ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 03 | March - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

RELATIONSHIP OF HYPONATREMIA AMONG PATIENTS ADMITTED IN ICU OF A TERTIARY CARE HOSPITAL IN WEST BENGAL

General Medicine

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ABSTRACT

Introduction: Hyponatremia is a serious adverse event in the paediatric critical care population is especially complex as many patients require multiple continuous infusion and excess fluid volumes due to hypovolemic shock or blood pressure instability.
Aim & objective: To detect hyponatremia among patients admitted in medical icu of agmc & gbph and to study its etiology.
Objectives
1. To find out the proportion of patients admitted in icu having hyponatremia.
2. To study the etiology of hyponatremia in these patients.
Material & methods: One year starting from 1st Nov 2019 to 31st October 2020. All the patient admitted in the ICU; age more than 18 years, size was depend on the total admission within the study period in General Medicine, Murshidabad Medical college and R. G. Kar Medical college, West Bengal.
Conclusion: We found that most common age group 41-60. It was found that male were predominance than female. It was found that 96(27.9%) patients had Hyponatremia
We found that 22(6.4%) patients had Euvolemia, 49(14.2%) patients had Hypervolemia, 25(7.3%) patients had Hypovolemia and 248(72.1%) patients had normal.

KEYWORDS

hyponatremia, serum osmolality and euvolumic

INTRODUCTION

Hyponatremia is a serious adverse event in the paediatric critical care population is especially complex as many patients require multiple continuous infusion and excess fluid volumes due to hypovolemic shock or blood pressure instability. Hyponatremia, a very common electrolyte abnormality in hospitalized patients and is defined as a serum sodium level <135 mEq/L. [1]Both total body sodium and total body water determine the serum sodium concentration. Acute hyponatremia poses an immediate danger to the central nervous system. The rapid shift of fluids associated with this condition requently results in brain edema. Administration of hypotonic maintenance fluids may worsen this edema. Hyponatremia can eventually lead to seizure and death depending magnitudeand severity of onset.[2,3] Hyponatremia can be classifiedon the basis of serum osmolality, volume status and urinary sodium into hypertonic, isotonic and hypotonic types. Hyponatremia may also be classified into hypervolemic, euvolemic and hypovolemic as follows:[4] Hypovolemic hyponatremia: Decreased total body sodium and decreased total body water. The sodium deficit exceeding water deficit. Euvolemic hyponatremia: Normal body sodium with increase in total body water. Hypervolemic hyponatremia: Increase in total body sodium with greater increase in total body water. The treatment of hyponatremia depends on the duration of hyponatremia and volume status of the patients. There is serious neurologic sequel if hyponatremia is inappropriately treated. Limited data is available on whether the presence of hyponatremia on intensive care unit (ICU) admission is independently associated with excess mortality.

Hyponatremia is one of the commonest electrolyte disturbances plaguing hospital admitted patient's at any point of time. It is a common problem encountered in patients presenting with non specific symptoms. It is defined as a serum sodium concentration less than 135mEq/L. Hyponatremia is subdivided diagnostically into 3 groups depending on clinical history and volume status, i.e.; hypovolumic, euvolumic and hypervolumic. This disorder is almost always the result of an increase in circulating AVP and/or increased renal sensitivity to AVP, combined with an intake of free water. The clinical presentation has a wide spectrum, varying from asymptomatic patients to ones having seizures and coma.[5] This study is done to know the common clinical features and etiology of hyponatremia in ICU patients and study the outcome of such patients. Unless addressed meticulously, the prognostic implications are grave and far reaching. It is particularly common in intensive care unit (ICU) where both access to water and renal handling are impaired in critically ill patients often afflicted with multiorgan system failure, contributing to substantial morbidity and mortality. As both hyponatremia and hypernatremia can cause substantial morbidity and mortality, ironically incorrect diagnosis and treatment can add to the problem. However early detection and management alters prognosis drastically. This type of study is not undertaken in our hospital, so this study is done to know the impact of hyponatremia in health and its etiology.

Sodium-related disorders (both hyponatremia and hypernatremia) are extremely common and are associated with considerable morbidity and mortality. Hyponatremia is the most common electrolyte disorder, reported in up to 6% of hospitalized patients. Mild hyponatremia (plasma sodium 125–135 mmol/l) is found in as many as 15%–30% of hospitalized patients, with an average of about 25% of Intensive Care Unit (ICU) patients experiencing this disorder. Moderate-to-severe hyponatremia, especially which is rapid in onset, is associated with considerable morbidity and mortality. Despite the awareness on hyponatremia since long time, this common disorder remains an enigma due to its association with a plethora of underlying disease states and its multiple etiologies with different pathophysiological mechanisms.

To detect hyponatremia among patients admitted in medical ICU and to study its etiology.

MATERIAL & METHODS

TYPE OF STUDY: Observational study.

STUDY PERIOD:
One year starting from 1st Nov 2019 to 31st October 2020.
All the patient admitted in the ICU; age more than 18 years, size was depend on the total admission within the study period in General Medicine, Murshidabad Medical college and R. G. Kar Medical college, West Bengal.

