The Prognostic Role of Lymphocytes with Respect to Mortality in Stroke Patients

Manoj Mathur[1], Isha Gupta[2]

ABSTRACT

Introduction: The secondary neuroinflammatory response after an episode of acute stroke can have grave impact on the prognosis of the stroke whether ischemic or hemorrhagic stroke. Physiological stress during an episode of acute stroke leads to high levels of cortisol and catecholamines due to sympathetic nervous system activation which causes a decrease in the circulating lymphocyte levels leading to lymphopenia. This may have an impact on the outcome of the stroke patients.

Materials and methods: A total of 100 adult patients, 50 each with onset ischemic and hemorrhagic stroke (as per CT/MRI diagnosis) were enrolled in the study within 48 hours of onset. Those with prior history of stroke were excluded. Demographic, clinical and hematological assessment was done. Patients were followed up till discharge/death. Data was analyzed using SPSS 21.0

Result: Out of the 100 patients of stroke analysed , 41 patients expired and 59 survived during the course of the study. It was observed that the mean lymphocytes % in those who expired was 11.34 (SD – 7.62) while in those who survived was 14.28 (SD – 6.43) i.e. the lymphocytes % in those who expired was significantly lower than in those who survived the stroke (p value – 0.04).

Conclusion: It was concluded that lymphopenia was significantly associated with poor neurological outcome i.e. mortality in patients of stroke , both ischemic and hemorrhagic. It can be considered as a prognostic marker in patients of stroke, however further studies with larger sample size are needed to explore the role of lymphocytes as a prognostic marker in stroke patients.

Keywords: Lymphocytes, Mortality, Stroke

INTRODUCTION

Stroke, both ischemic and hemorrhagic are one of the most common and devastating disorders. Stroke is the second most common cause of death worldwide. It is also a leading cause of serious long-term disability. Ischemic stroke comprises of about 85% of all strokes while hemorrhagic stroke are about 15%, however both these stroke lead to severe neurological and functional impairement.[1]

Lymphocytes are blood cells responsible for cellular and humoral immunity in the body that have shown to modulate the immunologic response in our body. Lymphocytes modulate the mononuclear cell phenotype and induce tissue inhibitor of metalloproteinase-1 expression that have key role in tissue healing. Experimental models have also revealed that lymphocytes exert anti-inflammatory response in atherosclerosis development. Recently, lymphopenia was associated with increased risk for developing adverse outcome in terms of morbidity and mortality in cardiovascular diseases particularly MI.[2] Studies have clearly demonstrated a negative correlation between lymphocyte counts and severity of coronary atherosclerosis.[3] Physiologic stress during acute stroke leads to high level of cortisol which leads to lower lymphocyte counts.[4] Moreover, acute stressful conditions cause activation of sympathetic nervous system which causes redistribution of lymphocytes to lymphatic organs and also promotes apoptosis of lymphocytes leading to lymphopenia.

Several studies have shown that a low lymphocyte count is correlated with poor clinical neurological outcome, plays a negative role in long-term functional recovery and can even be associated with higher mortality.[5,6]

This study aimed to highlight the importance of lymphopenia and its association with poor outcome especially mortality in stroke patients, both ischemic and hemorrhagic.

Aims and Objective –

To assess the prognostic role of lymphocytes with respect to mortality in stroke patients, both ischemic and hemorrhagic stroke.

MATERIAL AND METHODS

It was a Prospective Cohort (Observational) Study, carried out at the Department of Medicine, SRN Hospital, Motilal Nehru Medical College, Prayagraj. The study population included a total of 100 Adult patients (Age > 18 years), with signs and symptoms suggestive of stroke attending the medicine department of SRN hospital. (50 each with onset ischemic and hemorrhagic stroke)

Ethical clearance from ethics committee was taken. Patients/primary legal caregivers of the patients falling in sampling frame were invited to participate in study and were explained about the procedures involved. Only those subjects providing an informed consent were enrolled in the study.

After enrolment, demographic, clinical and hematological assessment was done. Patients were followed up till discharge/death.

