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Pattern and outcome of electrolytes imbalance in acute stroke patients admitted in a tertiary care hospital in Khulna city

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Abstract

Stroke is a major public health problem and a leading cause of chronic disability and death. There is scarcity of data about electrolytic disturbances in acute stroke, especially in developing countries. The objective of this study is to find out electrolyte disturbances among acute stroke patients and their association with severity of acute stroke and outcome. It was a cross-sectional study, conducted over a period of one year from 01/06/2018 to 31/05/2019, on 80 selected clinically and CT scan proven acute stroke patients at Gazi Medical College Hospital, Khulna. Out of 80 patients, 50 (62.5%) were male and 30 (37.5%) were female. Majority of the patients (38.7%) were above 70 years age group. CT scan findings revealed, 16 (20%) haemorrhagic, 60 (75%) ischaemic and 4 (05%) mixed (both haemorrhagic and ischaemic) stroke. Seventy-two (90%) of patients had unilateral and only 8 (10%) had bilateral lesion. Dyselectrolytemia was evident in 65% of total stroke patients. Thirty-five percent of all patients had hypokalaemia which was the most common dyselectrolytemia. Out of 20 patients with hyponatremia, 14 died and out of 28 patients with hypokalaemia, 14 died. Out of total 80 patients 48 (60%) had improved and 4 (5%) had been unchanged and referred to higher centre.

Keywords: Electrolyte imbalance, ischaemic stroke, haemorrhagic stroke.

Introduction

Stroke is a major public health problem. It is the second most common cause of death after ischaemic heart disease and major cause of disability worldwide.[1-3] Stroke also has enormous contribution to economic and social burden for patients and their family.[4] Among all neurological diseases of adult life stroke clearly ranks first in frequency. According to WHO, about 15 million people suffer from stroke worldwide every year. Of those, 5 million die and 5 million are permanently disabled. Stroke is a complex disease that requires the efforts and skills of all members of a multidisciplinary team. Electrolyte disturbance are commonly found in acute stroke cases.[5] Hyponatremia and hypokalemia are the commonest type of disturbances. Stroke patients die 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 other systemic complications like respiratory tract infection, urinary tract infection (UTI), bowel or bladder dysfunction, deep vein thrombosis,

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pulmonary embolism, upper gastrointestinal bleeding, aspiration, bedsores, falls, malnutrition etc.[6] Timely diagnosis and proper treatment of electrolyte disturbances can decrease mortality of patients with cerebrovascular disease (CVD) like stroke to a large extent.

Methodology

It was a cross-sectional study conducted at Gazi Medical College Hospital, Khulna, Bangladesh from 1st June 2018 to 31st May 2019. After taking approval from institutional ethical review committee, a total of 80 patients with acute stroke were selected based on evaluation of clinical profile and CT scan reports. An informed written consent was taken from patients or their relatives prior to study.

Inclusion criteria:
1. Patients of either sex above 15 years of age with first-ever acute stroke admitted within 48 hours of symptom onset.
2. Confirmation of stroke with CT scan of brain.
3. Patients who were not in diuretic therapy.
4. Patients who were not in resuscitation phase.
5. There was no history of kidney or endocrine diseases.

Exclusion criteria:
We excluded all patients with any complication that might affect electrolyte status during their stroke management; such as, patients with history of previous stroke, transient ischaemic attack (TIA), syncope and any neurological deficit secondary to head injury i.e., subdural haemorrhage (SDH), epidural haemorrhage or an intracerebral haemorrhage (ICH) or infraction which was caused by an infection/tumor (SOL) etc. or having preexisting severe physical or cognitive disabilities.

Electrolytes analyzed in this study were sodium and potassium. Sodium level in a range of 135-153 mEq/L was defined as normal. Potassium level in a range of 3.5-5 mEq/L was defined as normal. Other values were categorized as electrolyte disturbances. Hyponatremia was

defined when the level of sodium was below 135 mEq/L. Hypernatremia was the level of Sodium above 153 mEq/L. Hypokalemia was the level of potassium below 3.5 mEq/L, while Hyperkalemia was when the level of potassium was above 5 mEq/L. Data were presented through different tables and graphs using Microsoft excel 2007.

