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Original Research

Assessment of electrolyte abnormality in acute stroke patients

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ABSTRACT:
Background: Electrolyte disturbance are commonly found in acute stroke setting. Recently, research with electrolyte disturbances is not only focusing on the neuroendocrine mechanism but also on its prevalence, risk factors and association with other medical condition. The present study was conducted to assess electrolyte abnormality in acute stroke patients. **Materials & Methods:** 86 patients of stroke of both genders were assessed for urine sodium and potassium, serum osmolality. **Results:** Age group 40-50 years had 10 males, 6 females, 50-60 years had 12 males and 8 females, 60-70 years had 15 males and 6 female and >70 years had 19 males and 10 females. The mean serum osmolality (mmol/kg), in haemorrhagic stroke patients was 297.1 and in ischaemic stroke was 302.5, urine sodium (mEq/L/24 hours) was 60.1 and 64.2 and urinary potassium (mEq/L/24 hours) was 78.2 and 72.6 in haemorrhagic stroke and in ischaemic stroke patients respectively. Dyselectrolytaemia in haemorrhagic stroke patients was seen in 30% and in ischaemic stroke patients in 65%. Sodium level found to be normal in 34, hyponatraemia in 40 and hypernatraemia in 12. The difference was significant (P< 0.05). **Conclusion:** Among all electrolytes, sodium level was reduced in most of the patients. Hence the level of electrolytes should be assessed in stroke patients.
Key words: electrolytes, sodium level, 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]

Electrolyte disturbance are commonly found in acute stroke setting. Recently, research with electrolyte disturbances is not only focusing on the neuroendocrine mechanism but also on its prevalence, risk factors and association with other medical condition.[2]

Even though there are some data about large number of electrolyte disturbances in acute stroke setting, reports on the association between electrolyte imbalance and severity of acute stroke are still in limited number.[3] There is a lack of data about this association especially from developing countries. Intracerebral haemorrhage can be associated with raised ICT and cause headache and vomiting further leading to dyselectrolytemia in acute phage of stroke. Disorders of sodium and potassium concentration are the commonest electrolyte abnormalities found in cerebro vascular accident (CVA) and may contribute to mortality unless corrected urgently.[4] 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] The present study was conducted to assess electrolyte abnormality in acute stroke patients.

MATERIALS & METHODS

The present study comprised of 86 patients of stroke of both genders. Inclusion of patients was done with the written consent of patients.

Demographic data such as name, age, gender etc. was recorded. Complete history and thorough general physical examination and CNS examination was performed in all patients. Investigations like 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. Chest X-ray, USG Abdomen and Pelvis, CT scan Brain and MRI Brain plain/contrast with veno/angiogram. Results were statistically analysed. P value less than 0.05 was considered significant.

RESULTS

Table I Age & gender wise distribution

Age group (years)	Male	Female
40-50	10	6
50-60	12	8
60-70	15	6
>70	19	10
Total	56	30

Table I shows that age group 40-50 years had 10 males, 6 females, 50-60 years had 12 males and 8 females, 60-70 years had 15 males and 6 female and >70 years had 19 males and 10 females.

Table II Laboratory investigation

Parameters	Hemorrhagic (55)	Ischaemic (31)	P value
Serum osmolality (mmol/kg)	297.1	302.5	0.91
urine sodium (mEq/L/24 hours)	60.1	64.2	0.82
urinary potassium (mEq/L/24 hours)	78.2	72.6	0.74

Table II, graph I shows that mean serum osmolality (mmol/kg), in haemorrhagic stroke patients was 297.1 and in ischaemic stroke was 302.5, urine sodium (mEq/L/24 hours) was 60.1 and 64.2 and urinary potassium (mEq/L/24 hours) was 78.2 and 72.6 in haemorrhagic stroke and in ischaemic stroke patients respectively. The difference was non- significant (P> 0.05).

