Serum Albumin Level as Prognostic Indicator of Acute Ischemic Stroke in Tertiary Care Centre

Dr.Durgahariprasad D[1], Dr. E. Arunraj[2], Dr.K.Vignesh [3]

D.M 3rd year Post-Graduate in Neurology, KAPV Government Medical College, Trichy,Tamilnadu, INDIA.
DCH,MD.DM,FRCP(Glassgow),Associate Professor, Department of Neurology, KAPV Government Medical College, Trichy, Tamilnadu, INDIA.
MD,DM, Assistant professor of neurology, KAPV Government Medical College, Trichy, Tamilnadu, INDIA.

ABSTRACT: cerebral vascular accident is a neurological illness that cause significant disability. Level of serum albumin is an independent predictor of functional outcome in ischemic stroke. Our aim is to study the serum albumin level in AIS patients with in48 hours of stroke onset and the clinical outcome.

Material and methods: 100 patients of age more than 18 years with clinical and radiological evidence of acute ischemic stroke included. The severity of stroke at admission was assessed by National Institute of Health stroke scale (NIHSS). Serum level of Albumin was measured within 36 hrs of stroke onset. Functional outcome was measured 1 week post admission and after 3 months during follow up using modified Rankin scale (mRs). A score of mRs more than 3 or death was taken as poor outcome

Results: In 100 patients with acute ischemic stroke 72 were male and 28 were females. Most common risk factors were systemic hypertension followed by diabetes mellitus. In our study showed one patient had improvement in motor disability of patients with low serum albumin and 4 patients had improvement in patients with normal /high serum albumin

Conclusion: one patient had improvement in motor disability of patients with low serum albumin and 4 patients had improvement in patients with normal /high serum albumin

Keywords: Acute Ischemic Stroke, Serum Albumin, Functional Outcome

I.   INTRODUCTION

Stroke   or   cerebrovascular accident is neurological disorder that may cause significant disability. It constitute more than fifty percentage of admission due to neurological illness over worldwide Stroke is the 2nd most common cause of   mortality   and   4th   leading cause of disability worldwide.[1] Atherosclerosis is most common cause of Acute ischemic stroke . post stroke has high risk for epilepsy, falls and depression in developed countries. Predictor of mortality dependent on factors like stroke severity, type of stroke, Age, Gender, Vascular risk factors, level of consciousness. stroke in malnourished patient has poor prognosis. Serum proteins esp Albumin is synthesized in liver which acts as multifunctional protein in blood such as maintain osmotic gradient, inhibit aggregation of platelets, lower viscosity of blood. In some experimental studies done on animals showed Albumin acts as Neuro-protective in cerebral ischemia and traumatic brain injury. Studies have shown that in Ischemic stroke, serum albumin level is an independent predictor of outcome.[2,3] Only few studies conducted on the role of albumin in Acute ischemic stroke.

II.   MATERIAL AND METHODS

The   study   was   a   Hospital   based prospective study which included a total of 100 patients of age more than 18 years with clinical and radiological evidence of acute ischemic stroke admitted to the department of General Medicine and Neurology in a tertiary care centre. Diagnosis of ischemic stroke is based on clinical observation confirmed by radiological imaging. Patients were examined clinically in detail and the severity of stroke was assessed by National Institute of Health stroke scale (NIHSS) at baseline (table 1). Assessment of albumin was   done   by blood collected within 36 hrs of stroke onset. Functional outcome was measured 1 week post admission and after 3 months during follow up using modified Rankin scale (mRs).

Table 1: National institute of health stroke scale (NIHSS).

NIHSS SCORE	Stroke severity
0	No stroke symptoms
1-4	Minor stroke
5-15	Moderate stroke
16-20	Moderate to severe stroke
21-42	Severe stroke

Table 2: Modified rankin scale (mRS)

Score	Symptoms
0	No symptoms
1	No significant disability. Able to carry out all usual activities, despite some symptoms
2	Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities
3	Moderate disability. Requires some help, but able to walk unassisted
4	Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted
5	Severe disability. Requires constant nursing care and attention, bedridden, incontinent
6	Dead

Inclusion criteria:
1.Focal neurological symptoms not exceeding 48 hours,
2.CT scan diagnosis of ischemic brain
3.Age more than 18 years of both gender

Exclusion criteria:
Patients with Cerebral hemorrhage of any etiology, Liver disease; Cardiac failure, Nephrotic syndrome, Diabetic nephropathy, Protein losing enteropathies and Malignancies were excluded from the study. Serum albumin estimation was done.
This scale runs from 0-6, running from perfect health without symptoms to death. A score of mRs: 0-3 was taken as favorable score and mRs: 4-6 was taken as unfavorable score. Serum albumin level <3.5 g% is considered as low.

