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Original Research Article

Correlation of Serum C - reactive protein Concentration with Acute Ischemic Stroke Severity at Admission: A Retrospective Study from Northeast India

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Abstract

Background: Inflammation plays a pivotal role in the pathophysiology of acute ischemic stroke (AIS). C-reactive protein (CRP), an acute-phase reactant, has emerged as a potential biomarker reflecting systemic inflammatory response and disease severity.

Objectives: To evaluate the correlation between serum CRP levels and stroke severity as assessed by the National Institutes of Health Stroke Scale (NIHSS) at admission.

Methods: A retrospective observational study was conducted at a tertiary care centre in Northeast India from March 2025 to September 2025. A total of 50 patients with acute ischemic stroke were included.

Data Collected:

- Demographic profile
- Risk factors (diabetes, hypertension, smoking, alcohol)
- Serum CRP levels
- Stroke severity using NIHSS score

CRP levels were categorized into:

- <10 mg/dL
- >10 mg/dL

Stroke severity:

- Mild: NIHSS 0–4
- Moderate: 5–15
- Severe: >15

Statistical Analysis: Data were analysed using SPSS version 26.

- Chi-square/Fisher's exact test for categorical variables
- Student's t-test for continuous variables
- $p < 0.05$ considered significant

Results:

- Total patients: 50
- Male: 66%, Female: 34%
- Age >45 years: 90%

CRP correlation:

- CRP >10 mg/dL → strongly associated with severe stroke
- CRP <10 mg/dL → mostly mild–moderate stroke

Key finding: A statistically significant association was observed between CRP levels and stroke severity ($p < 0.001$).

Conclusion: Elevated CRP levels are significantly associated with increased severity of acute ischemic stroke. CRP may serve as a simple, accessible biomarker for early risk stratification.

Keywords: C-reactive protein, Stroke severity, NIHSS, Inflammation, Acute ischemic stroke.

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Introduction

Stroke is a leading cause of mortality and long-term disability worldwide. Acute ischemic stroke accounts for the majority of cases.

Inflammation plays a critical role in ischemic brain injury through:

- Cytokine release (IL-6, TNF-α)
- Microglial activation
- Endothelial dysfunction

CRP, synthesized in the liver in response to inflammation, is a widely available biomarker. Elevated CRP levels have been linked with poor outcomes and increased stroke severity. This study evaluates the relationship between CRP levels and stroke severity in a tertiary care setting.

Materials and Methods

Study Design: Retrospective observational study

Study Period: March 2025 – September 2025

Study Setting

Department of Neurology, Gauhati Medical College and Hospital

Inclusion Criteria

- Patients fulfilling WHO criteria for stroke
- Confirmed acute ischemic stroke

Exclusion Criteria

- Hemorrhagic stroke
- Head injury
- Stroke mimics (hypoglycemia, metabolic encephalopathy, demyelination)

Data Collection

- Detailed clinical evaluation
- NIHSS scoring
- Serum CRP measurement
- Risk factor assessment
- Neuroimaging

Statistical Analysis

- Data analysed using SPSS v26
- Chi-square / Fisher's exact test
- Student's t-test
- Significance: $p < 0.05$

Results

Table 1: Demographic Profile

Parameter	Number
Total patients	50
Male	33 (66%)
Female	17 (34%)
Age >45 years	45 (90%)

Table 2: Clinical Characteristics (Risk Factors)

Risk Factor	Frequency
Hypertension	42 (84%)
Diabetes mellitus	30 (60%)
Alcohol use	15 (30%)
Smoking	12 (24%)

Table 3: CRP and Stroke Severity Correlation

CRP Level	Mild	Moderate	Severe
≤10 mg/dL	9	14	1
>10 mg/dL	4	6	16

Key Finding

- CRP >10 mg/dL strongly associated with severe stroke
- Statistically significant ($p < 0.001$)

Discussion

This study demonstrates a strong association between elevated CRP levels and increased stroke severity.

Key insights:

1. Role of inflammation

CRP elevation reflects systemic inflammatory response following cerebral ischemia.

2. CRP as prognostic marker

Higher CRP levels correlated with severe NIHSS scores, indicating its role as a severity marker.

3. Clinical utility

- Easily available
- Cost-effective

- Can aid early risk stratification

4. Comparison with literature

Findings are consistent with prior studies showing:

- Elevated CRP → worse prognosis
- Strong correlation with infarct size and severity

Conclusion

- Elevated CRP levels correlate strongly with stroke severity
- CRP is a useful, simple biomarker for assessing AIS severity
- Early identification may improve prognostication and management

Limitations

- Single-centre study
- Moderate sample size
- Single-time CRP measurement
- No longitudinal follow-up

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