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Original Research

Evaluation of electrolyte abnormality in acute stroke patients

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ABSTRACT:

Background: Stroke or cerebrovascular accident or CVA is defined as rapidly developing clinical symptoms and/or signs of focal and at times global loss of brain function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin. The present study was conducted to evaluate electrolyte abnormality in acute stroke patients. **Materials & Methods:** 94 patients of stroke of both genders were enrolled. CNS examination was performed in all patients. Complete blood count, blood sugar level, liver function test, renal function test, lipid profile, serum sodium, potassium, chlorides urine sodium and potassium, serum osmolality were also done. CT scan Brain and MRI Brain was performed. **Results:** Age group 40-50 years had 14, 50-60 years had 20, 60-70 years had 27 and >70 years had 33 patients. The difference was significant (P< 0.05). Dyselectrolytaemia in haemorrhagic stroke patients was seen in 35% and in ischaemic stroke patients in 68%. The difference was significant (P< 0.05). The mean serum osmolality in haemorrhagic stroke patients was 294.1 mmol/kg and in ischaemic stroke was 308.5 mmol/kg, urine sodium was 61.4 mEq/L/24 hours in haemorrhagic stroke patients and 66.4 mEq/L/24 hours in ischaemic stroke patients and urinary potassium was 75.2 mEq/L/24 hours in haemorrhagic stroke patients and 71.6 mEq/L/24 in ischaemic stroke patients. The difference was non-significant (P> 0.05). **Conclusion:** Sodium level was reduced in most of the patients. Therefore. the level of electrolytes should be assessed in stroke patients.

Key words: Dyselectrolytaemia, electrolytes, stroke

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INTRODUCTION

Stroke or cerebrovascular accident or CVA is defined as rapidly developing clinical symptoms and/or signs of focal and at times global (applied to patients in deep coma and those with subarachnoid haemorrhage) loss of brain function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin. About 85% of all first ever stroke are ischaemic, 10% are due to primary intracerebral haemorrhage and 5% are due to subarachnoid haemorrhage.[1]Patients with acute stroke should have access to rapid assessment and early intervention with specialist care for optimal outcomes. Acute ischaemic stroke caused by a large vessel occlusion (LVO) is associated with high mortality rate of 80% [1] and can be optimally managed with intravenous (IV) thrombolysis followed by mechanical thrombectomy (MT). While IV thrombolysis can currently be provided in many general hospitals, MT can only be performed in specialised centres with neurointerventional facilities. Stroke is the second leading cause of death. Hyponatraemia, hypernatraemia resulting from inappropriate secretion of antidiuretic hormone (ADH), increase in Brain Natriuretic-peptide (BNP), Atrial Natriuretic peptide and inappropriate fluid intake and loss; can lead to complications like seizures and death.[5]Unfortunately, due to the urbanization growth and the incorrect culture of inactivity, inadequate consumption of fruits and vegetables, as well as the high prevalence of processed foods and fast food consumption and high body mass index (BMI), risk of ischemic stroke in young adults is increasing. Many important factors related to ischemic stroke are modifiable. Quit smoking, increased physical activity, and proper diet, so, controlled diabetes and hypertension as well-known risk factors for stroke can be effective in reducing the rate of stroke.The present study was conducted to evaluate electrolyte abnormality in acute stroke patients.

MATERIALS & METHODS

The present study consisted of 94 patients of stroke of both genders. All were informed regarding the study and their written consent of patients.

Data such as name, age, gender etc. was CNS examination was performed in all patients. Complete blood count, blood sugar level, liver function test, renal function test, lipid profile, serum sodium, potassium, chlorides urine sodium and potassium, serum osmolality were also done. CT scan Brain and MRI Brain was performed. Results were statistically analysed. P value less than 0.05 was considered significant.

RESULTS

Table I Age wise distribution

Age group (years)	Number	P value
40-50	14	0.05
50-60	20	
60-70	27	
>70	33	

Table I shows that age group 40-50 years had 14, 50-60 years had 20, 60-70 years had 27 and >70 years had 33 patients. The difference was significant (P< 0.05).

