



## ELECTROLYTE DISTURBANCE IN PATIENTS WITH ACUTE STROKE

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### ABSTRACT

**Background:** Stroke is the second most common cause of death after ischaemic heart disease and major cause of disability worldwide. electrolyte disturbances such as hyponatraemia, hypernatraemia resulting from inappropriate secretion of antidiuretic hormone (ADH), increase in Brain Natriuretic peptide (BNP) and Atrial Natriuretic peptide (ANP), 8 inappropriate fluid intake and loss; can lead to complications like seizures and death.

**Objectives:** The purpose of the study was to evaluate the Electrolyte disturbance in patients with acute stroke.

**Patients and methods:** The study was carried out in Neurology unit in the third floor of Baquba teaching hospital within one week of the onset of stroke. Performed on 50 patient randomly taking 35 male and 15 female they were diagnosed of having stroke clinically and by CT scan showing infarct or haemorrhage, The data obtained were; Age, sex, type of stroke, past medical history, drug history & Serum electrolytes level was estimated in all patients on admission. Association of electrolyte imbalance among acute stroke patients were identified and correlated. Analysis was carried out using simple statistical methods. This study conducted at 25\9 \2016 to 20\3 \2017.

**Results:** All the patients were in between 40-80 years age. 70% of patients were males and 30% of patients were females. Majority of the patients (80%) had ischaemic stroke, (20%) patients had haemorrhagic stroke. Haemorrhagic stroke male, female patients; (57.1%;33.3%), (71.4%,66.6%), (71.4%,66.6%) had no serum sodium, potassium neither chloride imbalances respectively. Of ischemic male, female patients; (50%,58.3%), (60.7%,14.6%), (82.1%,58.3%) had no serum sodium, potassium neither chloride imbalances respectively.

**Conclusions:** This study reveals that electrolyte disturbances are quite common problem after acute stroke. Hyponatraemia and hypokalaemia are most common abnormalities in both ischaemic and haemorrhagic stroke patients.

**KEYWORDS:** Ischaemic stroke, Haemorrhagic stroke, Hyponatraemia, Hypokalaemia.

### INTRODUCTION

Stroke is the second most common cause of death after ischaemic heart disease and major cause of disability worldwide.<sup>[1-3]</sup> Among all neurological diseases of adult life stroke clearly ranks first in frequency and importance. At least 50% of neurological diseases in a general hospital are of this type.<sup>[4]</sup> According to World Health Organization (WHO), about 15 million people suffer stroke Worldwide every year. Of these 5 million die and 5 million are permanently disabled.<sup>[5]</sup> Stroke is a complex disease that requires the efforts and skills of all members of a Multi-disciplinary team. There is evidence that organized management in stroke units improves survival and reduces dependency. How this improves survival is unclear, but parenteral fluids may have reduced the occurrence of dehydration and maintained blood pressure after acute stroke.<sup>[6]</sup> Stroke patients die of either due to the primary disease itself or due to complications. Common complications after acute stroke include neurological complications like recurrent stroke and seizures and medical complications like chest

infection, UTI, bowel or bladder dysfunction, deep vein thrombosis, pulmonary embolism, upper gastrointestinal bleeding, aspiration, bedsores, falls, malnutrition, etc. electrolyte disturbances such as hyponatraemia, hypernatraemia resulting from inappropriate secretion of antidiuretic hormone (ADH), increase in Brain Natriuretic peptide (BNP) and Atrial Natriuretic peptide (ANP),<sup>[8]</sup> inappropriate fluid intake and loss; can lead to complications like seizures and death. Most haemorrhagic stroke patients present with headache and vomiting. Vomiting is an important cause of electrolyte disturbances. Electrolyte disturbances are more common in the acute phase of stroke. The aim of our present study is to find out the common electrolyte disturbances in acute phase of stroke patients and its' association with outcome.

### METHOD

In this observational study which started from July 2016 till February 2017, a total number of 50 patients were randomly selected, they were diagnosed of having stroke

clinically and by CT scan showing infarct or haemorrhage. They had been admitted in Neurology unit in the third floor of Baquba teaching hospital within one week of the onset of stroke. The data obtained were; Age, sex, type of stroke, past medical history, drug history & Serum electrolytes level was estimated in all patients on admission. Association of electrolyte imbalance among acute stroke patients were identified and correlated. Analysis was carried out using simple statistical methods.

## RESULTS

Out of total 50 patients with a mean age of 60 years old. 35 cases were male patients and 15 were female patients.

