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Correlation of Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP) with Severity in Patients of Acute Ischaemic Stroke

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ABSTRACT

Stroke is a major cause of morbidity and mortality worldwide, with acute ischaemic stroke (AIS) accounting for nearly 82% of all cases. Inflammation plays a significant role in the pathophysiology of AIS, with markers such as Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP) being potential prognostic indicators. This cross-sectional study included 72 patients with AIS to evaluate the association of ESR and CRP with stroke severity assessed by the Modified Rankin Scale (mRS) and the National Institutes of Health Stroke Scale (NIHSS). The mean ESR was 29.39 ± 16.54 mm/hr, and mean CRP was 10.89 ± 13.85 mg/L, both above normal ranges. While higher levels were seen in non-survivors, the association with mortality was not statistically significant. However, both markers showed a strong correlation with stroke severity scores ($p<0.001$). These findings suggest that ESR and CRP may serve as useful prognostic biomarkers in AIS, aiding in risk stratification and patient management.

INTRODUCTION

Acute Ischaemic Stroke (AIS) remains a leading cause of long-term disability and death globally. The pathogenesis involves vascular occlusion leading to cerebral ischaemia and infarction. In recent years, systemic inflammation has been increasingly recognized as a contributor to stroke severity and outcomes. Acute-phase reactants such as ESR and CRP are simple, inexpensive, and widely available laboratory markers that may reflect ongoing inflammation and predict disease severity. Previous studies have shown variable associations of ESR and CRP with stroke outcomes, highlighting the need for further research. This study was designed to evaluate the correlation between ESR and CRP with severity in patients presenting with AIS.

METHODOLOGY

- **Study Design:** Cross-sectional observational study.
- **Setting:** Conducted at Adichunchanagiri Hospital and Research Centre.
- **Study Population:** 72 patients aged >18 years presenting with AIS.
- **Data Collection:** Demographic details, clinical history, physical examination, and relevant investigations.
- **Stroke Severity Assessment:** NIHSS and mRS were used to grade severity.
- **Biomarker Measurement:** Serum ESR and CRP levels were measured at admission.
- **Statistical Analysis:** Mean values were calculated, and correlations with severity and mortality were assessed using appropriate statistical tests.

RESULTS

The mean ESR was 29.39 ± 16.54 mm/hr and mean CRP was 10.89 ± 13.85 mg/L, both elevated above normal values. Higher levels of ESR and CRP were noted in patients who succumbed to the illness; however, their association with mortality was not statistically significant ($p=0.571$ for ESR, $p=0.586$ for

CRP). Both markers demonstrated a statistically significant correlation with severity indices (NIHSS and mRS, $p<0.001$).

Table 1: Correlation of ESR and CRP with Mortality and Severity

Parameter	Mean ± SD	Association with Mortality	Correlation with Severity
ESR (mm/hr)	29.39 ± 16.54	Not significant (p=0.571)	Significant (p<0.001)
CRP (mg/L)	10.89 ± 13.85	Not significant (p=0.586)	Significant (p<0.001)

DISCUSSION

This study highlights the significant correlation of ESR and CRP with stroke severity as assessed by NIHSS and mRS. Although their direct association with mortality was not statistically significant, elevated values reflect a greater inflammatory burden and poorer clinical outcomes. These findings are consistent with earlier research demonstrating the prognostic role of inflammatory markers in AIS. CRP, in particular, has been linked with larger infarct size and functional disability. ESR, though less specific, remains a useful adjunct marker. Together, these markers provide valuable insight into the underlying pathophysiological mechanisms and may help in risk stratification, treatment planning, and prognosis prediction.

CONCLUSION

Serum ESR and CRP levels are significantly correlated with stroke severity in patients with AIS, though not directly associated with mortality. Their measurement can serve as a simple and cost-effective prognostic tool in clinical practice. Routine incorporation of these biomarkers may assist clinicians in identifying high-risk patients early and tailoring individualized management strategies.

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