

"The Hyponatremia." A Real Masquerader in Emergency Medicine

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ABSTRACT

Introduction: The Hyponatremia is a most common electrolyte disorder, occurring in up to 30% among hospitalized patients and has been associated with increased mortality. Current research aimed to study the etiology, clinical presentations of Hyponatremia in admitted patients in an emergency medicine department, to analyse the biochemical spectrum of Hyponatremia and to study the associated morbidity and mortality of Hyponatremia.

Material and methods: An observational study was done in the present institute after obtaining the ethical clearance from committee. In the emergency medicine ward, all the patients, including symptomatic and asymptomatic, blood samples were taken and serum electrolytes estimation was done in central biochemistry laboratory. The patients who found to had hyponatremia were selected and values repeated once more for confirmation.

Results: Total number of cases included in our study are 422 patients, in that 60.9% (257) were male, 39.1% (165) were females. The main comorbid conditions with hyponatremia found in our study were hypertension (8.53%), Diabetes mellitus (9.95%), chronic alcohol intake (6.63%), ischemic heart disease (2.13%), HIV positive with AIDS related complex (1.18%), COPD (2.6%), thyroid illness in three cases [p value <0.001].

Conclusion: The Hyponatremia is a real masquerader in emergency medicine and it is most easily treatable also. Which needs to be suspected in every case, who gets admitted in emergency medical wards and confirmed by appropriate investigations early and promptly in order to reduce morbidity and mortality associated with this condition.

Keywords: Hyponatremia, Masquerader, Hypovolemia, Hypervolemia, Normovolemia, Mortality, Morbidity.

INTRODUCTION

The Hyponatremia is the most common electrolyte disorder, occurring in up to 30% among hospitalized patients and has been associated with increased mortality. Hyponatremia occurs in a broad spectrum of patients who are asymptomatic or critically ill. Clinical signs and symptoms vary from individual to individual. The majority of patients with hyponatremia are asymptomatic.¹⁻⁴ Some times patients with hyponatremia may presents with non-specific symptoms or symptoms due to an underlying disease. Symptoms occurring early in hyponatremia are usually nausea, vomiting, anorexia, headache and irritability.² As serum sodium levels falls low, patients may develop neuropsychiatric symptoms. These symptoms vary from restlessness, lethargy, altered consciousness, seizures to coma. Prompt recognition and optimal management of Hyponatremia in hospitalized patients will reduce the symptoms severity and in-hospital mortality. It also decreases the duration of hospitalization, allow for less intensive hospital care and associated costs. Again early interventions improves the treatment of underlying co morbid conditions and patients quality of life.³⁻⁶

So current research was planned to study the Etiology, clinical presentations of Hyponatremia in admitted patients in an Emergency Medicine Department, to analyse the Biochemical spectrum of Hyponatremia, to study the associated Morbidity and Mortality of Hyponatremia.

MATERIAL AND METHODS

An observational study was done in the department of department of General Medicine, Mysore Medical College and Research Institute, Mysuru between March 2016 to September 2016. All the Patients who were admitted in emergency medical wards were taken up for study. After obtaining clearance from Institutional Ethics Committee, MMC & RI, Mysuru, with the number EC REG:ECR/134/Inst/KA/2013 dated 30th March 2016 and after written consent of cases, the study was started. In the emergency medicine ward, from all the patients, including symptomatic and asymptomatic, blood samples were taken and serum electrolytes estimation was done in central biochemistry laboratory. The patients who were found to have hyponatremia were selected and values were repeated once more for confirmation. A standard proforma was used to record detailed history of presenting complaints, past history-including diabetes mellitus, systemic hypertension, Ischemic heart disease, dyslipidemia, neurological, renal and endocrine abnormalities. Findings on clinical examination including volume status of patients were recorded. Initial serum sodium, final sodium at discharge, calculated serum osmolality, urine osmolality, urine spot sodium and endocrine work up (as and when required) was done. The fluid management and drugs, if used were noted, the probable cause was correlated and the outcome of hospitalization was also recorded. Sample size of 422 patients was selected based on inclusion and exclusion criteria.

Inclusion criteria: All patients of more than 18 years of age, who were admitted in Emergency medical ward.

Exclusion criteria: The patients who are treated with Mannitol and osmotic diuretics.

STATISTICAL ANALYSIS

SPSS version 21 was used for the statistical analysis. Descriptive statistics like frequency, percent, mean and standard deviation and Inferential statistics like Chi-square test and Cramer's V test were done to interpret the data.