Results

The results of this study were analyzed through the following tables and charts:

Table 01 shows that, among 80 study participants, 7.5% were below 50 years age group, 38.7% were in 51-60 years age group, 25% were 61-70 years age group and 28.75% were above 70 years age group. Among 80 patients, males were 50 (62%) and females were 30 (38%) in number which is shown in **Figure 01**.
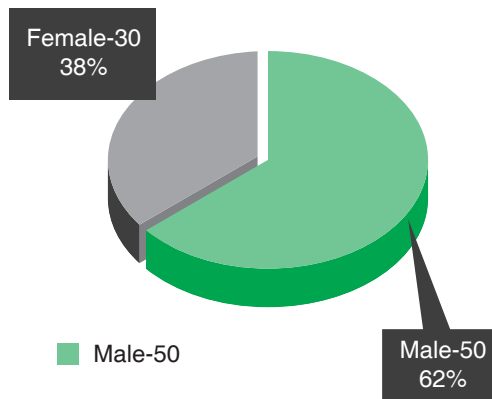
Figure 02(a) reveals percentage of different types of strokes in this study. 16 (20%) haemorrhagic stroke, 60 (75%) ischaemic stoke, and 4 (05%) mixed (both haemorrhagic and ischaemic stoke). 72 (90%) of patients had unilateral lesion and only 8 (10%) of patients had bilateral lesion **[Figure 02(b)]**.

Table 02 reveals electrolyte abnormality in different types of acute stoke. Out of 80, we found that 52 (65%) patients had dyselectrolytemia & 28 (35%) patients had no dyselectrolytemia. Sodium abnormality was present in 27.5% cases, where 25% patients had hyponatraemia and 2.5% patients had hypernatraemmia. Potassium abnormality was present in 37.5% cases, where 35% patients had hypokalaemia and 2.5% patients had hyperkalaemia. The most common electrolyte imbalance in our study was hypokalaemia.
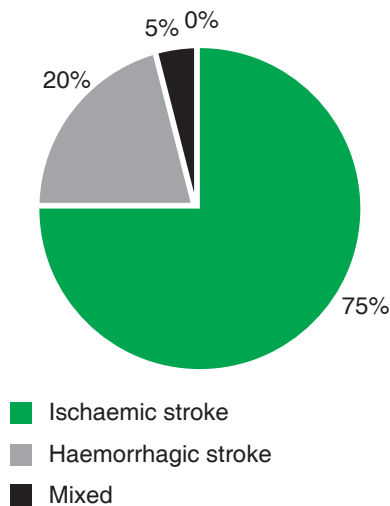
Table 03(a) & Table 03(b) reveals association between dyselectrolytemia and outcome of stroke. Patients who had dyselectrolytemia - 17.5% of them had poor outcome. Out of 20 patients with hyponatremia, 14 died and out of 28 patients with hypokalaemia, 14 died.

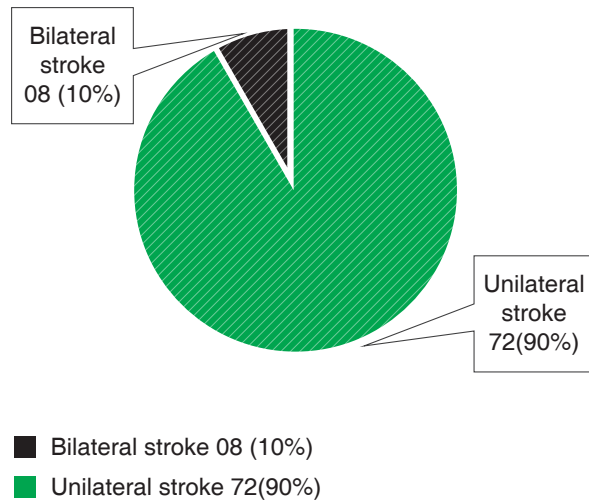**Table 01: Age distribution of the patients (n=80)**

Age group (Years)	Male (n=50)	Female (n=30)	Total Patients
<50	04 (66.6%)	02 (33.4%)	06
51-60	20 (64.5%)	11 (35.5%)	31
61-70	12 (60%)	08 (40%)	20
>70	14 (60.8%)	09 (39.2%)	23
Total	50 (62.5%)	30 (37.5%)	80

