

**IMPACT OF SERUM CALCIUM LEVELS ON CLINICAL OUTCOMES IN ACUTE ISCHEMIC STROKE: A PROSPECTIVE STUDY****Dr. Gagan N**

Junior resident, Rajarajeswari Medical College and Hospital, Bangalore.

**Dr. Kanneganti
Navya Sri**

Junior Resident, Rajarajeswari Medical College And Hospital, Bangalore.

KEYWORDS :**INTRODUCTION:**

Stroke remains a major global health concern, currently ranking as the second leading cause of death and projected to become the leading cause by 2030 [1]. Among the types of stroke, ischemic stroke represents the majority and poses significant challenges in terms of morbidity and mortality.

The physiological role of calcium in cellular signaling and membrane function is well known. During ischemia, intracellular calcium overload initiates a cascade of cytotoxic events leading to neuronal injury [2,3]. Although mechanisms of calcium-induced neurotoxicity have been studied, the clinical significance of serum calcium levels in predicting stroke severity and outcome remains underexplored.

Previous studies suggest a potential association between low serum calcium and worse outcomes following stroke [4-8]. Based on this background, the present study was designed to evaluate how serum calcium levels correlate with stroke severity and functional recovery in patients with acute ischemic stroke.

Objectives:

This study aimed to assess how serum calcium levels at admission correlate with symptom severity (NIHSS) and clinical outcomes (mRS) in acute ischemic stroke patients.

Methods:

Conducted at Rajarajeshwari medical college, Bangalore, India, this prospective observational study included 100 consecutively admitted ischemic stroke patients. Data collection utilized a self-made questionnaire, with statistical analysis performed using Epi Info 7 and significance set at $p < 0.05$.

Inclusion Criteria

All consenting patients with radiologically confirmed acute ischemic stroke who presented within 24 hours of onset of symptoms.

Exclusion Criteria

- All patients less than 20 years of age.
- Patients with chronic liver disease, chronic kidney disease, thrombophilias, coagulation disorders, malignancies.
- Patients with previous history of stroke / chronic infarct/hemorrhagic stroke.
- Patients on calcium and vitamin D supplements.

Study Procedure

All the participants were subjected to thorough clinical examination and routine blood investigations including complete blood count, ESR, LFT, RFT, serum electrolytes, serum calcium, albumin corrected calcium levels, fasting lipid profile, RBS and non-contrast CT scan of head (Siemens 16 slice) were obtained.

Participants were categorized into 4 quartiles based on the albumin corrected calcium levels at admission.

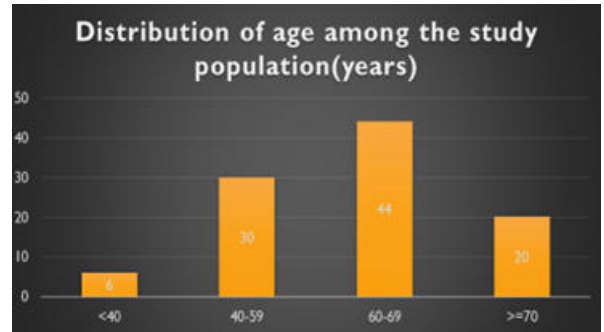
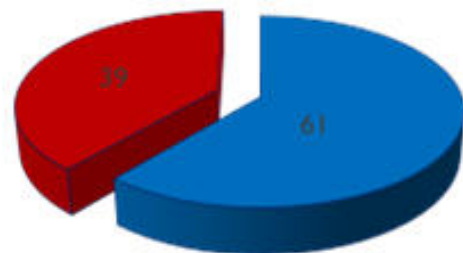
Group 1 - Q1 - < 8.59 mg/dL