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RESULTS

The Hyponatremia is an acute emergency treatable condition, so many times it may be over looked without giving suspicion, so early diagnosis and treatment can add on life to the emergency patients. Total number of cases included in our study are 422, in that 60.9% (257) were male, 39.1% (165) were female, with age variation from 16 to 96 years, majority were in the age group between 40 to 60 years (37.9%). The symptoms found in our cases were vomiting (29.6%), giddiness (2.4%), altered sensorium (8.5%), headache (9.2%), chest pain (6.4%), generalized weakness (8.4%), fever (12.3%), cough (15.2%), loss of consciousness (0.7%), nausea (22.5%), loose stools (5%), easy fatiguability (10.4%), breathlessness (17.8%), abdominal pain (8.8%), difficulty in micturition (0.9%), lower limb swelling (3.6%), seizures (6.4%) (table-1).

The main comorbid conditions with hyponatremia found in our study were hypertension (8.53%), Diabetes mellitus (9.95%), chronic alcohol intake (6.63%), ischemic heart disease (2.13%), HIV positive with AIDS related complex (1.18%), COPD (2.6%), thyroid illness in three cases [p value <0.001].

The important conditions in which hyponatremia found were cases with Acute stroke, acute gastroenteritis, CKD, viral fever, COPD, poisonings and CCF.

The severe hyponatremia was seen in 49 (11.61%) cases, moderate hyponatremia is found in 27 (6.39%) cases and severe hyponatremia is found in 84 (19.90%) cases (Figure-1, table-2).

DISCUSSION

In the present study, the incidence of hyponatremia is 39.57% in patients admitted in emergency ward. It is the most commonly ordered investigation among in patients. During the period of the present study serum sodium was done in all the admitted patients. The present study included patients with serum sodium less than 135 mEq/L. There were 60.9% male, 39.1% female, shows that incidence of dyselectrolytemia more in male than female, with age variation from 16 to 96 years, shows that irrespective of the age, hyponatremia occurrence is common. The more number of cases were found in the age between 41 to 60 years (37.9%). Similar trend was also observed by Hochman Vurgese⁵ in their study has shown that elderly patients were more prone for hyponatremia. The mean age in the present study was 52.20 years in male and 49.26 years in female. which was comparable to studies by Anderson⁶ where the mean age was 58 years and the study done by Vurgese, the population consisted of 66 patients with 56% males and 44% females. The mean age was 57.05 + 2SD. The commonest age group affected was 45 to 64 years (72.8%). The various factors responsible for hyponatremia in elderly are decreased glomerular filtration rate, impaired ability of kidney to conserve sodium, increased release of arginine vasopressin to a given osmotic stimulus, various drugs taken by them, decreasing appetite and concomitant illnesses.⁷

Based on serum sodium concentration, hyponatremia is classified as mild, moderate and severe with serum sodium 130 – 135mEq/L, 125 – 129mEq/L and less than or equal to 125mEq/L respectively.⁸ There were 84 (19.90%) cases with mild hyponatremia, 49 (11.61%) cases with severe hyponatremia and 27 (6.39%) cases moderate hyponatremia. The degree of hyponatremia could be more or less predict the symptoms of

hyponatremia. But patients with serum sodium less than or equal to 125mEq/L showed severe neurological symptoms like seizures and unconsciousness. In study by Hochman et al, there were 39% patients with mild hyponatremia and rest 61% had moderate to severe hyponatremia. The presence or absence of symptoms and severity was more related to rapidity of fall of serum sodium rather than the amount of fall. The elderly patients with chronic hyponatremia can tolerate lower levels of hyponatremia without any symptoms. Hence, we conclude that more severe the hyponatremia and rapid fall of sodium, more severe the symptoms.⁹⁻¹⁵