- Bilateral stroke 08 (10%)
- Unilateral stroke 72(90%)

Figure 02(b): Percentage of different types of strokes (n=80)

Table 02: Electrolyte abnormalities in different types of acute stroke (n=80)

Sodium	Total	%	Sodium	Total	%
Normal	58	72.5%	Normal	50	62.5%
Hypernatraemia	02	2.5%	Hypernatraemia	02	2.5%
Hyponatraemia	20	25%	Hyponatraemia	28	35.0%
Total	80	100%	Total	80	100%

- Male-50
- Female-30 38%
- Male-50 62%

Figure 01: Gender distribution of the patients (n=80)

Table 03(a): Association between sodium disturbances & outcome of stroke.

Outcome	With hyponatremia	Without Hyponatremia	Total
Died	08	06	14
Survive	12	54	66
Total	20	60	80

5% 0%
20%
75%

- Ischaemic stroke
- Haemorrhagic stroke
- Mixed

Figure 02(a): Percentage of different types of strokes (n=80)

Table 03 (b): Association between potassium disturbances & outcome of stroke.

Outcome	With hyponatremia	Without Hyponatremia	Total
Died	08	06	14
Survive	20	46	66
Total	28	52	80

Discussion

Stroke predominantly occurred at the middle age group or above and is commonly found in male than female. The current study also revealed that most of the patients are male and in 51-60 years age group. Most of them admitted to the hospital with ischaemic stroke. The result in this study showed that only limited number of patients admitted with sodium disturbances, but large number of patients presented with potassium disturbances. Siddiqui[4] reported a high percentage of patients with electrolyte imbalance (53%). Most of them were suffering from acute hemorrhagic stroke. Among all patients in their study, it was revealed that there were 36% patients with sodium disturbance and 31% patients with potassium disturbance. Among patients with sodium disturbance, most of them had hyponatremia (32%). The majority of potassium disturbance was hypokalemia (30%).

The incidence of stroke increases with increasing age. In present study 7.5% were below 50 years age group, 38.7% were in 51-60 years age group, 25% were in 61-70 years age group and 28.75% were above 70 years age group. Here, 62.5% were male and 37.5% were female patients, which is almost similar to the findings of Siddique et. al.[7] Out of 80 patients M:F ratio was 5:3. This result correlates well with another study conducted at Chittagong Medical College Hospital[8], though it differs from the study of Badiuzzaman et al. in Dhaka Medical College Hospital in 2007.[9] Majority of the patients (75%) had ischaemic stroke, 20% patients had haemorrhagic and only 5% patients had mixed (both haemorrhagic and ischaemic)

stroke. 72 (90%) of patients had unilateral lesion and only 8 (10%) of patients had bilateral lesion. Sodium disturbances was 27.5% and potassium disturbances were 37.5%. Here, 65% of total stroke patients had dyselectrolytemia and 35% patients had no dyselectrolytemia. 25% of all patients had hyponatraemia and 2.5% of all patients had hypernatraemia. 35% of all patients had hypokalaemia which was the most common electrolyte imbalance and 2.5% of all patients had hyperkalaemia. In a study, Kusuda et al.[10] found that 34% of acute stroke patients presented with sodium imbalance and 44% with potassium imbalance, which correlates well with our study. However, both hyponatraemia and hypokalaemia were more common in ischaemic stroke patients in our study, which differs from the study of Kusuda et al.[10] and Siddique et al.[7] who found these to be more common with haemorrhagic stroke. Patients who had dyselectrolytemia, 35% had poor outcome. Out of 20 patients with hyponatremia, 14 died and out of 28 patients with hypokalaemia, 14 died.

Conclusion

In conclusion, it is evident that electrolyte disturbances are quite common in acute stroke patients. Among electrolyte disturbances hyponatraemia and hypokalaemia were the most common abnormalities. Electrolyte abnormalities may adversely affect the outcome in acute stroke patients. Patients who had no electrolyte imbalance, had good outcome. So, serum electrolyte levels should be very cautiously monitored in patients with acute stroke. Early diagnosis and proper treatment can improve the overall outcome of stroke patients.

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