[1]Professor, Department of Internal Medicine, [2]Junior Resident 3rd Year, Department of Internal Medicine, Motilal Nehru Medical College and Swaroop Rani Nehru Hospital, Prayagraj

Corresponding author: Isha Gupta, Flat UG01, C block, Tulsiani Enclave, George Town, Lowther Road, opposite Bhola Hospital, Prayagraj, Uttar Pradesh, Pin - 211002, India

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SN	Parameter	Expired (n=41)		Survival (n=59)		Statistical significance	
		Mean	SD	Mean	SD	t	'p'
1.	Hb (g/dl)	13.06	2.13	12.07	1.70	2.58	0.011
2.	TLC ('000/cumm)	13.98	4.78	10.83	3.60	3.65	<0.001
3.	Neutrophils (%)	81.90	13.71	79.04	8.30	1.30	0.196
4.	Lymphocytes (%)	11.34	7.62	14.28	6.43	-2.09	0.040
5.	Monocytes (%)	5.04	2.38	6.45	2.55	-2.79	0.006
6.	PC (lakhs/cumm)	1.50	0.86	1.60	0.73	-0.64	0.525
7.	MPV(fl)	10.11	1.34	10.19	1.60	-0.28	0.777
8.	PDW	15.71	3.02	15.57	3.05	0.22	0.824
9.	PCT	0.13	0.07	0.15	0.06	-1.52	0.133
10.	PLR	0.22	0.21	0.14	0.09	2.43	0.017
11.	RDW	14.40	3.86	13.68	1.86	1.23	0.221

