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Original Research Article

Factors Predicting Post-Stroke Epilepsy: A Retrospective Analysis

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Abstract

Background: Post-stroke epilepsy (PSE) is one of the most common causes of acquired epilepsy in adults, particularly in the elderly. The incidence ranges from 2.3% to 43%, depending on stroke subtype and population studied. Identifying predictors of PSE is crucial for risk stratification and early intervention.

Objectives: To evaluate seizure types and identify clinical and radiological predictors of post-stroke epilepsy.

Methods: A retrospective observational study was conducted at a tertiary care centre in Northeast India. Thirty adult patients with post-stroke seizures and no prior epilepsy were included over a 7-month period (February–August 2025). Variables analysed:

- Demographics
- Stroke subtype (ischemic vs hemorrhagic)
- Seizure semiology (ILAE 2017 classification)
- Timing of seizures
- Stroke severity (ASPECTS for ischemic stroke)
- Risk factors and EEG findings

Statistical: Analysis: Descriptive statistics were used. Associations between categorical variables were analysed using chi-square/Fisher's exact test (where applicable). A p-value <0.05 was considered significant.

Results: A total of 30 patients were included in the study, with a male predominance accounting for 53% of the cohort. The majority of patients had ischemic stroke, which constituted 86% of cases, while hemorrhagic stroke accounted for 14%. Regarding seizure semiology, generalized tonic-clonic seizures (GTCS) were the most common type, observed in 60% of patients. This was followed by focal impaired awareness seizures (FIAS) in 30% and focal aware seizures (FAS) in 10% of cases. In terms of timing, late-onset seizures were more frequent, occurring in 64% of patients, whereas early seizures were observed in 36% of cases.

Key Associations:

- Hemorrhagic stroke → significantly associated with early seizures
- Ischemic stroke → associated with late seizures
- Moderate ASPECTS (5–7) → highest seizure occurrence

Conclusion: Post-stroke epilepsy is more common following ischemic stroke and typically presents as late-onset seizures. Stroke severity and cortical involvement are key predictors. Early identification of high-risk patients can guide preventive strategies.

Keywords: Post-stroke epilepsy, Stroke, Seizures, ASPECTS, Risk factors, EEG.

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Introduction

Stroke is a leading cause of acquired epilepsy, accounting for a substantial proportion of new-onset seizures in older adults.

Post-stroke seizures are categorized into early (≤2 weeks) and late (>2 weeks), reflecting distinct pathophysiological mechanisms. Early seizures are thought to arise from acute biochemical and metabolic disturbances, whereas late seizures are attributed to gliosis, cortical scarring, and network reorganization. Several factors influence seizure risk:

- Cortical involvement
- Stroke subtype
- Infarct size
- Hemorrhagic transformation

Despite growing evidence, data from Northeast India remain limited. This study aims to bridge this gap by analysing predictors of PSE in a tertiary care setting.

Materials and Methods

Study Design: Retrospective observational study.

Study Period: February 2025 – August 2025.

Study Setting: Department of Neurology, Gauhati Medical College and Hospital.

Inclusion Criteria

- Adults with stroke and subsequent seizures.

Exclusion Criteria

- Pre-existing epilepsy.
- Metabolic or provoked seizures.

Data Collection: Clinical and radiological data were retrieved from hospital records. Stroke classification was based on neuroimaging.

Seizures were classified according to International League against Epilepsy (2017). Stroke severity in ischemic stroke was assessed using the ASPECTS scale.

Statistical Analysis

- Data analysed using descriptive statistics
- Chi-square/Fisher's exact test applied
- Significance threshold: $p < 0.05$

Results

Demographic Profile

- Total: 30 patients
- Male: 53%, Female: 47%

Clinical Characteristics

- Majority patients >60 years
- Atrial fibrillation noted in a subset, frequently associated with GTCS.

Table 1: Stroke Distribution

Stroke Type	n	%
Ischemic	26	86%
Hemorrhagic	4	14%

Table 2: Seizure Types

Seizure Type	n	%
GTCS	18	60%
FIAS	9	30%
FAS	3	10%

Table 3: Timing of Seizures

Timing	n	%
Early (<2 weeks)	11	36%
Late (>2 weeks)	19	64%

Table 4: ASPECTS Correlation (Ischemic Stroke)

Score	Interpretation	Seizure Frequency
0–4	Severe	5
5–7	Moderate	16
8–10	Mild	5

Discussion

This study reinforces that post-stroke epilepsy is predominantly associated with ischemic stroke and occurs as a late complication.

Key insights:

1. Stroke subtype: Ischemic stroke constituted the majority of cases, consistent with global epidemiological data. Hemorrhagic stroke, though less frequent, showed a higher association with early seizures.

2. Seizure semiology: GTCS was the most common seizure type, likely reflecting secondary generalization from cortical foci.

3. Timing of seizures: Late seizures were more frequent, supporting the hypothesis of structural reorganization and epileptogenesis.

4. Stroke severity (ASPECTS): Moderate infarcts (ASPECTS 5–7) had the highest seizure association, suggesting an optimal threshold for epileptogenesis—neither too small nor too extensive.

5. Clinical implications

- Early identification of high-risk patients
- Consideration of EEG monitoring
- Potential role of prophylactic anti-seizure medication (controversial)

Comparison with Literature: Findings are consistent with studies by:

- Beghi et al.
- Camilo & Goldstein
- Feyissa et al.

Which highlight cortical involvement and stroke subtype as major predictors.

Conclusion

- Post-stroke epilepsy is more common in ischemic stroke
- Late-onset seizures predominate
- Cortical involvement and infarct size are key predictors
- ASPECTS is a useful prognostic tool
- Risk stratification is essential for better outcomes

Limitations

- Small sample size
- Single-centre design
- Lack of multivariate analysis
- Limited EEG data

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