 5% and above 6.5% with one-year mortality respectively (HR: 1.37; 95% CI: 1.02-1.84 or HR: 1.62; 95% CI: 1.20-2.18) [35].

Multivariate linear regression analysis showed that both sodium levels (β=-1.06, p-value <0.001) and duration of diabetes (β=0.67, p-value=0.001) were significant and independent predictors of the SOFA score, reinforcing poorer outcomes with greater hyponatraemia and longer duration of diabetes. Age (β=-0.16, p-value=0.036) and HbA1c (β=-0.012, p-value=0.050) also showed statistically significant associations with SOFA scores, albeit smaller. For the APACHE II score, a similar strong negative association was observed with sodium levels (β=-1.15, p-value=0.005) and a contrasting strong association with HbA1c (β=0.38, p-value=0.006). This disparity could be due to the scoring systems themselves. The SOFA score emphasises acute organ dysfunction, which may not correlate with long-term glycemic burden. Age (p-value=0.493) and duration of diabetes (p=0.071) were not statistically significant. These findings suggest that corrected serum sodium levels consistently predict both organ dysfunction and physiological severity, but the other predictors influence the scores differently, reflecting the different aspects of critical illness measured by the scores (organ dysfunction vs physiological reserve).

Limitation(s)

This study was cross-sectional with a sample size of n=100, limiting generalisability or external validity. A sample from a single centre may not accurately represent the population as a whole, as the sample is a selection from a subset of patients with diseases and environmental and social factors endemic to the local region. Purposive sampling may introduce selection bias and confound the results. This study could only draw associations and cannot elucidate underlying mechanisms, nor establish causality or directionality. Since follow-up beyond 24 hours was not conducted and only point data were collected, the long-term significance or correlation with

actual mortality or improvement with hyponatraemia management could not be assessed. There is an increased risk of type II error due to the small sample size, and subgroup analyses could not be performed. Eliminating these biases would require a larger sample size, more precise subgroup analyses, a multicentre study with control groups, and follow-up of patients with minimal attrition to the established endpoints of survival and mortality. Although significant associations were observed and aligned with prior studies, much remains uncertain about causality, pathophysiology and the clinical significance of the findings.

CONCLUSION(S)

These findings underscore the importance of measuring serum sodium levels on admission in diabetic critically ill patients. There is a significant increase in SOFA scores with worsening hyponatraemia, but beyond a certain threshold, further worsening is not associated with proportional worsening of organ failure. In contrast, APACHE II scores continue to rise across all severities of hyponatraemia, indicating that the extent of hyponatraemia contributes to overall disease severity. Corrected serum sodium levels significantly predict both the severity of disease and the severity of organ dysfunction. Therefore, monitoring serum sodium on admission may aid risk stratification in diabetic critically ill patients, especially in resource-limited settings.

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