

## ORIGINAL ARTICLE

# Variation of electrolyte status in relation to the type of acute stroke patients

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### Abstract

**Background:** Stroke is considered as a major health problem and contributes to serious residual disability and death worldwide. Both serum sodium and potassium disturbance influence negatively on the overall outcome of stroke. There is limited data about electrolyte abnormality in acute stroke, especially from developing countries.

**Objective:** The objective of this study was to evaluate the incidence of electrolyte imbalance in relation to aetiological type of acute stroke patients admitted in hospital.

**Methods:** Total fifty three patients of stroke diagnosed clinically and confirmed by CT scan within 24 hours of onset & consecutively selected for the study after fulfillment of inclusion criteria in the inpatient department of Neuromedicine ward, Khulna Medical College Hospital from January 2018 to July 2018. Baseline serum electrolytes were estimated along with other biochemical tests as needed. Data were collected and analysed.

**Results:** Fifteen (29%) of ischaemic stroke patients and 4 (8%) of haemorrhagic stroke patients had dyselectrolytaemia. Hyponatraemia was found in 15 (29%) of stroke patients. Hyponatraemia was more common in ischaemic stroke patients (22.6%) than haemorrhagic stroke patients (5.6%). In this study hypokalaemia was found in 3 (5.6%) cases of ischaemic stroke patients and 1 (1.88%) cases of haemorrhagic stroke patients.

**Conclusion:** The incidence of electrolyte disturbance was more in ischaemic stroke than in haemorrhagic stroke and most of which were hyponatraemia followed by hypokalaemia.

**Keywords:** Dyselectrolytaemia, Electrolyte imbalance, Stroke

### Introduction

Stroke may be defined as an abrupt onset of neurological deficits that are attributable to a focal and at times the global loss of main functions due to the vascular origin with symptoms lasting more than 24 hours or leading to death.<sup>1</sup> According to WHO about 15 million people suffer stroke world wide every year. Of these 5 million dies and 5 million are permanently disabled.<sup>2</sup>

Stroke is the third leading cause of death in Bangladesh. The mortality rate of stroke increased from 6.00% (in 2006) to 8.57% (in 2011) with an age adjusted mortality rate of 108.31 per 100000 people (in 2011).<sup>3</sup> The World Health Organization (WHO) ranks mortality due to stroke in Bangladesh as number 84 in the world.

During the management of acute stroke patient, the primary focus is given on the identification of risk factors and managing them accordingly. Thereafter comes the prevention of different complications of stroke like cerebral oedema, raised ICP (intracranial pressure), aspiration pneumonia, malnutrition, dyselectrolytemia, bowel and bladder dysfunction, deep vein thrombosis (DVT), pulmonary embolism, bed sores, joint abnormalities, and muscle contractures.<sup>4</sup> In an acute setting, many factors contribute to the development of electrolyte imbalance like syndrome

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such as inappropriate antidiuretic hormone (SIADH) or cerebral salt wasting (CSW) syndrome, elevated brain natriuretic peptide (BNP), inappropriate fluid intake or loss leading to death and seizures.<sup>5</sup> An early and accurate prediction of stroke outcome in the emergency department is crucial for decision making as well as in assessing prognosis.

In most cases, acute haemorrhagic stroke patients suffer from vomiting and headache. Vomiting results in dyselectrolytaemia. Thus, acute stroke is a state of complex pathophysiology and therefore its management demands a multidisciplinary approach. The objective of this study was to observe the electrolyte status in acute stroke patients, so that we can manage dyselectrolytaemia and prevent mortality and mobility of acute stroke patients.

**Materials and Methods**

During the study period of January 2018 to June 2018, 53 cases of stroke were included in this study who got admitted in the Neuromedicine Department of Khulna Medical College and Hospital. Informed written consent was taken from patients or their relatives. Patients of either sex above 12 years of age presenting with symptoms of acute stroke within 24 hrs of onset, were selected and diagnosed clinically and confirmed by CT scan. Stroke patients with a history of recent diarrhoea, congestive cardiac failure, cirrhosis of liver, CKD and Acute Kidney Injury (AKI), severe malnutrition, patients on glucocorticoids or mineralocorticoids, CNS infections i.e. meningitis or CNS surgery or on the shunt, patients already received mannitol, diuretics, intravenous fluid, subarachnoid haemorrhage (SAH) and intracerebral haemorrhage (ICH) with ventricular extension with secondary SAH were excluded from the study. Detailed history taking and physical examination were done and baseline serum electrolytes i.e. Sodium, Potassium, chloride and bicarbonate along with other relevant biochemical tests were done. Normal range of Serum Sodium is considered as 136-146 mmol/L and that of potassium is 3.5-5 mmol/L.

