

Original Research Article

A prospective Study of Serum albumin level as a prognostic indicator of functional recovery following acute ischemic stroke in patients managed at narayan medical college and hospital, Sasaram.**Amit Kumar Ranjan¹, Harjot Singh², Rituraj Lahkar³, Ranjan Kumar⁴**^{1,2,3}PG resident, Department of General Medicine, Narayan Medical College and Hospital, Sasaram, Bihar, India.⁴Associate Professor, Department of General Medicine, Narayan Medical College and Hospital, Sasaram, Bihar, India.**Received: 04-08-2020 / Revised: 15-10-2020 / Accepted: 07-11-2020****Abstract****Introduction:** Acute ischemic stroke is a medical problem of vascular occlusion which results in non-functioning of a part of neuronal tissue. Pathophysiology of acute ischemic brain stroke (AIS) suggests it is caused by sudden loss of blood supply (ischemia) to the brain. Ischemia results in neuronal necrosis that causes paralysis of affected body part **Aim and Objectives:** To study whether serum albumin is a good prognostic indicator of acute ischemic stroke.**Material and Methods:** This observational study was conducted in Narayan medical college & Hospital, south Bihar over a period of six months. 100 patients who were admitted in medical wards of our hospital with first instance of ischemic stroke within the first 72 hours of onset of symptoms. These patients will be included in the study after getting informed consent either from the patient or from the legal guardian. **Results:** There was mild correlation between serum albumin with GCS score in patients of ischemic stroke with R square 0.360. There was mild correlation between serum albumin with SSS score in patients of ischemic stroke with R square 0.307. There was moderate correlation between serum albumin with MRS score in patients of ischemic stroke with R square 0.474. **Conclusion:** There was mild correlation between serum albumin with GCS score, SSS score, and MRS score with R square 0.360, 0.307 and 0.474.**Key words:** Serum albumin, GCS score, SSS score, MRS score

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Introduction

Acute ischemic stroke is a medical problem of vascular occlusion which results in non-functioning of a part of neuronal tissue. Pathophysiology of acute ischemic brain stroke (AIS) suggests that it is caused by sudden loss of blood supply (ischemia) to the brain. Ischemia results in neuronal necrosis that causes paralysis of affected body part.¹ Following a stroke, the central nervous system undergoes reorganization during the process of functional recovery. However, the degree of recovery is variable and the processes subserving this recovery is incompletely understood.

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Neurophysiologic changes associated with recovery often begin within one to two weeks following a stroke and may plateau within two or three months, depending on the degree and extent of neurologic deficit. A large number of factors such as admission functional ability, hemineglect, incontinence, age and others may influence the functional outcome of stroke patients.²

However due to poor public awareness and inadequate infrastructure this is not properly addressed. Thrombolytic therapy, as the generally proven effective treatment for AIS is limited by its narrow therapeutic time window i.e. <4.5 hrs after onset. This compounded by lack of good hospital set up, competent practitioners and haemorrhagic complications, has remained underutilised.³

Albumin is a multifunctional protein, which has been proven to have neuroprotective effects in animal studies. Albumin is also an indicator of the nutritional status. This fact holds importance, as out of 15 million stroke events occurring annually all over the world,

two-third occurs in low income and middle income developing countries, where malnutrition is rampant.⁴

Experimental studies have shown that human albumin infusion after stroke onset significantly improves the neurological function and reduces the infarct volume. Although low serum albumin is associated with poor neurological outcome, albumin therapy in acute stroke patients is not beneficial as shown by the ALIAS (Albumin in Acute Ischemic Stroke) part 1 and 2 trials which evaluated the efficacy and safety of human albumin therapy in acute ischemic stroke.⁵

Low serum albumin levels obtained within 48 hours of admission were associated with increased length of stay and in-hospital mortality. However, because albumin levels may decrease early with severe illness, levels obtained 48 hours after admission may be lower than admission levels.⁶

Studies on prognostic factors of ischemic stroke in our population are limited. Serum albumin level at admission was found to be an independent prognostic factor for ischemic stroke outcome in studies done in western population. Some of the studies have shown that albumin transfusion is capable of minimising volume of infarction and cerebral edema. Albumin reduces the haematocrit as well as the erythrocyte sedimentation rate by its effect on erythrocyte aggregation. Effect of albumin is primarily in the early reperfusion phase of acute ischemic stroke where it has an inhibitory effect on thrombosis, stagnation and adhesion of leucocytes in microcirculation. There is scarcity of data regarding the usefulness of albumin as a prognostic indicator. Hence this study is planned to understand the association between serum albumin level and prognosis of acute ischemic stroke.

Aims and objective

1. To study whether serum albumin is a good prognostic indicator of acute ischemic stroke.
2. To identify other clinical and biochemical factors affecting the prognosis of acute ischemic stroke.

