



Original Article

“A Study of Electrolyte imbalance in stroke patients”.

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Abstract

Background: After coronary artery disease and cancer, stroke is the third commonest cause of death in the developed countries. Mortality risk is quite variable among stroke patients. Careful and early risk evaluation of each patient is therefore important. Electrolyte imbalance is a common phenomenon after stroke, particularly in the elderly. This research will provide the information regarding electrolyte imbalance in stroke patients. **Objective:** To find out prevalence of different type of electrolyte imbalance between ischemic and hemorrhagic stroke patients. **Method:** This short term prospective observational study was done in Medicine dept. of MMCH. We valuated 50 patients of Stroke admitted in hospital. Venous blood sample was collected for electrolyte. Additional clinical data was recorded including detailed complications of Stroke. **Results:** Out of 50 patients of Stroke the percentage of hypernatremia, hyponatremia, hypokalemia, hyperchloremia, hypochloremia, metabolic acidosis and metabolic alkalosis were higher in patients with Hemorrhagic stroke (27.3%,18.2%, 9.1%,18.2%, 45.5%, 18.2% and 9.2% respectively) than ischemic stroke patients (3.6%,7.1%, 3.6%, 0%, 3.6%, 0%, and 2.6% respectively).

Conclusion: Electrolyte imbalance more prevalence in Hemorrhagic stroke

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Introduction

After coronary artery disease and cancer, stroke is the third commonest cause of death in the developed countries.¹ Stroke patients increasing in our country and remain a leading cause of morbidity and mortality. Mortality risk is quite variable among stroke patients. Careful and early risk evaluation of each patient is therefore important.

Electrolytes are essential for normal cellular function. Abnormal electrolyte concentrations altered metabolic status. Electrolytes imbalance is a common phenomenon after stroke, particularly in the elderly. Because too much or too little of

any one of the electrolytes quickly becomes a major problem of its own, doing everything possible to maintain the proper balance is a vital component of patient care. Therefore, monitoring electrolytes and checking for signs of an imbalance should be an integral part of nursing assessment.

Electrolytes imbalance has shown reasonable promise in predicting the adverse outcome of stroke patients. This research will provide the information regarding prevalence of electrolytes imbalance in stroke patients. The findings of the study might be helpful physicians to take the necessary steps to correct imbalances before the situation becomes dire.

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Identification of high risk patients with electrolytes imbalance may be helpful for selection of more intense interventional or pharmacological treatment strategies. Early tissue level reperfusion is especially important in electrolytes imbalance patients and can alter the adverse outcome for this high risk group. The data will also give future direction of research on the same issue.

Material and Methods

This Observational prospective study was carried out in the Department of Medicine, Mymensingh Medical College Hospital from November 2010 to April 2011. We evaluated 50 patients of stroke admitted in the hospital and CT scan proven stroke. Patients who treated with intravenous fluid and who refused to be included in the study were excluded from the study. Informed consent was obtained prior to any study-related procedures. Demographic data and prevalence of risk factors was obtained from all patients. Detailed clinical history and physical examination was done. Venous blood sample was collected for electrolyte. Additional clinical data was recorded include a detailed description of complications encountered during hospital stay.

Statistical Analysis:

Statistical analyses were carried out by using the Statistical Package for Social Sciences version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). A descriptive analysis was performed for all data. The quantitative and qualitative observations were indicated by frequencies and percentages. Chi-Square test and Fisher Exact test was used to analyze the categorical variables as shown with cross tabulation and unpaired t—test was used to analyze the continuous variable was expressed as mean (\pm SD). A P-value will considered to be statistically significant if ≤ 0.05 .

Results and observations:

A total number 50 patients with stroke, out of them Majority patients were in 5th decade. Mean age was found 60.6 ± 3.6 years in ischemic group and 58.4 ± 3.9 years in hemorrhagic group (Table-1). Risk factors reveals that the proportion of patients with kidney disease, acid base imbalance and congestive heart failure were somewhat higher in Hemorrhagic group (Table-2). Regarding electrolyte imbalance, patient with hemorrhagic stroke group had more electrolyte imbalance (Table-3).

