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TO EVALUATE THE ROLE OF SERUM ALBUMIN AS A PREDICTOR OF FUNCTIONAL OUTCOME OF ACUTE ISCHEMIC STROKE

General Medicine

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ABSTRACT

INTRODUCTION Stroke or cerebrovascular accident is a life threatening neurological disorder. It constitutes more than 50% of admissions in a hospital. Westernization of lifestyle and the resulting demographic transition might increase the burden of stroke even in the developing countries. Albumin is a multifunctional protein which has been proven to have neuroprotective effects in animal studies. There have been several studies in the western world including interventional studies trying to explore the scope of albumin as a neuroprotective agent. Some of these have shown that albumin therapy is capable of minimizing infarction volume and cerebral oedema. Therefore, the present study was conducted to evaluate the role of serum albumin as a predictor of functional outcome of acute ischemic stroke. **AIMS & OBJECTIES** To determine the correlation between serum albumin level and functional outcome of acute ischemic stroke. **MATERIALS & METHODS** This prospective, observational study was conducted at district hospital, JamKhambhalia, Dist. Devbhoomi Dwarka. 75 patients admitted with the diagnosis of acute ischemic stroke and meeting the inclusion and exclusion criteria. **OBSERVATIONS & RESULTS** Most of the cases (58.66%) belonged to the age group of 51 to 70 years. There was a male preponderance. Majority of the cases of minor stroke had serum albumin level of more than 4.5 g/dL, those with moderate stroke had serum albumin of 4.0 to 4.49 g/dL while cases of severe stroke had serum albumin levels of less than 3.0 g/dL; P value: less than 0.001. **DISCUSSION** Globally, stroke is a leading cause of mortality and disability and there are substantial economic costs for post-stroke care. From the present study, it can be effectively concluded that acute ischemic stroke is prevalent in the older age groups with significant male preponderance. Hypertension is the most commonly associated co-morbidity. Acute ischemic stroke affects the cerebral arteries more commonly than the cerebellar and lacunar circulation. Middle cerebral artery is the most commonly affected arterial territory. When assessed with the mean serum albumin levels, there was a significant strong negative correlation with NIHSS score and MRS score. This indicates that low serum albumin levels are associated with increased severity of the stroke and increased/severe disability indicating poor recovery profile.

KEYWORDS

INTRODUCTION

Stroke or cerebrovascular accident is a life threatening neurological disorder. The persistent complications of brain ischemia are due to permanent brain damage and are a final common pathway to necrosis: neuronal shrinkage and death, gliosis with astrocytosis, and loss of volume. Neuronal sensitivity to ischemia is multifactorial: the brain has high basal metabolic rate and high cell-cell signaling activates pathways such as glutamate-induced neuronal death, dopamine-induced potentiation of ischemic injury, free radical release, zinc toxicity, and release of enzymes leading to combination apoptosis and catabolic necrosis.[1]

There have been several studies in the western world including interventional studies trying to explore the scope of albumin as a neuroprotective agent. Some of these have shown that albumin therapy is capable of minimizing infarction volume and cerebral edema. Albumin reduces hematocrit as well as erythrocyte sedimentation rate by its effects on erythrocyte aggregation. Effect of albumin is mainly in the early reperfusion phase of acute ischemic stroke where it exerts an inhibitory effect on stagnation, thrombosis and leucocyte adhesion in microcirculation. Therefore, the present study was conducted to evaluate the role of serum albumin as a predictor of functional outcome of acute ischemic stroke.

AIMS & OBJECTIVES

1. To find out the association between serum albumin level at admission and the functional outcome of Acute Ischemic Stroke after 7 days.
2. To determine the prognostic value of Serum Albumin levels in Acute Ischemic Stroke by correlating its levels with clinical outcome.

MATERIALS & METHODS

This prospective, observational study was conducted at district hospital, JamKhambhalia, Dist. Devbhoomi Dwarka. Prior approval of ethical committee was taken before start of the study. A written signed informed consent was taken from the relatives/legal guardians prior to enrolling the subjects in the study.

Duration Of Study:
March 2018 - October 2021

Study Population:
75 patients admitted with the diagnosis of acute ischemic stroke and meeting the inclusion and exclusion criteria.

Inclusion Criteria:

1. Patients diagnosed with Acute Ischemic Stroke on CT Scan/MRI Brain.
2. Patients of 25 to 70 years.
3. Patients of either gender.

Exclusion Criteria:

1. Patients presented after 24 hrs after onset of symptoms
2. Patients having previous history of stroke
3. Patients having hemorrhagic stroke on presentation
4. Patients having stroke due to tuberculoma, tumour or trauma
5. Patients having subarachnoid hemorrhage
6. Patients taking treatment for diabetes mellitus
7. Patients with renal or hepatic disease and
8. Patients with fever and infections
9. Patients whose death occured within 7 days of admission
10. Patients with malignancies
11. Patients whose relatives/legal guardians did not consent to participate in the study.

Materials:

1. Sysmex Automated Hematology Analyzer XN-1000, for automated analysis.
2. Beckman Coulter AU480 Analyzer with Bromocresol Green for estimation of serum albumin levels.
3. CT Scan/ 1.5 Tesla MRI.