CT scan findings reveal majority (80%) of patients had ischaemic stroke, and only (20%) of patients had haemorrhagic stroke. 25 patients of ischaemic stroke (above half of patients) and all the patients with haemorrhagic stroke were hypertensive. Electrolyte disturbances were more common in those with ischemic than haemorrhagic stroke patients, and from those, hyponatraemia and hypokalaemia were the commonest.

### Haemorrhagic stroke

10 cases (20%) of the total (7(70%) were males & 3(30%) were females)

**Table 1: Serum sodium imbalance in acute haemorrhagic stroke patients**

#### A) Males

Normal S. sodium	Hyponatraemia	Hypernatraemia	Total
4(57.1%)	2(28.5%)	1(14.2%)	7 (100%)

#### B) Females

Normal S. sodium	Hyponatraemia	Hypernatraemia	Total
1 (33.3%)	1 (33.3%)	1 (33.3%)	3 (100%)

\*Normal S. sodium (135-145 mmol/L)

\* Hyponatraemia (less than 135 mmol/L)

\* Hypernatraemia (more than 145mmol/L)

**Table 2: Serum potassium imbalance in acute haemorrhagic stroke patients.**

#### A) Male

Normal S. potassium	Hypokalaemia	Hyperkalaemia	Total
5 (71.4%)	1 (14.2%)	1 (14.2%)	7 (100%)

#### B) Females

Normal S. potassium	Hypokalaemia	Hyperkalaemia	Total
2 (66.6%)	1 (33.3%)	0 (0%)	3 (100%)

\* Normal S. potassium (3.5-5 mmol/L).

\* Hypokalaemia (Less than 3.5 mmol/L).

\* Hyperkalaemia (more than 5 mmol/L).

**Table 3 Serum chloride imbalance in acute haemorrhagic stroke patients.**

#### A) Males

Normal S. chloride	Hypochloraemia	Hyperchloraemia	Total
5 (71.4%)	2 (28.5%)	0(0%)	7 (100%)

#### B) Females

Normal S. chloride	Hypochloraemia	Hyperchloraemia	Total
2 (66.6%)	1 (33.3%)	0 (0%)	3 (100%)

\* Normal S. chloride (95-107mmol/L)

\* Hypochloraemia (less than 95 mmol/L)

\*Hyperchloraemia (more than 107mmol/L)

\*\*\* All of haemorrhagic stroke pt were hypertensive.

\*\*\*3 of males were on ACE-I chronic use.

Ischemic stroke 40 cases (80% of the total) (28 were males & 12 were females)

**Table 1: Serum sodium imbalance in acute ischemic stroke patients.****A) Males**

Normal S. sodium	Hyponatraemia	Hypernatraemia	Total
14 (50%)	9 (32.1%)	5 (17.8%)	28 (100%)

**B) Females**

Normal S. sodium	Hyponatraemia	Hypernatraemia	Total
7 (58.3%)	4 (33.3%)	1 (8.3%)	12 (100%)

**Table 2: Serum potassium imbalance in acute ischemic patients.****A) Males**

Normal S. potassium	Hypokalaemia	Hyperkalaemia	Total
17(60.7%)	6 (21.4%)	5 (17.8%)	28 (100%)

**B) Females**

Normal S. potassium	Hypokalaemia	Hyperkalaemia	Total
5 (41.6%)	5 (41.6%)	2 (16.6%)	12 (100%)

**Table 3: Serum chloride imbalance in acute ischemic stroke patients.****A) Males**

Normal S. chloride	Hypochloraemia	Hyperchloraemia	Total
23 (82.1%)	2 (7.1%)	3 (10.7%)	28

**B) Females**

Normal S. chloride	Hypochloraemia	Hyperchloraemia	Total
7 (58.3%)	3 (25%)	2 (16.6%)	12(100%)

\*25 of total 40 ischemic stroke pt. were hypertensive.

\*11 of males and 5 of females on ACE-I

\*Two of male patients were with a positive Hx of RF.

Tables shows that majority of patients having electrolyte imbalances & of all acute stroke patients hyponatraemia and hypokalaemia were the commonest and more common among ischaemic stroke patients.

**DISCUSSION**

The incidence of stroke increases with increasing age. In our present study all the patients were in between 40-80 years age. 70% of patients were males and 30% of patients were females. Majority of the patients (80%) had ischaemic stroke, (20%) patients had haemorrhagic stroke. Higher rates of haemorrhagic stroke in our country may be due to inadequate treatment or no treatment of hypertension by many of our patients due to poverty and lack of health awareness and poor drug compliance leading to sudden rise of blood pressure causing intracerebral haemorrhage. In this study majority of all acute stroke patients had electrolyte abnormalities. This small scale hospital based studies, which may not be representative of the problem in whole country. More over data on electrolyte disturbances in patients with acute stroke are relatively scanty in our country as well as in other parts of the world so difficult to compare.