**Result**

Total 53 cases were selected for this study after fulfillment of inclusion and exclusion criteria. Among them, 26 were male (49%) and 27 were female (51%), (Figure 1). There were 41 (77%) cases of Ischaemic stroke (ISCHS) and 12 (23%) cases of intracerebral haemorrhage (ICH) (Figure

2). Only Hypertension was present in 28 cases (in ICH 8 and 20 in ISCHS). Eight patients had only diabetes

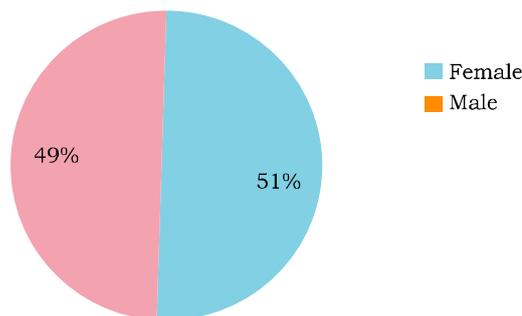


Figure 1. The percentage of stroke according to sex

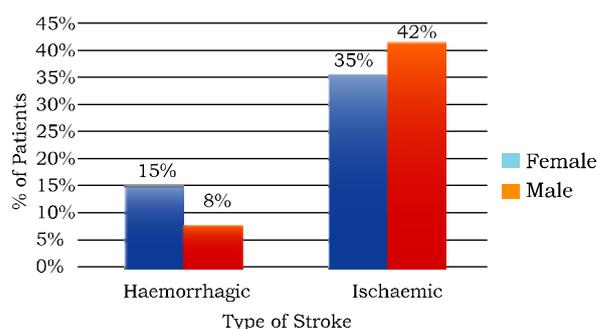


Figure 2. Types of stroke encountered

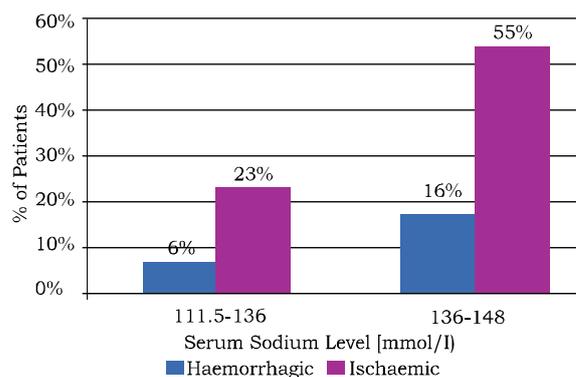


Figure 3. Serum sodium status in stroke patients

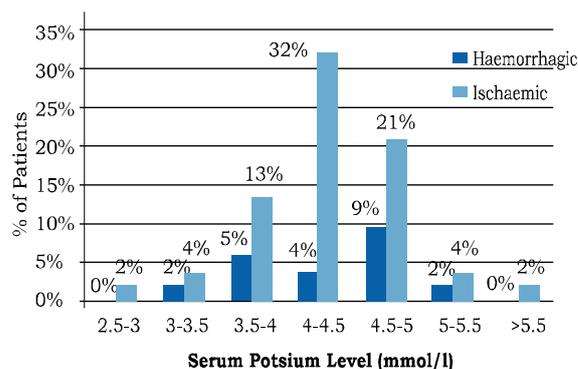


Figure 4, Serum potassium status in stroke patients

and 7 patients had both diabetes and hypertension. Ten patients had no detectable risk factor. (Table 1)

**Table I**

Frequency distribution of risk factors among stroke patients encountered in this study

Risk Factor	Female(%)	Male (%)
Diabetics Mellitus	17	13
Hypertension	46	33
Dyslipidaemia	17	11

Twenty nine percent of all stroke patients had hyponatraemia. Hyponatraemia was more common among ischaemic stroke patients (23%) than haemorrhagic stroke patients (6%), (Figure 3). Hypokalaemia was found in 6% of cases in ischaemic stroke patients and 2% of cases in haemorrhagic stroke patients. Only 2% of patients had hyperkalaemia, (Figure 4).

## Discussion

In this series, 39% of our acute stroke patients had dyselectrolytaemia and 61% had normal electrolyte. Out of 23% of haemorrhagic stroke patients, 8% of patients were found of having dyselectrolytaemia. In a study, Bandopayopadhyay M et al, found that 63.83% haemorrhagic stroke and 4.17% ischaemic stroke patients had dyselectrolytaemia.<sup>7</sup> In this aspect our study findings became contradictory to other previous studies.

In this study, 29% of all stroke patients had hyponatraemia. Hyponatraemia was most common among ischaemic stroke patients (23%) followed by haemorrhagic stroke patients (6%). But there was no statistically significant association between hyponatraemia and type of stroke ( $p > 0.05$ ). Wen-yi Huang et al reported hyponatraemia in 11.6% of acute stroke in their study.<sup>10</sup> Bandopayopadhyay M et al and Siddiqui MR et al showed that hyponatraemia was most common in their series of haemorrhagic strokes.<sup>6,7</sup> Total 10% stroke patients had serum potassium abnormality. Only 04 (8%) of all stroke patients had hypokalaemia. Hypokalaemia was more common among ischaemic stroke patients (6%) than haemorrhagic stroke patients (2%). Only 2% of all stroke patients had hyperkalaemia. Hassan MK et al reported in 28.78% of acute stroke patients and Siddiqui MR et al reported more frequently in ICH patients.<sup>8,6</sup> The difference

between the findings in our study and many other international studies in respect of prevalence of dyselectrolytaemia according to the type of stroke may be due to our greater percentage of ischaemic strokes.

This study had several limitations. Firstly, the sample size was small. Secondly, we could not carry out any long term follow up. Thirdly, the definite causes of this electrolyte imbalance could not be sought. So the result of this study should be interpreted in the light of the above mentioned limitations, However, the main analysis of the present study was focused to find out the electrolytes status and common electrolytes disturbances in a different type of acute stroke patients and their correlation with different clinical presentations.

## Conclusion

Electrolyte disturbances are very common at the time of presentation of patients with acute stroke and may play important role in stroke related morbidity and mortality. Early detection and correction of this electrolyte imbalance may prevent grave outcome.

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