Material and Methods

This observational study was conducted in Narayan medical college & Hospital, south Bihar over a period of six months. 100 patients were admitted in medical wards of our hospital with first instance of ischemic stroke within the first 72 hours of onset of symptoms. These patients were included in the study after getting informed consent either from the patient or from the legal guardian.

Study design- Prospective observational study

Inclusion criteria

All patients of more than 18 years of age diagnosed with first attack of stroke with a new focal neurological deficit, admitted within 36 hours of symptom onset with clinical and radiological evidence of AIS will be included in the study.

Exclusion criteria:

- Acute haemorrhagic stroke, ischemic stroke with haemorrhagic transformation or stroke related to intracranial space occupying lesion (ICSOL).
- Past history of stroke
- Patients with diagnosed malignancy
- Patients with history of chronic liver disease, chronic heart failure, chronic kidney disease or dementia
- Patients with fever or infections

Cases were defined as per WHO definition of stroke. Hypertension will be documented if there is records proving it or when at least 2 readings of blood pressure - systolic blood pressure was ≥ 140 mm Hg and diastolic blood pressure will be ≥ 90 mmHg after the acute phase of stroke. Coronary artery disease will be diagnosed with either ECG changes or previous records. Patient will be considered a smoker if he had a history of smoking in the past 5 years. A detailed history will be elicited from the attenders, followed by general examination, an elaborate CNS examination and relevant examination of other systems. Vitals will be stabilised, and patients will undergo a CT scan of the brain in order to rule out haemorrhagic stroke or any mass lesion. Severity of stroke will be graded using the Scandinavian Stroke Scale (SSS). Basic investigations like complete hemogram-including ESR, blood sugar, renal function test, liver function test, serum proteins-albumin and globulin, lipid profile and urine routine examination will be performed. ECG will be taken to establish any coronary artery disease Serum albumin will be measured using Bromocresol Green. Patients will be followed up and after 90 days following the onset of stroke, will be evaluated either in person or over the phone using the Modified Ranking scale to assess their functional status. The collected data will be entered into Microsoft Excel spreadsheet or Epi Info 7.2.1 software and analysed statistically. Statistical analysis will be carried out to establish whether a statistically significant association exists between serum albumin level on admission and the stroke severity, as well as the functional outcome at the end of 90 days. The secondary outcomes that were aimed to be tested included the association with risk factors and the viability of the stroke scales

Result

Table 1: Distribution of study subjects as per age

AGE IN YEARS	NO OF PATIENTS	PERCENTAGE
< 40	10	10%
41-50	25	25%
51-60	24	24%
61-70	20	20%
> 70	21	21%
Total	100	100

Table 1 shows distribution of study subjects as per the age. 25% study subjects were in the age group of 41-50, 24% were in the age group 51-60 yrs, 21% were above 70 yrs, 20% were in the age group 61-70 yrs whereas 10% study subjects were in the age group less than 40 years. The mean age of the study subjects were 57.95 ± 13.75 yrs

Table 2: Distribution of study subjects as per sex

SEX	NO OF PATIENTS	PERCENTAGE
MALE	54	54%
FEMALE	46	46%
Total	100	100%

Table 2 shows distribution of study subjects as per sex. 54% of study subjects were male whereas rest 46% were female.

Fig 1: Box Plot showing distribution of GCS, SSS Score and MRS Score of study subjects.

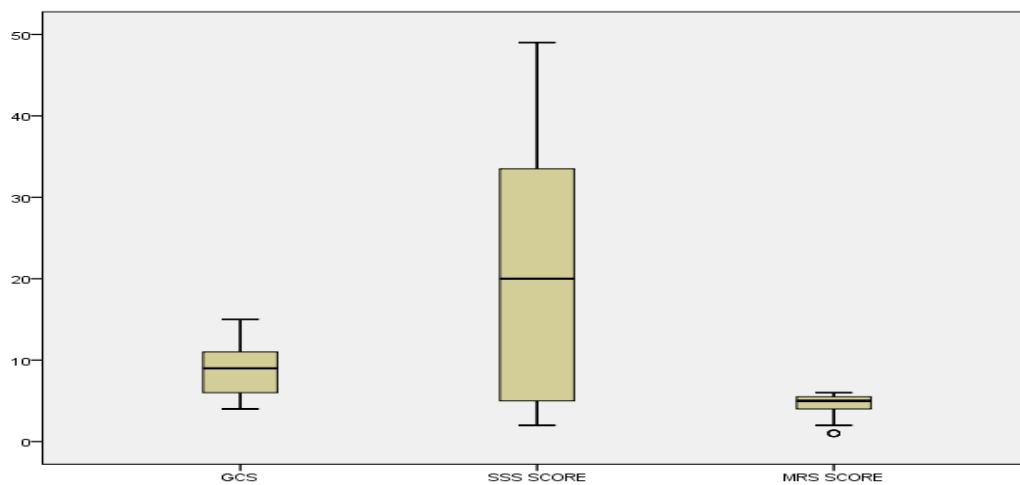


Fig. 1 shows Box Plot showing distribution of GCS, SSS Score and MRS Score of study subjects. The mean GCS score was 8.72 ± 3.02 , with Range 4-15, The mean SSS score were 21.35 ± 14.91 , with range 2-49, MRS score was 4.41 ± 1.38 , with range 1-6.