Table II Type of stroke with dyselectrolytaemia

Dyselectrolytaemia	Hemorrhagic	Ischaemic	P value
Present	35%	68%	0.01
Absent	65%	32%	

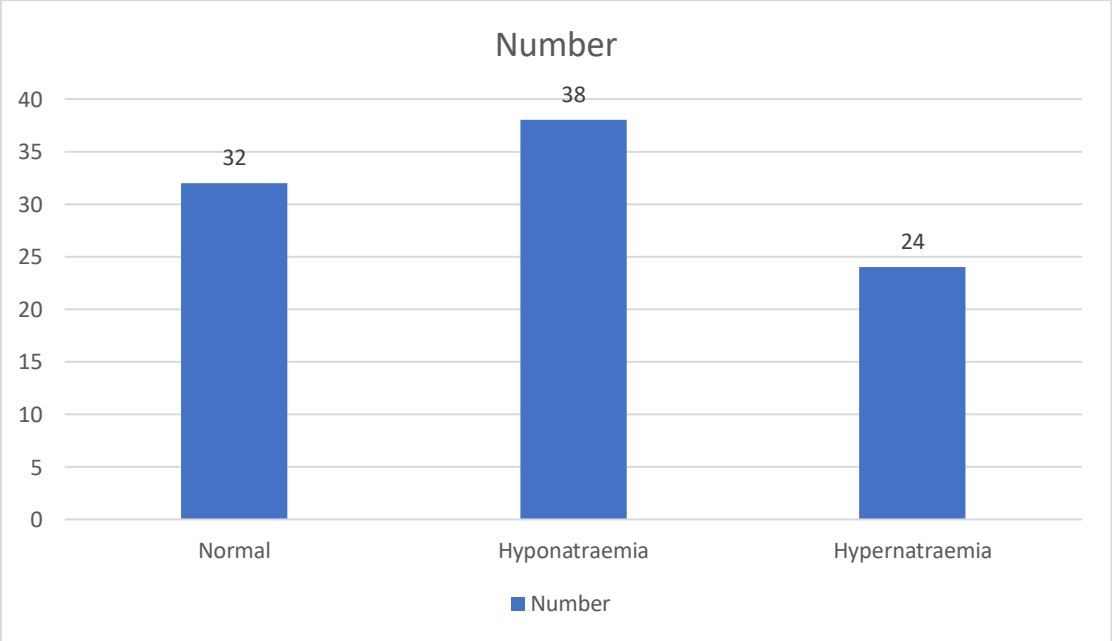
Table II shows that dyselectrolytaemia in haemorrhagic stroke patients was seen in 35% and in ischaemic stroke patients in 68%. The difference was significant (P< 0.05).

Table III Assessment of laboratory investigation

Parameters	Hemorrhagic (45)	Ischaemic (49)	P value
Serum osmolality (mmol/kg)	294.1	308.5	0.90
urine sodium (mEq/L/24 hours)	61.4	66.4	0.81
urinary potassium (mEq/L/24 hours)	75.2	71.6	0.95

Table III shows that mean serum osmolality in haemorrhagic stroke patients was 294.1 mmol/kgand in ischaemic stroke was 308.5mmol/kg, urine sodium was 61.4 mEq/L/24 hours in haemorrhagic stroke patients and 66.4mEq/L/24 hours in ischaemic stroke patients and urinary potassium was 75.2 mEq/L/24 hours in haemorrhagic stroke patients and 71.6 mEq/L/24 in ischaemic stroke patients. The difference was non-significant (P> 0.05).

Graph I Occurrence of hyponatraemia in patients



Graph Ishows that sodium level found to be normal in 32, hyponatraemia in 38 and hypernatraemia in 24. The difference was significant (P< 0.05).