In our study Of haemorrhagic stroke male, female patients; (57.1%; 33.3%), (71.4%, 66.6%), (71.4%, 66.6%) had no serum sodium, potassium neither chloride imbalances respectively.

Of ischemic male, female patients; (50%,58.3%), (60.7%,14.6%), (82.1%,58.3%) had no serum sodium, potassium neither chloride imbalances respectively. hyponatraemia was most common among ischaemic stroke patients followed by haemorrhagic stroke patients Hyponatraemia in male patients were (28.5%,32.1%), while in female patients were (33.3%, 33.3%) in haemorrhagic and ischemic stroke respectively.

This finding differs from the study of Siddique MR et al in which they found no statistically significant association of hyponatraemia and types of stroke.

patients had hypernatraem is less common than hypernatraemia. Hypernatraemia in male patients were (14.2%, 17.8%), while in female patients were (33.3%, 8.3%) in haemorrhagic and ischemic stroke respectively.

Of all stroke patients who had hypokalaemia, it was most common among ischaemic Patients followed by haemorrhagic stroke patients.

Hypokalaemia in male were (14.2%, 21.4%), while in female were (33.3%, 41.6%) in haemorrhagic and ischemic stroke respectively.

While Hyperkalaemia in male were (14.2%,17.8%) while in female were (0%,16.6%) in haemorrhagic and ischemic stroke respectively.

Hypochloraemia in male were (28.5%, 7.1%) while in female were (33.3%, 25%) in haemorrhagic and ischemic stroke respectively.

Hyperchloraemia in male were (0%, 10.7%), while in female were (0%, 16.6%) in haemorrhagic and ischemic stroke respectively.

That means all patients had hyperchloraemia all of whom were having ischaemic stroke.

All patients with hyperchloraemia also had hypernatraemia suggesting a possible common aetiology.

No patient with haemorrhagic stroke had hyperchloraemia.

However both hyponatraemia and hypokalaemia were more common in ischaemic stroke patients in our study, which differs from the study of Kusuda K et al. and Siddique MR et al. who found these to be more common with haemorrhagic stroke.

## CONCLUSION

This study reveals that electrolyte disturbances are quite common problem after acute stroke. Hyponatraemia and hypokalaemia are most common abnormalities in both ischaemic and haemorrhagic stroke patients. Electrolyte abnormalities result from inappropriate secretion of ADH, increased BNP and ANP secretion; as well as inappropriate and/or inadequate fluid administration and loss of fluid due to vomiting. Electrolyte abnormalities may adversely affect outcome of the acute stroke patients. So serum electrolytes level should be determined in every patient with acute stroke. Thus fluid intake and electrolyte levels should be closely monitored in patients with acute stroke. *Dinajpur Med Col J* 2013 Jan; 6(1) 16

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## REFERENCES

1. Truelsen T, Begg S, and Mathers C. The global burden of cerebrovascular disease, Non-communicable diseases and Mental Health Cluster, WHO Geneva (CCS/NMH).
2. Donnan GA, Fisher M, Macleod M et al, *Stroke*, The Lancet, 10th May 2008; 371(9624): 1612–1623.
3. Van der Worp H B and van Gijn J. Acute Ischaemic Stroke, *N Eng J Med.*, August 9, 2007; 357: 572–579.
4. Cerebrovascular Diseases, Ropper AH, Brown RH editors. ADAMS AND VICTOR'S Principles of

Neurology, Eighth edition, The McGraw-Hill Company, Inc., 2005; 660-746.

5. World Health Report. World Health Organization, International Cardiovascular Disease Statistics (200 Update). In: American Heart Association, 2007.
6. Bhalla A, Sankaralingam S, Dundas R et al. Influence of Raised Plasma Osmolality on Clinical Outcome After Acute Stroke, *Stroke*, 2000; 31: 2043-2048.
7. Navarro J C, Bitanga E, Suwanwela N et al. Complication of acute stroke: A study in ten Asian countries, *Neurology Asia*, 2008; 13: 33–39.
8. 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.
9. Kusuda K, Saku Y, Sadoshima S et al. Disturbances of fluid and electrolyte balance in patients with acute stroke; *Nihon Ronen Igakkai Zasshi*, May, 1989; 26(3): 223-7.