INCLUSION CRITERIA:
1. Patients admitted in the ICU; age more than 18 years.
2. Patients were followed up during their ICU stay

EXCLUSION CRITERIA:
1. Post operative patients.
2. Patients who may not give consent.

STATISTICALANALYSIS:
For statistical analysis data were entered into a Microsoft excel

spreadsheet and then analyzed by SPSS (version 25.0; SPSS Inc., Chicago, IL, USA) and Graph Pad Prism version 5. Data had been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate.

p-value ≤ 0.05 was considered for statistically significant.

DISCUSSION

Mokhtari M et al [6] (2010) found that the mean age of patients with serum sodium imbalance was significantly higher as compared to those without it 52±21 vs. 44±20 years for hyponatremics and 56±20 vs. 49±22 years for hypernatremics respectively.

We found that 12(3.5%) patients had ≤30 years of age, 54(15.7%) patients had 31 to 40 years of age, 103(29.9%) patients had 41 to 50 years of age, 113(32.8%) patients had 51 to 60 years of age, 52(15.1%) patients had 61 to 70 years of age and 10(2.9%) patients had 71 to 80 years of age. Vora CS et al 56 (2015) found that Hyponatraemia was commonly observed in the age group of 35-50 years in both the groups. We found that in hyponatremia, 17(17.7%) patients had 41 to 50 years of age, 44(45.8%) patients had 51 to 60 years of age, 25(26.0%) patients had 61 to 70 years of age and 10(10.4%) patients had 71 to 80 years of age. In normal, 12(4.8%) patients had ≤30 years of age, 54(21.8%) patients had 31 to 40 years of age, 86(34.7%) patients had 41 to 50 years of age, 69(27.8%) patients had 51 to 60 years of age and 27(10.9%) patients had 61 to 70 years of age. Association of age vs. Group was statistically significant (p<0.001). It was found that 160(46.5%) patients had female and 184(53.5%) patients had male.

It was found that in hyponatremia, 37(38.5%) patients had female and 59(61.5%) patients had male. In normal, 123(49.6%) patients had female and 125(50.4%) patients had male. Association of sex vs. group was not statistically significant (p=0.0652).

Patni M et al [7] (2015) found that the commonest age group of presentation of hyponatremia was older age group (>56 years). Hyponatremia was more common in males than in females.

It was found that 96(27.9%) patients had Hyponatremia and 248(72.1%) patients had normal.

We found that 22(6.4%) patients had Euvolemia, 49(14.2%) patients had Hypervolemia, 25(7.3%) patients had Hypovolemia and 248(72.1%) patients had normal.

Mokhtari M et al [6] (2010) found that Hyponatremia occurred more frequently in surgical patients than those with medical causes, 72% vs. 22% respectively. Mortality of patients with hyponatremia and hypernatremia were significantly higher than patients without sodium imbalance. 55%with hypernatremia died vs. 34% with hyponatremia.

We found that in hyponatremia, the mean blood urea (mean± s.d.) of patients was 71.6875 ± 45.7267 mg/dl. In normal, the mean blood urea (mean± s.d.) of patients was 31.1193 ± 9.1610 mg/dl. Distribution of mean blood urea vs. group was statistically significant (p<0.0001).

It was found that in hyponatremia, the mean serum creatinine (mean± s.d.) of patients was 4.4656 ± 3.7429 mg/dl. In normal, the mean serum creatinine (mean± s.d.) of patients was 1.0940 ± .4267 mg/dl. Distribution of mean serum creatinine vs. group was statistically significant (p<0.0001). We found that in hyponatremia, the mean serum uric acid (mean± s.d.) of patients was 6.4417 ± 2.4695. In normal, the mean serum uric acid (mean± s.d.) of patients was 6.2407 ± 1.9287. Distribution of mean serum uric acid vs. group was not statistically significant (p=0.4250). It was found that in hyponatremia, the mean serum sodium (mean± s.d.) of patients was 122.2500 ± 6.7543. In normal, the mean serum sodium (mean± s.d.) of patients was 137.9597 ± 2.6355. Distribution of mean serum sodium vs. group was statistically significant (p<0.0001). It was found that in hyponatremia, the mean serum potassium (mean± s.d.) of patients was 4.1917 ± .5107. In normal, the mean serum potassium (mean± s.d.) of patients was 4.2629 ± .5697. Distribution of mean serum potassium vs. group was not statistically significant (p=0.2855). It was found that in hyponatremia, the mean blood glucose (mean± s.d.) of patients was 157.5625 ± 99.4436. In normal, the mean blood glucose (mean± s.d.) of patients was 132.0968 ± 12.8128. Distribution of mean blood glucose vs. group was statistically significant (p=0.0001). We found that in hyponatremia, the mean serum osmolality (mean± s.d.) of patients was 265.1363 ± 16.9449. In normal, the mean serum osmolality (mean± s.d.) of patients was 288.4284 ± 5.5887. Distribution of mean serum osmolality vs. group was statistically significant (p<0.0001). We found that in hyponatremia, the mean Hb (mean± s.d.) of patients was 9.6750 ± 1.5266%. In normal, the mean Hb (mean± s.d.) of patients was 10.8044 ± 1.2752%. Distribution of mean Hb vs. group was statistically significant (p<0.0001).