Table I: Comparison of demographic data and symptoms between two groups among the study population (n=50)

Characteristics	Ischemic (n=28)		Hemorrhagic (n=22)		P value
	n	%	n	%	
Age (years) Mean \pm SD	60.6 \pm 3.6		58.4 \pm 3.9		^a 0.049
Sex#					
Male		60.7		59.1	0.907
Female		39		40.9	
Weakness#	27	96.4	22	100	0.560
Twitching *	2	7.1	3	13.6	0.384
Seizures #	5	17.9	8	38.1	0.112
Muscle spasm*	1	3.6	1	4.5	0.691
Irregular heart beat*	3	10.7	00	00	0.167
Convulsion#	5	17.9	7	31.8	0.251
Confusion#	7	25.0	14	63.6	.006
Blood pressure change#	13	46.4	22	100	<.001

*Data were analyzed using fisher exact test. # Chi-square test used to analyses the data.

^a P value reached from unpaired t-test.

Table II: Comparison of causes of electrolyte imbalance between two groups among the study population (n=50)

Risk factors	Ischemic (n=28)		Hemorrhagic (n=22)		P value
	n	%	n	%	
Kidney disease*	2	7.1	4	18.2	0.225
Vomiting #	0	0	11	50	<0.001
Severe dehydration #	0	0	3	13.6	0.079
Acid base imbalance*	1	3.6	6	27.3	0.023
Congestive heart failure#	2	7.1	2	9.1	0.598

*Data were analyzed using fisher exact test. #Chi-square test used to analyses the data.

Table III: Comparison of electrolyte imbalance between two groups among the study population (n=50)

Characteristics	Ischemic (n=28)		Hemorrhagic (n=22)		P value
	n	%	n	%	
Sodium*					
Hypernatremia	1	3.6	6	27.3	0.017
Hyponatremia	2	7.1	4	18.2	
Potassium#					
Hyperkalemia	2	7.1	1	4.5	0.678
Hypokalemia	1	3.6	2	9.1	
Calcium*					
Hypocalcaemia	0	0	2	9.1	0.189
Chloride*					
Hyperchloremia Hypochloremia	1	3.6	4	18.2	0.033
	7	25.0	10	45.5	
Bicarbonate#					
Metabolic Acidosis	0	0	4	18.2	0.038
Metabolic Alkalosis	1	2.6	2	9.1	

*Data were analyzed using fisher exact test. #Chi-square test used to analyses the data

Discussion

In this present series it was observed that out of fifty patients male was predominant in the both ischemic (60.7%) and hemorrhagic (59.1%) group. Confusion, convulsion, seizure and muscle twitching were more in hemorrhagic group. Nearly two- third (63.6%) had confusion, (38.1%) seizures, (31.8%) convulsion, (13.6%) twitching in hemorrhagic group. Risk factors reveal that the proportion of patients with kidney disease, acid base imbalance and congestive heart failure were somewhat higher in hemorrhagic group compared to ischemic group (18.2% vs 7.1%, $p=.225$; 27.3% vs 3.6%, $p=.023$ and 9.1% vs 7.1%, $p=.598$ respectively. Half (50%) of the hemorrhagic stroke patients had a history of vomiting and 13.6% severe dehydration ($p<.001$ and $p=.079$ respectively). Similar findings was reported by previous several authors such as Dalal et al (2001), Chiu et al (1997), Oken et al (1994).

This study revealed that percentage of hypernatremia, hyponatremia, hypokalemia hyperchloremia, hypochloremia, metabolic acidosis, and metabolic alkalosis were higher in patients with hemorrhagic (27.3%, 18.2%, 9.1%, 9.1%, 18.2%, 45.5% 18.2% and 9.2% respectively) than ischemic stroke patients (3.6%, 7.1%, 3.6%, 0%, 3.6%, 0%, and 2.6% respectively). Only hyperkalemia was found higher in ischemic patients compare to hemorrhagic patients (7.1% vs 4.5%). This was supported by other previous study of Kusuda et al. (1989), who found that serum sodium, potassium, calcium, chloride concentrations were measured in 196 patients with ischemic stroke and 56 patients with hemorrhagic. The proportion of hypernatremia, hyponatremia, hyperkalemia hyperchloremia, and metabolic acidosis were higher in patients with hemorrhage than patients

with ischemic. On the other hand, Metheny (2000) concluded that, incidences of hypernatremia, hyponatremia, hypokalemia and hyperkalemia were higher in in patients with hemorrhage than infarction.

Conclusion

The frequency and severity of electrolyte abnormalities of sodium, potassium, chloride and bicarbonate associated with stroke patient is apparently more prevalent in hemorrhagic patients. We should take the necessary steps to correct imbalance before the situation become dire.

Limitations

Although the result of this study supports the hypothesis there are some facts to be considered which might affect the results. Results were not correlated with other confounding variables. Further required long term follow up.

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