DISCUSSION

Electrolyte disturbance are commonly found in acute stroke setting. Hypernatremia, hyponatremia and hypokalaemia was the commonest type of disturbance.[8] Recent researches with electrolyte disturbances are not only focusing on the neuroendocrine mechanism but also on its prevalence, risk factors and association with other medical condition.Many lifestyle risk factors for the incidence of ischemic stroke are modifiable.Hypertension, hypercholesterolemia, diabetes mellitus, cigarette smoking, alcohol drinking, and hookah consumption are very important risk factors that are manageable easily.[9]The present study was conducted to evaluate electrolyte abnormality in acute stroke patients.

We found that age group 40-50 years had 14, 50-60 years had 20, 60-70 years had 27 and >70 years had 33 patients. Dyselectrolytaemia in haemorrhagic stroke patients was seen in 35% and in ischaemic stroke patients in 68%. We observed that the mean serum osmolality in haemorrhagic stroke patients was 294.1 mmol/kg and in ischaemic stroke was 308.5 mmol/kg, urine sodium was 61.4 mEq/L/24 hours in haemorrhagic stroke patients and 66.4 mEq/L/24 hours in ischaemic stroke patients and urinary potassium was 75.2 mEq/L/24 hours in haemorrhagic stroke patients and 71.6 mEq/L/24 in ischaemic stroke patients.Mitchell[11]showed an association between increased BMI so insufficient physical activity and early onset stroke, which is consistent with studies conducted in older adults. High daily dietary intake of fat is associated with obesity and may act as an independent risk factor or may affect other stroke risk factors such as hypertension, diabetes, and hyperlipidemia.

We found thatsodium level found to be normal in 32, hyponatraemia in 38 and hypernatraemia in 24.Rosamond et al[12] assessed diagnostic performance of currently available clinical tools for identification of acute ischaemic and haemorrhagic strokes and stroke mimicking conditions. Twenty-five articles were included. Cortical signs (gaze deviation, aphasia and neglect) were shown to be significant indicators of large vessel occlusion (LVO). Sensitivity values for selecting subjects with LVO ranged from 23 to 99% whereas specificity was 24 to 97%. Clinical tools, such as FAST-ED, NIHSS, and RACE incorporating cortical signs as well as motor dysfunction demonstrated the best diagnostic accuracy. Tools for identification of stroke mimics showed sensitivity varying from 44 to 91%, and specificity of 27 to 98% with the best diagnostic performance demonstrated by FABS (90% sensitivity, 91% specificity). Hypertension and younger age predicted intracerebral haemorrhage whereas history of atrial fibrillation and diabetes were associated with ischaemia.

Alam et al[13] in their study the serum concentration of Na^+, K^+, and Cl^- were measured in 110 cases during acute period of stroke (55 ischemic and 55 haemorrhagic strokes). In haemorrhagic stroke, out of 55 patients 29(52.72%) had abnormal sodium level, of them 23(41.8%) had hyponatremia, 6(10.9%) had hypernatremia. In contrast in ischemic stroke 23(41.80%) out of 55 had abnormal sodium level, of them 21(38%) had hyponatremia. The result showed that hyponatremia is almost equally common in both haemorrhagic and ischaemic group without significant difference ($p>0.05$). The study also revealed that hyponatremia is more common than hypernatremia in both groups. Mean ± SD of age of the haemorrhagic group was 60.80 ± 15.97 while the age of ischaemic group was 59.89 ± 15.84 years. Male, female ratio in haemorrhagic and ischaemic group 1:0.62 and 1:0.89 respectively. Mean ± SD of serum Na^+, K^+, Cl^- in haemorrhagic group were 136.18 ± 10.5, 3.83 ± 0.65, 97.96 ± 16.74 mmol/L, in ischaemic group 135.08 ± 9.08, 4.00 ± 0.75, 100.27 ± 8.39 mmol/L.

The shortcoming of the study was small sample size.

CONCLUSION

Authors found that sodium level was reduced in most of the patients. Therefore, the level of electrolytes should be assessed in stroke patients.

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