Group 2 - Q2 - $8.60-8.99$ mg/dL

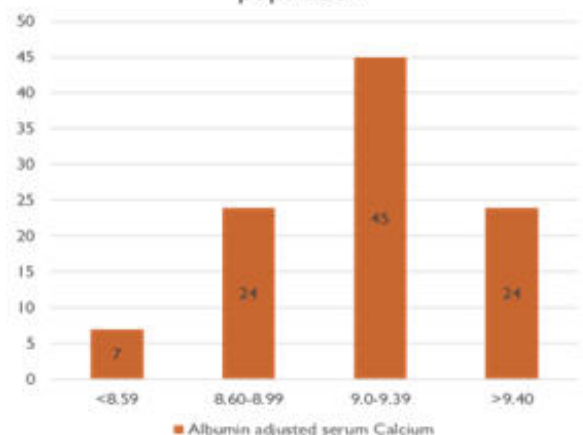
Group 3 - Q3 - $9.0-9.39$ mg/dL

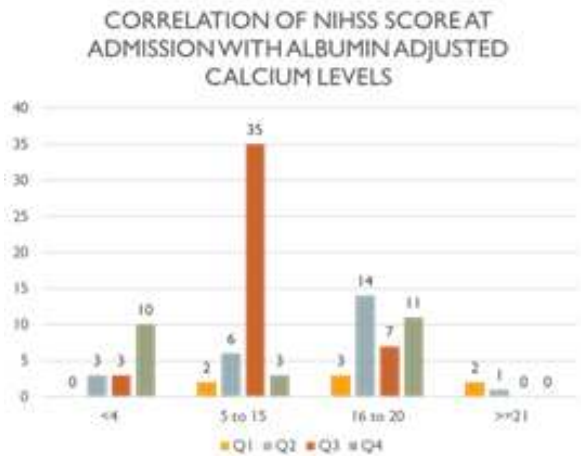
Group 4 - Q4 - > 9.40 mg/dL

The NIHSS at admission and discharge, MRS at admission and discharge were calculated and were analyzed to see if there was any significant association with different quartiles of calcium levels.

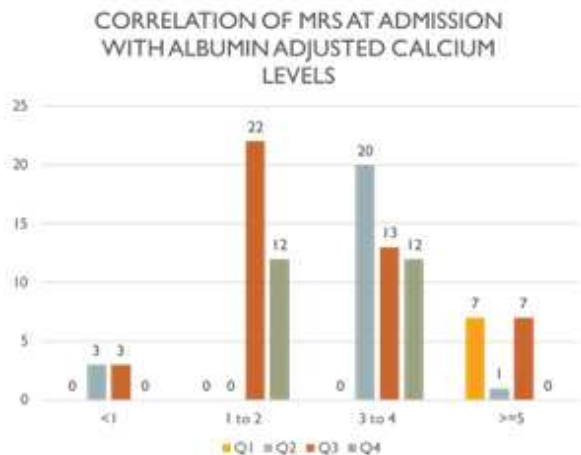
RESULTS:**Gender distribution among study population**

■ Male ■ Female

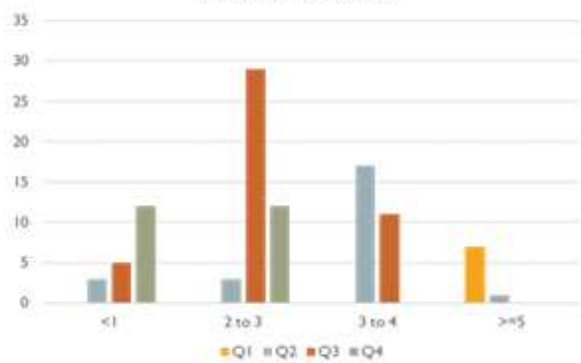
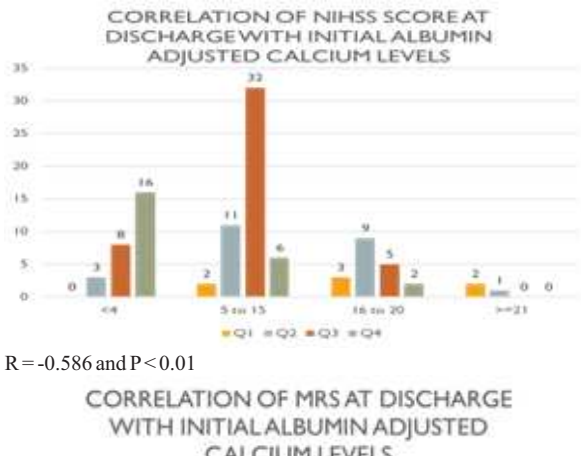
Albumin adjusted calcium among the population



R = -0.290 and P < 0.001



R = -0.359 and P = 0.002



R = -0.593 and P = 0.001

Parameter	Correlation (R)	p-value	Interpretation
NIHSS at admission vs. Calcium	-0.290	<0.001	Lower stroke severity with higher calcium
mRS at admission vs. Calcium	-0.359	0.002	Better functional status with higher calcium
NIHSS at discharge vs. Calcium	-0.586	<0.01	Improved recovery with higher calcium
mRS at discharge vs. Calcium	-0.593	0.001	Significant functional improvement with higher calcium

DISCUSSION

Our findings are consistent with previous studies demonstrating that low serum calcium at admission correlates with higher stroke severity and poorer recovery [4–8]. Prabhakar et al. [5] and Gupta et al. [6] found that lower calcium levels were significantly associated with larger infarct size and worse NIHSS scores. A large registry-based study by Xue et al. [8] found that while elevated calcium may predict better short-term function, extremely high levels could be linked to long-term mortality.

The pathophysiological basis may involve calcium's role in regulating neuronal excitability and membrane integrity. Ischemia-induced hypocalcemia could reflect systemic metabolic stress or blood-brain barrier disruption [3,9].

CONCLUSION:

Higher serum calcium levels at admission are significantly associated with reduced stroke severity and better clinical outcomes in patients with acute ischemic stroke. Serum calcium may serve as a useful, low-cost prognostic marker in the acute setting.

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