Graph I Laboratory investigation

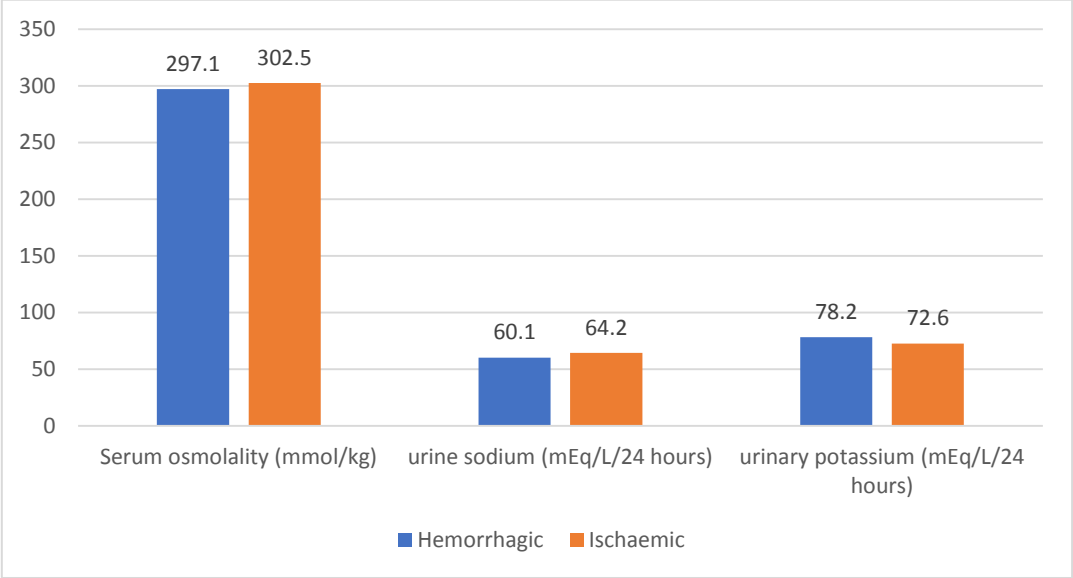

Table III Type of stroke with dyselectrolytaemia

Dyselectrolytaemia	Hemorrhagic	Ischaemic	P value
Present	30%	65%	0.02
Absent	70%	35%	

Table III shows that dyselectrolytaemia in haemorrhagic stroke patients was seen in 30% and in ischaemic stroke patients in 65%. The difference was significant (P< 0.05).

Table IV Occurrence of hyponatraemia

Status	Number	P value
Normal	34	0.01
Hyponatraemia	40	
Hypernatraemia	12	

Table IV shows that sodium level found to be normal in 34, hyponatraemia in 40 and hypernatraemia in 12. The difference was significant (P< 0.05).

DISCUSSION

Stroke is one of the leading causes of death and disability in India. The estimated adjusted prevalence rate of stroke range, 84-262/100,000 in rural and 334-424/100,000 in urban areas.[6] The incidence rate is 119-145/100,000 based on the recent population based studies. Stroke is the fifth leading cause of death worldwide.[7] In almost all neurological disorders, electrolyte disturbances were prominent. 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.[9] The present study was conducted to assess electrolyte abnormality in acute stroke patients.

In present study, age group 40-50 years had 10 males, 6 females, 50-60 years had 12 males and 8 females, 60-70 years had 15 males and 6 female and >70 years had 19 males and 10 females. Meenakshi et al[10] studied the electrolyte disturbances including serum and urinary sodium, potassium and chlorides in acute stroke with its comparison in ischaemic and haemorrhagic stroke. Serum electrolytes (sodium potassium and chlorides) and urinary electrolytes were investigated in 50 acute stroke patients in a tertiary care hospital. Mean age of the patients was 54years.23 patients (46.0%) had haemorrhagic stroke and 27 (54.0%) had ischaemic stroke. 25 (50.0%) had dyselectrolytaemia which is statistically significant (p = 0.047).10 (37.0%) ischaemic stroke patients and 6 (26.1%) haemorrhagic stroke patients had hyponatremia which is significant (p= 0.048).