Table-1: Association of Hematological Parameters with mortality

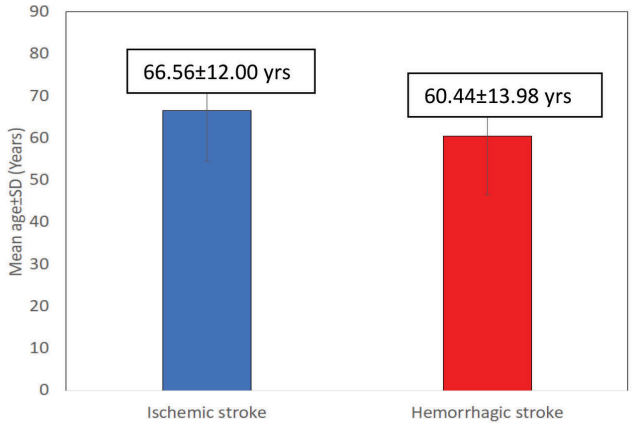

Figure-1: Comparison of mean age of ischemic and hemorrhagic stroke patients

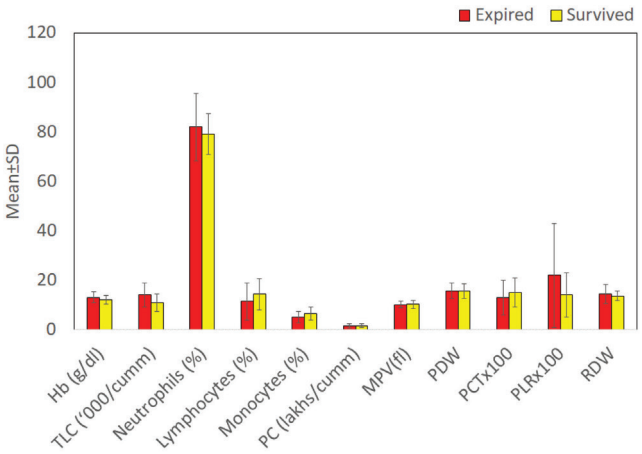

Figure-3: Association of Hematological Parameters with mortality

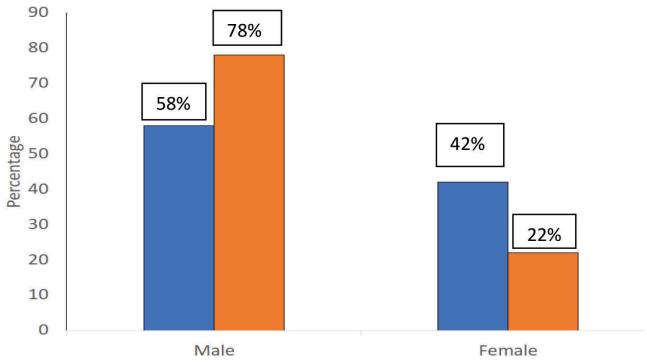

Figure-2: Comparison of Sex profile of ischemic and hemorrhagic stroke patients

Data was analyzed using IBM Statistical Package for Social Sciences, 21.0.

Inclusion criteria

MRI/CT confirmed cases of new onset cerebrovascular accidents (both ischemic and haemorrhagic stroke).

Presenting to the Medicine department within 48 hrs of onset.

Both genders, age > 18 years.

Exclusion criteria

Patients with prior history of stroke.

Patients with intracerebral hemorrhage due to bleeding from brain tumour and haemorrhagic transformation of a cerebral infarct

RESULTS

The present study was carried out to study the prognostic role of lymphocytes with respect to mortality in stroke patients, both ischemic and hemorrhagic.

For this purpose, a total of 100 stroke patients (50 each of ischemic and hemorrhagic type) were enrolled in the study. Fig 1 and 2 shows the age and gender profile of patients enrolled in the study respectively.

Overall age of patients ranged from 30 to 95 years. Mean age of patients was 63.50±13.32 years.

Overall, majority of patients were males (68%). Almost one-third (32%) were females. The sex-ratio was 2.13.

Table 1 shows that out of the total 100 stroke patients analyzed, 41 expired while 59 survived during the course of the study. Mean hemoglobin, TLC level and PLR were significantly higher of those who expired as compared to those who survived. Mean lymphocyte as well as monocyte counts were significantly lower among those who expired as compared to those who survived.

The mean lymphocytes % in those who expired was 11.34 (SD – 7.62) while in those who survived was 14.28 (SD – 6.43) i.e. there was significant lymphopenia in those who expired than in those who survived the stroke (p value –

0.04).

Statistically, there was no significant difference between two groups with respect to mean neutrophils, platelet count, MPV, PDW, PCT and RDW

Discussion –

In our study, out of 100 stroke patients studied, 41 expired while 59 survived during the course of the study. It was observed that there was significant lymphopenia in those who expired than in those who survived the stroke (p value – 0.04).

These findings corroborated with the study findings of Juli C et al. wherein they found that decreased lymphocyte count was associated with poor outcome(poor NIHSS score) in acute ischemic stroke patients.[7]

The similar findings were reproduced by **Vogelgesang** A et al. wherein they concluded that loss of CD4+ T lymphocytes led to stroke induced immunosuppression further contributing to a poor outcome in stroke patients. [8]

Conclusion – The present study conducted on 100 stroke patients including both ischemic as well as hemorrhagic stroke patients, we observed that lymphopenia was significantly associated with poor neurological outcome (in terms of mortality). Thus, Lymphocyte count is a simple, cost effective and routinely available test which can be considered as a prognostic marker in patients of stroke. This study is amongst the very few studies of Indian subcontinent wherein both ischemic and hemorrhagic strokes were studied together and the prognostic role of lymphocytes was analyzed with respect to mortality.

Further studies with larger sample size are needed to explore the role of lymphocytes as a prognostic marker in stroke patients.

Limitation: Despite the best efforts, our study had few limitations:

1. The sample size of our study was small involving only a single centre patients of acute ischemic stroke and acute haemorrhagic stroke which might not be representative of the overall stroke population.
2. Owing to lack of long term follow up for our patients, we cannot comment whether lymphocyte count is a useful predictor of long-term prognostic outcome in patients with stroke or not.
3. Our study was carried out in a tertiary care centre where the cases are either serious or referred thus justifying the higher than usual mortality of stroke in our study. Our study may thus be biased towards more serious cases.

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