In present study 60.43% were in asymptomatic phase as compared to study done by Hochman et al, there were 43.4% patients with Asymptomatic phase. The hydration status of the patients is diagnosed on the basis of clinical examination and was divided into normovolumic, hypovolumic and hypervolumic states.⁸ In the present study 26.5% patients were hypovolumic, 5.5% patients were normovolumic and 7.6% patients were hypervolumic. In study by Anderson, 34% had euvolumia, 35% had hypovolumia and 31% had hypervolumia. In study by Hochman, 50% patients had euvolumia, 30.5% had hypovolumia and 19.5% had hypervolumia. Patients with hypovolumia were more symptomatic and had more severe symptoms of hyponatremia compared to the other groups. The major symptoms found in our study are vomiting (29.6%), altered sensorium (8.5%), headache (9.2%), generalized weakness (8.4%), fever (12.3%), cough (15.2%), nausea (22.5%), easy fatiguability (10.4%), breathlessness (17.8%). The above symptoms were compared with study done by Arinzon¹¹, where he found that Most patients complained of weakness, dizziness, confusion, seizures and vomiting. This shows that irrespective of etiology of hyponatremia the symptoms were more or less same in all patients. In the study done by Barclay L, the incidence of hyponatremia was 30% with the definition of hyponatremia as serum sodium levels <135m mol/L, but in our study the incidence of hyponatremia is 39.57%. The most common comorbidity found with hyponatremia in our study were Hypertension (11.6%), Type 2 Diabetes mellitus (8.3%) and Alcohol (8.1%) intake, (p value is <0.001), this shows that most emergency cases, who get admitted will have associated with the above conditions.¹⁶⁻²⁰ The most common causes found in our study for hyponatremia in descending order were stroke (10%), CKD (7.8%), Acute Gastroenteritis (7.3%), viral fever (7.3%), HIV positive patients (2.1%). The stroke, meningitis, abdominal tuberculosis and Hiv patients had normovolumic hyponatremia in 31%, 20%, 66.7% and 22.2% patients respectively. In CCF (50%), DCM (60%), CKD (24.2%) patients had hypervolumic hyponatremia and hypovolemic hyponatremia was found in predominantly in Acute gastroenteritis (41.9%), viral fever (41.9%), poisonings (21.4%), Unknown bites (22.2%), DKA (55.6%) etc. The hypovolemic hyponatremia was the most common type of hyponatremia found in our study, which indicates that the majority of patients who reached to our hospital were suffering with poor hydration status, which needs to be intervened promptly and in emergency manner to add days for life. which is statistically significant with p value of <0.001. The above causes were compared with the study done by Kende M¹³, where he found that major causes for hyponatremia were renal failure, Diabetes mellitus, central nervous system

Diagnosis		Type Hyponatremia				Total
		Nil	hypovolumic	normovolumic	hypervolumic	
Stroke		26	2	13	1	42
		61.9%	4.8%	31.0%	2.4%	100.0%
Dengue		3	3	0	0	6
		50.0%	50.0%	0.0%	0.0%	100.0%
Pleural Effusion		4	3	0	0	7
		57.1%	42.9%	0.0%	0.0%	100.0%
UTI		4	2	0	0	6
		66.7%	33.3%	0.0%	0.0%	100.0%
Metabolic Encephalopathy		0	2	0	0	2
		0.0%	100.0%	0.0%	0.0%	100.0%
COPD		17	5	0	0	22
		77.3%	22.7%	0.0%	0.0%	100.0%
CKD		21	4	0	8	33
		63.6%	12.1%	0.0%	24.2%	100.0%
LVF		1	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	100.0%
Acute gastroenteritis		17	13	0	1	31
		54.8%	41.9%	0.0%	3.2%	100.0%
Poisoning		22	6	0	0	28
		78.6%	21.4%	0.0%	0.0%	100.0%
Viral fever		18	13	0	0	31
		58.1%	41.9%	0.0%	0.0%	100.0%
Pneumonia		14	5	0	0	19
		73.7%	26.3%	0.0%	0.0%	100.0%
Meningitis		7	1	2	0	10
		70.0%	10.0%	20.0%	0.0%	100.0%
Cirrhosis		4	1	0	4	9
		44.4%	11.1%	0.0%	44.4%	100.0%
Unknown bite		6	2	0	1	9
		66.7%	22.2%	0.0%	11.1%	100.0%
Tumors		2	1	0	1	4
		50.0%	25.0%	0.0%	25.0%	100.0%
Abdominal tuberculosis		0	1	2	0	3
		0.0%	33.3%	66.7%	0.0%	100.0%
Pulmonary tuberculosis		5	6	0	1	12
		41.7%	50.0%	0.0%	8.3%	100.0%
Hypoglycemia		1	2	0	0	3
		33.3%	66.7%	0.0%	0.0%	100.0%
Primary GTCS		13	5	1	0	19
		68.4%	26.3%	5.3%	0.0%	100.0%
DKA		8	10	0	0	18
		44.4%	55.6%	0.0%	0.0%	100.0%
Electroceution		1	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	100.0%
CCF		7	1	0	8	16
		43.8%	6.2%	0.0%	50.0%	100.0%
Anaemia		12	5	0	0	17
		70.6%	29.4%	0.0%	0.0%	100.0%
IHD		10	2	0	0	12
		83.3%	16.7%	0.0%	0.0%	100.0%
Quadripareisis		1	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	100.0%
DCM		1	0	1	3	5
		20.0%	0.0%	20.0%	60.0%	100.0%
AKI		1	3	0	0	4
		25.0%	75.0%	0.0%	0.0%	100.0%
Chronic hepatitis		2	1	0	0	3
		66.7%	33.3%	0.0%	0.0%	100.0%
HIV Positive		3	4	2	0	9
		33.3%	44.4%	22.2%	0.0%	100.0%