Fig 2: Scatter diagram showing correlation of serum albumin and GCS score

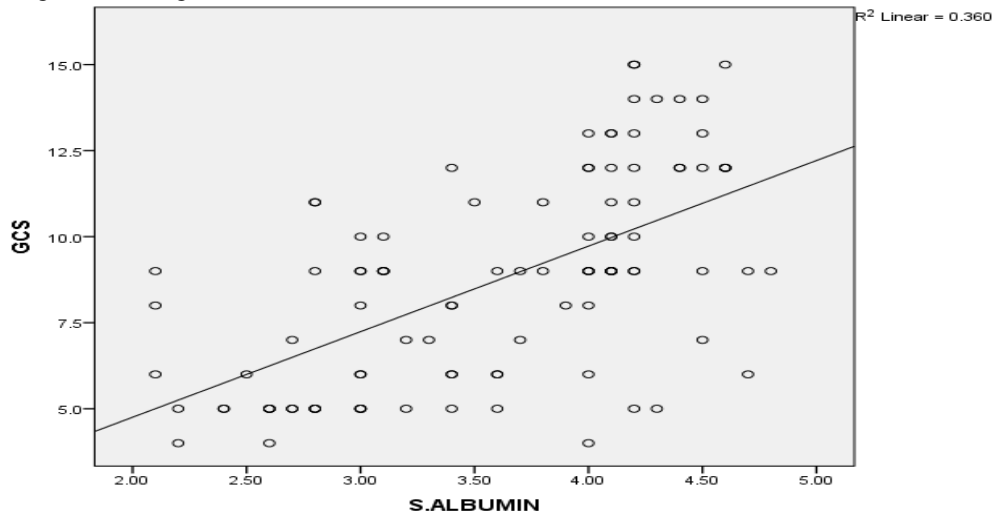


Fig. 2 shows Scatter diagram showing correlation of serum albumin and GCS score. There was mild correlation between serum albumin with SSS score in patients of ischemic stroke with R square 0.360.

Fig 3: Scatter diagram showing correlation of serum albumin and SSS score

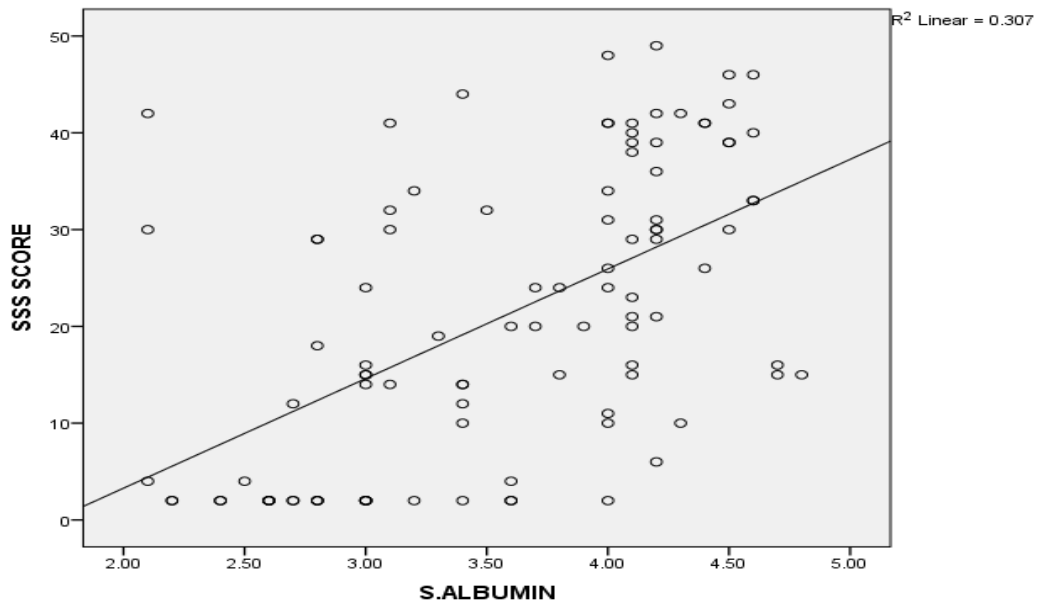


Fig. 3 shows Scatter diagram showing correlation of serum albumin and SSS score. There was mild correlation between serum albumin with SSS score in patients of ischemic stroke with R square 0.307.