III. RESULTS
Among the study population of 100 patients, 72 (72%) were males and 28(28%) were female(stable 3). Number of patients with NIHSS score less than or equal to 10 was 88 and more than 10 was 12. Age of onset stroke is tabulated   (table 4)

Table 3

	number
Male	72
Female	28
Total	100

Table 4 demographic details age at   which stroke onset

Age	Number of patients
<40	5
41- 50	23
51-60	31
61-70	29
>70	11

Table 5 risk factors associated with stroke

Risk factor	Number
Hypertension	36
Diabetes	30
Smoking	21
CAD	6
Old CVA	2

Table 6 presentation at admission

Presenting compliant	Number of patients
Right hemiparesis/hemiplegia	52
Left hemiparesis/hemiplegia	48

Table 7 NIHSS score at admission

NIHSS	<10	>10
Number of patients	78	22

Table 8 imaging finding in stroke patients

Imaging abnormalities	Number
LEFT MCA infarct	52
RIGHT MCA infarct	48

Table 9 serum albumin level

albumin level	No of patients
<3.5	49
>3.5	51

Table 10 serum albumin and functional outcome (1week) based on mRS scale

Serum Albumin	mRS<3	mRS>3
<3.5	39	10
>3.5	39	12

Table 11 serum albumin and functional outcome (3month) based on mRS scale

Serum Albumin	mRS <3	mRS >3
<3.5	40	9
>3.5	43	8

Among the 100 patients, number of patients with mRS> 3 were 17 . Number of patients with mRS >3 were 83.

IV. DISCUSSION

Albumin in serum plays a major role in the clinical outcome of diseases .The neuroprotective effect of albumin is due to its anti-inflammatory and anti-oxidant effects, inhibition of thrombosis in microcirculation[4-6] It reduces hematocrit level and also anti aggregation effect on erythrocytes[15] by lowering viscosity and decreasing erythrocyte sedimentation.

Albumin inhibits copper ion dependent lipid per oxidation at cell membrane. Also exerts neuroprotection by binding to lysophosphatidylcholine, which increases leukocyte adhesion molecules in turn lead to inflammatory mediated damage on vascular endothelium.

Belayev et al done studies in animals showed that high-dose human albumin therapy, if administered within 2 to 4 hrs OF stroke onset, is highly effective in improving neurological status and in reducing infarction volume.[7]

In our study, AIS was predominance in male compared to females, 72 were males, 28 were females which was consistent with study done by Abubakar et al[8]. Young onset of stroke (<40yrs of age) seen in 5 patients, between 41-50 yrs seen in 23, 31 patients affected between 51-60,29 patients affected between age of 61-70,11 were more than 70yrs of age(table 4). Most common risk factors noticed in this study were systemic hypertension(table 5), which was supported by study done by Reeta et al and Gaurav et al[9,10] followed by diabetes, smoking, coronary artery disease, old cerebrovascular disease.

Right side weakness was presenting complaint in 52 patients followed by left side weakness was presenting complaint in 48(table 6), Out of 100 patients 52 have LEFT MCA infarct ,48 have RIGHT MCA infarct.

In table 10 showing after 1week , patients with albumin level <3.5, 39 have mRS scale less than 3 and 10 have have mRS > 3 and patients with albumin level > 3.5, 39 have mRS scale less than 3 and 12 have mRS >3 .

In table 11 showing after 3months ,patients with <3.5 serum albumin 40 patients have mRS <3 and mRS > 3.5 in 9 patients.

In patients with >3.5 showing minimal improvement in disability, mRS < 3 seen in 43 and mRS >3 seen in 8 patients

V. CONCLUSION:

Risk of stroke increase with age. Most common modifiable risk factors are systemic hypertension and diabetes. one patient had improvement in motor disability of patients with low serum albumin and 4 patients had improvement in patients with normal /high serum albumin

REFERENCES:

[1]. WHO. Stroke, Cerebrovascular accident [Internet]. Health topics. 2013. Available from: http://www.who.int/ topics/cerebrovascular_accident/en/

[2]. Dziedzic T, Slowik A, Szczudlik A. Serum albumin level as a predictor of ischemic stroke outcome.Stroke. 2004; 35: 156–158.

[3]. Babu MS, Kaul S, Dadheech S, Rajeshwar K, Jyothy A, Munshi A. Serum albumin levels in ischemic stroke and its subtypes: correlation with clinical outcome. Nutrition. 2013;29:872-5.

[4]. Jorgensen KA, Stoffersen E. On the inhibitory effect of albumin on platelet aggregation. Thromb Res 1980;17:13–8.

[5]. Halliwell B. Albumin: an important extracellular antioxidant? Biochem Pharmacol. 1998;37:569–571.

[6]. Belayev L, Pinard E, Nallet H, Seylaz J, Liu Y, Riyamongkol P, Zhao W, Busto R, Ginsberg MD. Albumin therapy of transient focal cerebral ischemia. In vivo analysis of dynamic microvascular responses. Stroke. 2002;33:1077–1084

[7]. Belayev L, Liu Y, Zhao W, Busto R, Ginsberg MD. Human Albumin Therapy of Acute Ischemic Stroke Marked Neuroprotective Efficacy at Moderate Doses and With a Broad Therapeutic Window. Stroke. 2001; 32:553- 560.

[8]. Abubakar S, Sabir A, Ndakotsu M, et al. Low admission serum albumin as prognostic

determinant of 30-day case fatality and adverse functional outcome following acute ischemic stroke. Pan Afr Med J 2013;14:53.

[9]. James R, Antony J, Sreedhar S, Mathew R, Surendran A. study of serum albumin as a predictor of short-term functional outcome in acute ischaemic stroke J. Evolution Med Dent Sci. 2278-4802.

[10]. Kasundra G, Sood I. Prognostic Significance Of Serum Albumin Levels In Acute Ischemic Stroke. Natl J Integr Res Med. 2014;5:1-4.

[11]. Prasad BO, Sunita T, Kauser U. Acute ischemic stroke in young adults-a hospital based study in North India. Int J Biomed Research. 2015;6:113-7.