		Type Hyponatremia				Total
		Nil	hypovolumic	normovolumic	hypervolumic	
RHD		3	0	0	0	3
		100.0%	0.0%	0.0%	0.0%	100.0%
Bronchial asthma		3	2	0	0	5
		60.0%	40.0%	0.0%	0.0%	100.0%
Accerated htn		2	0	0	0	2
		100.0%	0.0%	0.0%	0.0%	100.0%
Peripheral neuropathy		2	0	0	0	2
		100.0%	0.0%	0.0%	0.0%	100.0%
Hypoxic encephalopathy		2	0	0	0	2
		100.0%	0.0%	0.0%	0.0%	100.0%
LVF+CKD		1	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	100.0%
IHD+Pneumonia		1	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	100.0%
CCF+Cirrhosis of liver		0	0	0	1	1
		0.0%	0.0%	0.0%	100.0%	100.0%
DCM+CCF		0	0	0	3	3
		0.0%	0.0%	0.0%	100.0%	100.0%
CCF+COPD		1	0	0	0	1
		100.0%	0.0%	0.0%	0.0%	100.0%
Others		9	7	2	0	18
		50.0%	38.9%	11.1%	0.0%	100.0%
Total		255	112	23	32	422
		60.4%	26.5%	5.5%	7.6%	100.0%

P value<0.001

Table-1: The correlation of clinical diagnosis with type of hyponatremia.

			Type of Hyponatremia				Total	P Value
			Nil	hypovolumic	normovolumic	hypervolumic		
Outocome	Recovered	Count	248	105	20	21	394	<0.001
		% within outocme	62.9%	26.6%	5.1%	5.3%		
	Died	Count	3	6	2	4		
		% within outocme	20.0%	40.0%	13.3%	26.7%		
Status quo	Count	4	1	1	7			
	% within outocme	30.8%	7.7%	7.7%	53.8%			
Total	Count	255	112	23	32	422		
	% within outocme	60.4%	26.5%	5.5%	7.6%	100%		

Table-2: Outocme Vs type of Hyponatremia

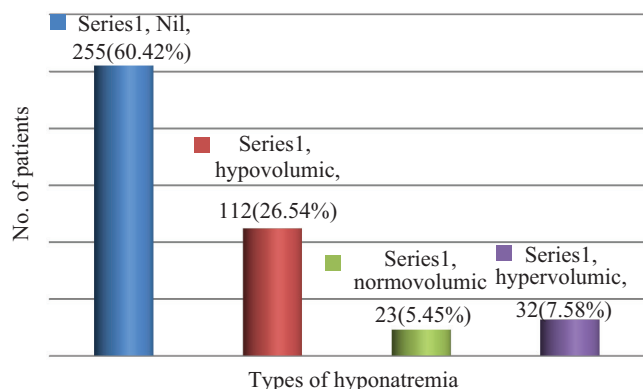


Figure-1: Type of Hyponatremia

infections, pulmonary infections, gastrointestinal disturbances, tumors, heart failure.²¹⁻²⁵

The outcomes which we found in our study are the hyponatremia with prompt and early intervention recovery of patients was seen in 34.59% of patients, about 2.84% of patients have died

due to associated comorbidity with hyponatremia and 2.13% of patients were in status quo even after appropriate intervention with respect to management of hyponatremia. Which is compared with the study by Bhananker SM, Paek R² said that -Severe hyponatremia is associated with a mortality rate of around 50%, most commonly from cerebral edema and central nervous system dysfunction. Also compared with the study done by Ivor Douglas⁴ said that - Hyponatremia is a common electrolyte disorder among in patients and out patients, it was associated with increased mortality. The majority of patients who died and sustained in status quo were having terminal illnesses like chronic refractory heart failure, End stage Chronic Kidney disease, HIV positive with AIDS related complexes.

CONCLUSION

Based on the above observations and discussion, we conclude that Hyponatremia is a real masquerader in emergency medicine and easily treatable one. Which needs to be suspected in every case, who gets admitted in emergency medical wards and

confirmed by appropriate investigations, early and promptly in order to reduce morbidity and mortality associated with this condition.

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ABBREVIATIONS

CKD - Chronic kidney disease, DCM - Dilated cardiomyopathy, IHD - Ischemic heart disease, RHD - Rheumatic heart disease, LVF - Left ventricular failure, COPD - Chronic obstructive pulmonary disease, CCF - Congestive cardiac failure, UTI - Urinary tract infection, AKI - Acute kidney injury, DKA - Diabetic keto acidosis.

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