Fig 4: Scatter diagram showing correlation of serum albumin and MRS score

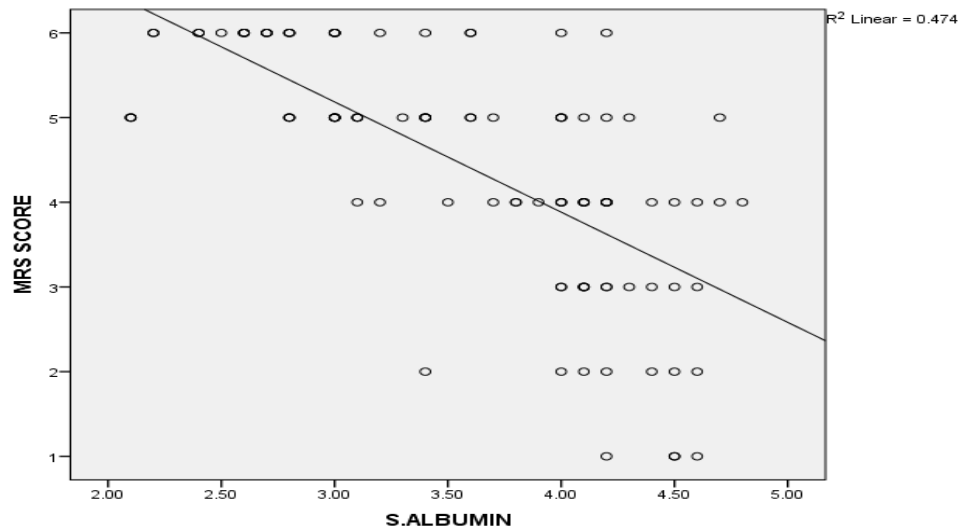


Fig. 4 shows Scatter diagram showing correlation of serum albumin and MRS score. There was moderate correlation between serum albumin with MRS score in patients of ischemic stroke with R square 0.474.

Discussion

Albumin is a molecule with multifaceted action on various systems in the body. Neuroprotective effects of albumin have been well documented in animal studies. Studies have been conducted in the western population regarding the usefulness of serum albumin as an indicator of prognosis in ischemic stroke.

In our study, there were 56% were males and 44% females. Majority of patients were in the 41-50-year age group, constituting 25% of the total patients. The mean age of 57.95 ± 13.75 , the oldest being 85 years old and the youngest was 27 years. Other studies done on similar topics shows almost similar findings such as study by Ali A et al¹ shows age of control and cases was noted as 52.41 ± 5.08 and 56.72 ± 7.12 respectively ($P=0.002$). Male to female ratio was 1.88:1. Study by James R et al⁴ shows the mean age of the study population was 58.44 ± 14.42 years which is also in accordance with our study.

In our study there was mild correlation between serum albumin with GCS score in patients of ischemic stroke with R square 0.360. Study by James R et al⁴ found that Pearson Correlation Coefficient of the correlation between serum albumin and the Glasgow Coma Scale score at admission 0.612 is statistically significant ($p < 0.05$). The study by Gariballa et al⁷, has observed that

low serum albumin level is a prognostic indicator of poor functional outcome in stroke. In this study, among the various nutritional markers used, only serum albumin level had significant and independent association with stroke outcome.

In our study there was a mild correlation between serum albumin with SSS score in patients of ischemic stroke with R square 0.307. Study by Dziedzic T et al⁸ shows SSS score on admission, mean (SD) 19.7 (12.8) in patient with poor outcome and 41.5 (10.8) in non-poor outcome.

In our study there was moderate inverse correlation between serum albumin with MRS score in patients of ischemic stroke with R square 0.474. Study by Ali A et al¹ shows that serum albumin was inversely associated with MRS score which is almost in accordance with our study. Study by James R et al⁴ shows a strong negative correlation between serum albumin at admission and MRS score. Study by KIM HS et al⁹ shows that after adjusting the crude model, patients in the hypoalbuminemia group were 3.5 times more likely to have poor neurologic outcome than those in the normal albumin group (OR 3.526, 95% CI 1.388–8.956, $p = 0.008$). Study by Dash PS et al³ also have similar findings as Serum albumin level was compared with mRS score at the end of first week revealing spearman's

rank correlation coefficient of $r = -0.410$ and p value less than 0.001 which is significant

Conclusions

Majority of subjects were in the 41-50 year age group. Male patients had more chances stroke compared to female patients. Serum albumin has a significant association with severity as well as the prognosis of stroke.

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