

# Comparative Assessment of Severity of Dyselectrolytaemia (Sodium and Potassium) in Cerebral Infarction and Cerebral Hemorrhage

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## Abstract

**Aim:** 1) To compare serum electrolyte levels (sodium and potassium levels) in cerebral infarction and cerebral hemorrhage. 2) To compare serum electrolytes in thalamic and other intracranial hemorrhages. **Material and Methods:** In this retrospective type of study, we compared serum electrolyte levels of 70 patients, 45 diagnosed as cerebral infarction with the 25 patients, diagnosed as cerebral hemorrhage. The sample for electrolyte analysis was collected within first 24 hrs of onset of the event. **Result:** Statistical analysis was done by Z test and independent t test using SPSS 16 which showed statistically no significant difference in serum electrolyte levels in both groups there was also no statistical difference in serum electrolyte levels in thalamic hemorrhages compared to other intracranial hemorrhages. **Conclusion:** Electrolyte imbalance is common in cerebrovascular accidents and needs to be intervened as early as possible irrespective of the type of cerebral insult. Correction of electrolytes imbalance can help in better prognosis of the patient and may avoid complications.

**Keywords:** Cerebral Hemorrhage, Cerebral Infarction, Serum Electrolytes (Serum Sodium and Potassium)

## 1. Introduction

Electrolyte imbalance now a days is very common complication seen in cerebrovascular accidents. Early diagnosis and timely treatment for the same can improve the mortality rate in cerebrovascular accidents<sup>1</sup>.

There are two main types of cerebrovascular accidents. An ischemic stroke caused due to blockage and a hemorrhagic stroke caused due, to breakage in blood vessel<sup>2</sup>.

The release of osmotically active substances (arachidonic acid, electrolytes, lactic acid) from the necrotic brain

tissue causes cerebral oedema. This is aggravated by vascular injury and leakage of proteins in the interstitial space.

This fluid accumulation within initial 3-4 days is the most dangerous stage. This may lead to the electrolyte imbalance between intracellular and extra cellular compartment and may be towards the complications<sup>3</sup>.

Comparative studies in types of the cerebrovascular accidents are not much though it is proved that electrolyte imbalance is common in cerebrovascular accidents. Hence this study was undertaken to evaluate severity of the imbalance in both types.

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## 2. Material and Methods

The study was carried out at Tertiary care centre and research hospital.

Prior to that, ethical clearance was obtained from ethics committee. Permission for data collection from medical record department was also obtained from higher authority.

Samples of 70 diagnosed (clinically & radiologically) patients with cerebrovascular accidents were analyzed for serum electrolytes. The age group range was from 35 to 85 yrs.

These were divided as

**Group: I** – 45 patients with diagnosis of cerebral infarction.

**Group: II** – 25 patients with diagnosis of cerebral hemorrhage.

The group II was further divided depending upon the site of hemorrhage as thalamic hemorrhage (17 patients) and other intracranial hemorrhages (8 patients).

The sample collection was done within 24 hours of the onset of the event.

The patients with history of cerebrovascular accidents or those patients admitted after 24 hrs of the onset were excluded from the study.

Serum electrolytes in terms of serum sodium and serum potassium levels were analysed in central clinical laboratory on electrolyte analyzer based on the principle of Ion selective electrode.

Results were analyzed by SPSS -16 using appropriate statistical test.

## 3. Result

**Table 1.** Comparison of serum sodium among cerebral infarct and cerebral hemorrhage

Group	N	Mean ± SD(mEq/lit)
I	45	137.93 ± 6.9
II	25	137.56 ± 7.7

Test – Z Test P = 0.84 (<0.05 means significant)

So there is no statistically significant difference in serum sodium levels in both the groups (Table 1).

**Table 2.** Comparison of serum potassium among cerebral infarct and cerebral hemorrhage

Group	N	Mean ± SD(mEq/lit)
I	45	4.2 ± 0.64
II	25	± 0.59

Test – Z Test P = 0.81 (< 0.05 means significant)

So there is no statistically significant difference in serum potassium levels in both the groups (Table 2).

**Table 3.** Comparison of serum sodium and serum potassium levels in thalamic and other intracranial hemorrhages

Group	N	Serum sodium (mEq/lit)	Serum potassium (mEq/lit)
Thalamic hemorrhage	17	139.88 ± 4.5	4.2 ± 0.56
Other intracranial hemorrhages	08	136.47 ± 8.7	4.2 ± 0.62
		P=0.316	P=0.928

Test – independent t test P <0.05 = significant

There is no statistically significant difference in serum sodium and serum potassium levels (Table 3).

## 4. Discussion

Disturbances in serum electrolyte levels are very common in cerebrovascular accidents, irrespective of the type of the insult. It is already being proved by number of studies like Kusuda et al.<sup>1</sup>, Keshab Sinha Roy et al.<sup>4</sup> and Surekha Nemade et al.<sup>5</sup>

In our comparative study, we found that there is no statistically significant difference in electrolyte imbalance between cerebral infarction and cerebral hemorrhage.

These results are in accordance with the studies done by Keshab Sinha Roy et al.<sup>4</sup> and Alam MN et al.<sup>6</sup>

Further, we compared the cerebral hemorrhage depending upon the site of hemorrhage as thalamic or other intracranial hemorrhages.

We observed that electrolyte imbalance is more common in thalamic type of hemorrhage than others. In our study there was no statistically significant difference in serum sodium and serum potassium levels.

Guo Z et al.<sup>7</sup> also stated the higher incidence of electrolyte imbalance in thalamic hemorrhage than those

with non thalamic hemorrhages & the reason may be partly related to the location of the hemorrhage. This may contribute to the higher mortality rate of patients with thalamic hemorrhages.

While Kusuda K et al.<sup>1</sup> stated that this imbalance may lead to complications like renal insufficiency and diabetes mellitus or even to death.

Present study emphasizes that electrolyte imbalance irrespective of the type of cerebrovascular accidents should be assessed and treated as early as possible. Thalamic hemorrhage having high grade of electrolyte imbalance and mortality should be treated as an emergency.

Since, present study is limited to small group of patients (n = 70) and also other lines of treatment like IV fluids, medications, chronic diseases are not considered, we propose that such trials should be carried out at large scale. Other factors contributing to this electrolyte imbalance should be analysed and studied in detail.

## 5. References

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