We found that mean serum osmolality (mmol/kg), in haemorrhagic stroke patients was 297.1 and in ischaemic stroke was 302.5, urine sodium (mEq/L/24 hours) was 60.1 and 64.2 and urinary potassium (mEq/L/24 hours) was 78.2 and 72.6 in haemorrhagic stroke and in ischaemic stroke patients respectively. Alam et al[11] 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.

We found that dyselectrolytaemia in haemorrhagic stroke patients was seen in 30% and in ischaemic stroke patients in 65%. The sodium level found to be normal in 34, hyponatraemia in 40 and hypernatraemia in 12. Sriram et al[12] determined the subtype of stroke, clinical examination followed by CT / MRI scan of brain taken was used. Total serum sodium, potassium, chloride and bicarbonate levels were determined using serum samples. The patients were followed up for outcome up to 2 weeks during their stay in hospital and before discharge using GOS. A total of 105 patients were included in the present study. Normal serum sodium was seen in 32 patients (30.5%), hyponatremia was present in 72 patients (68.6%) and hypernatremia in 1 patient (1%). 71 patients (67.6%) had normal serum potassium, 31 patients (29.5%) had hypokalaemia and 3 patients (2.9%) had hyperkalaemia. The outcome of the patient was assessed using Glasgow Outcome Scale (GOS), which revealed that 8 patients (8%) had a score of 3 which indicates severe disability, 43 patients (41%) had a score of 4 which indicates moderate disability and 54 patients (51%) had a score of 5 which indicates good recovery.

CONCLUSION

Authors found that among all electrolytes, sodium level was reduced in most of the patients. Hence the

level of electrolytes should be assessed in stroke patients.

REFERENCES

1. Kusuda K, Saku Y, Sadoshima S et al. Disturbances of fluid and electrolyte balance in patients with acute stroke. Nihon Ronen Igakkai Zasshi 1989; 26: 223-7.
2. Coenraad M J, Meinders A E, Tall J C et al. Review Hyponatraemia in intracranial disorders. The Netherlands Journal of Medicine 2001:58; 123 – 127.
3. Moussa NA, Osman AR, Yahya TM. Acute hyponatremic encephalopathy after a cerebrovascular accident. Am J Med Sci 1998; 316: 56-9.
4. Xie JX, Sasaki S, Joossens JV et al. The relationship between urinary cations obtained from the INTERSALT study and cerebrovascular rmortality. J Hum Hypertens 1992; 6: 17-21.
5. Navarro J C, Bitanga E, Suwanwela N et al. Complication of acute stroke: A studying ten Asian countries, Neurology Asia2008; 13: 33 – 39.
6. Hasan MK, Hasan AB, Rubaiyat KA. Electrolyte Disturbances in Acute Phase of Stroke Patients. Dinajpur Med Col J 2013 Jan; 6 (1):12-16.
7. Boutayeb A, Derouich M, Boutayeb W, Lamlili MEN. Cerebrovascular Diseases and Associated Risk Factors in WHO Eastern Mediterranean Countries, Cardiology and Angiology. 2014 An. Inter. J. 2(1):62-75.
8. Hinkle J L, Guanci M M. Acute Ischemic Stroke Review. Journal of Neuroscience Nursing. 2007; 39(5):285-310.
9. Bhatti A B, Ali F, Satti S A.Association of Obesity with Stroke.International journal of biomedicalresearch.2013; 4(8):422-426.
10. Meenakshi K, Waleed N, S. Kanitkar, Abhijit M, Rajdeb S. Electrolyte Imbalance In Acute Stroke. Natl J Integr Res Med 2017; 8(4):23-2.
11. Alam MN, Uddin MJ, Rahman KM, Ahmed S, Akhter M, Nahar N, Swapan MK, Alam MM, Sultana N, Hallaz MM, Uddin MM. Electrolyte changes in stroke. Mymensingh medical journal: MMJ. 2012 Oct 1;21(4):594-9.
12. Sriram S, Asokan K, Suruthi Priyaa J.M, Tharani C, Arthy L, Cleyliya N. Study on Electrolyte Abnormality and Quality Outcomes in the Management of Stroke. International Journal of Science and Research (IJSR). 2020; 152-157.