Lath R. et al [8] (2005) found that Hyponatremia in neurological disorders is usually of the hypo-osmolar type caused either due to the Syndrome of Inappropriate Secretion of Anti Diuretic Hormone(SIADH) or Cerebral Salt Wasting Syndrome (CSWS).

We found that in hyponatremia, the higher number of patients 26(27.1%) had plenty pus cell than other. In normal, the higher number of patients 109(44.0%) had WNL than other. Association of urine R/E vs. group was statistically significant (p<0.0001).

It was found that in hyponatremia, 22(22.9%) patients had Euvolemia, 49(51.0%) patients had Hypervolemia and 25(26.0%) patients had normal. In normal, 248(100.0%) patients had normal. Association of Hyponatremia geroup vs. group was statistically significant (p<0.0001).

We found that in hyponatremia, the higher number of patients 20(20.8%) had DKA than other. In normal, the higher number of patients 33(13.3%) had Septicemia than other. Association of diagnosis vs. group was statistically significant (p<0.0001).

Balk RA et al [9] (2000) found that the most common electrolyte abnormality was hyponatremia.

It was found that distribution of mean TLC, Platelet and serum bilirubin with groups were not statistically significant.

We found that in hyponatremia, the mean Total Protein (mean± s.d.) of patients was 6.6670 ± .7616. In normal, the mean Total Protein (mean± s.d.) of patients was 6.8690 ± .3317. Distribution of mean Total Protein vs. group was statistically significant (p=0.0007).

It was found that in hyponatremia, the mean serum albumin (mean± s.d.) of patients was 3.6868 ± .6314. In normal, the mean serum albumin (mean± s.d.) of patients was 3.8952 ± .2878. Distribution of mean serum albumin vs. group was statistically significant (p=0.0001).

We found that in hyponatremia, the mean TGS (mean± s.d.) of patients was 184.1979 ± 27.5973. In normal, the mean TGS (mean± s.d.) of patients was 178.2562 ± 29.1485. Distribution of mean TGS vs. group was not statistically significant (p=0.0872).

It was found that in hyponatremia, the mean HDL (mean± s.d.) of patients was 35.2604 ± 5.4061. In normal, the mean HDL (mean± s.d.) of patients was 37.3589 ± 6.6646. Distribution of mean HDL vs. group was statistically significant (p=0.0062).

We found that in hyponatremia, the mean LDL (mean± s.d.) of patients was 155.0104 ± 27.6293. In normal, the mean LDL (mean± s.d.) of patients was 148.5645 ± 32.2122. Distribution of mean LDL vs. group was not statistically significant (p=0.0846).

CONCLUSION

We found that most common age group 41-60. It was found that male were predominance than female

It was found that 96(27.9%) patients had Hyponatremia
We found that 22(6.4%) patients had Euvolemia, 49(14.2%) patients had Hypervolemia, 25(7.3%) patients had Hypovolemia and 248(72.1%) patients had normal.

Table: Distribution of mean Blood Urea (mg/dl), S# Creatinine (mg/dl), S# Uric Acid), S# Na+, S#K+, Blood Glucose, Serum Osmolality and S# Albumin

		Number	Mean	SD	Minimum	Maximum	Median	p-value
Blood Urea (mg/dl)	Hyponatremia	96	71.6875	45.7267	17.0000	168.0000	69.0000	<0.0001
	Normal	243	31.1193	9.1610	18.0000	72.0000	30.0000	
S# Creatinine (mg/dl)	Hyponatremia	96	4.4656	3.7429	0.9000	11.2000	3.3000	<0.0001
	Normal	248	1.0940	.4267	0.6000	3.4000	1.0000	
S# Uric Acid)	Hyponatremia	96	6.4417	2.4695	1.8000	11.2000	5.8000	0.4250
	Normal	248	6.2407	1.9287	3.2000	11.2000	5.7000	
S# Na+	Hyponatremia	96	122.2500	6.7543	107.0000	131.0000	122.5000	<0.0001
	Normal	248	137.9597	2.6355	135.0000	145.0000	137.0000	
S#K+	Hyponatremia	96	4.1917	.5107	3.2000	5.6000	4.2000	0.2855
	Normal	248	4.2629	.5697	1.5000	4.9000	4.2000	
Blood Glucose	Hyponatremia	96	157.5625	99.4436	100.0000	500.0000	118.0000	<0.0001
	Normal	248	132.0968	12.8128	110.0000	176.0000	130.0000	
Serum Osmolality	Hyponatremia	96	265.1363	16.9449	224.0000	296.5000	264.4150	<0.0001
	Normal	248	288.4284	5.5887	280.1000	304.2000	287.0000	
S# Albumin	Hyponatremia	96	3.6868	.6314	2.1000	4.6800	3.8000	<0.0001
	Normal	231	3.8952	.2878	2.8000	4.4000	4.0000	

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