Laboratory investigations were performed for the assessment of serum albumin levels at the time of admission and after 1 week. The location of the stroke was recorded as per CT scan/MRI findings. The severity of stroke was determined by the National Institute of Health stroke scale (NIHSS).

Statistical Analysis:
The data was analyzed using statistical software (IBM SPSS, IBM Corporation, Armonk, NY, USA). Descriptive statistics: The Numerical/Continuous data were expressed as Mean ± Standard Deviation and the Categorical data were expressed as Percentages.

OBSERVATIONS & RESULTS

Most of the cases (58.66%) belonged to the age group of 51 to 70 years. There was a male preponderance. The age distribution was similar in

both the genders; P value: 0.486. Comorbidities were present in 25.33% of the cases in the study population. the distribution of affected arterial territories and diagnosis. Ischemia with haemorrhagic transformation was present in 6.66% of the cases. MCA was the most commonly affected arterial territory. Majority of the cases of minor stroke had serum albumin level of more than 4.5 g/dL, those with moderate stroke had serum albumin of 4.0 to 4.49 g/dL while cases of severe stroke had serum albumin levels of less than 3.0 g/dL; P value: less than 0.001. Serum albumin levels showed significant strongly negative correlation with NIHSS score; P value: less than 0.001.

DISCUSSION

Stroke, a cerebrovascular accident, is prevalent across patient populations and can be a significant cause of morbidity and mortality. The ensuing complications are often permanent and severely debilitating. Therefore, there has been a search for neuroprotective agents which can prolong the window of treatment while also decreasing the risk of severe complications. There has been recent interest in the neuro-protective function of albumin and its role as a prognostic indicator. However, studies in this regard are scarce. Therefore, the present study was conducted to assess the same. In the present study, it was observed that the mean age of the study population was 52.96 ± 13.11 years. Almost 58.66% of the cases belonged to the age group of 51 to 70 years. There was a male preponderance in the study population (86.67%). The age distribution was similar in both the genders; P value: 0.486. Ranjan A. et al[2] conducted a prospective observational study on 100 patients of acute ischemic stroke to assess the role of serum albumin as a prognostic indicator of functional recovery. They observed that the mean age of the study population was 57.95±13.75 years. They also found a slight male preponderance (54%).

These findings were similar to the present study. In another study by Sandeep F. et al[3], they observed that the mean age of males was 55.71 ± 5.76 years and females was 59.31 ± 7.81 years. They also observed male preponderance with 77.7% of the cases being males. These findings were similar to the present study. Similar distribution was also observed in the studies by Manickam S. et al[4], Dash P. K. et al[5], James R. et al[6] and Kasundra G. et al[7]. These were similar to the present study.

Thus, it can be effectively concluded that hypertension is the commonest comorbidity associated with cases of acute ischemic stroke. In the present study, the mean serum albumin levels at the time of admission was 3.86 ± 0.49 g/dL and the mean serum albumin levels at discharge were 3.95 ± 0.47 g/dL. When assessed with age, there was no significant variation in the serum albumin levels at admission and discharge; P value: more than 0.50. In the study by Manickam S. et al[4], the mean serum albumin levels were 3.85 g/dL.

This was similar to the present study. In the present study, it was observed that moderate stroke was most common (86.67%), followed by moderate to severe stroke (9.33%) and minor stroke (4%). When assessed according to the serum albumin levels on admission, it was observed that majority of the cases of minor stroke (66.67%) had serum albumin level of more than 4.5 g/dL. In moderate stroke, majority (44.62%) had serum albumin of 4.0 to 4.49 g/dL while in cases of severe stroke 71.43% cases had serum albumin levels of less than 3.0 g/dL. Thus, there was a decrease in the mean serum albumin levels alongwith the increase in the severity of the stroke as per the NIHSS score; P value: less than 0.001. The NIHSS score and the serum albumin levels showed a strongly negative significant correlation ®= -0.78, P value: less than 0.001).

In the study by Sandeep F. et al[3], they observed that NIHS score showed strongly negative significant correlation with serum albumin levels ®= -0.724; P value: 0.0001). This was similar to the present study. In the study by Nair R. et al[8], they observed that moderate stroke was the most common (68.3%), followed by severe stroke (24.8%), very severe stroke (5.9%) and mild stroke (1.0%). These findings were similar to the present study.

Thus, most cases of acute ischemic stroke are moderate stroke according to the NIHSS score. It can be also concluded that low serum albumin levels are associated with increased severity of stroke. Thus, in general, low albumin levels are associated with worse functional outcomes. It may be because of some of the beneficial effects of albumin, including the antithrombotic effects, decreases leukocyte adherence, and endothelial stasis of cells.[9]

These effects may result in early reperfusion phased of acute ischemic stroke.[10] It is also hypothesized that the neuroprotective effects of albumin are also contributed through the improved venular perfusion and microcirculation, maintaining endothelial integrity, and anti-oxidant & anti-lipid peroxidant activity.

Limitations:

The present single centre study was limited by the IPD attendance of the patients having stroke. Therefore, the results may not be generalised.

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