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A RETROSPECTIVE STUDY ON CLINICAL PROFILE AND NEUTROPHIL LYMPHOCYTE RATIO IN STROKE PATIENTS IN A TERTIARY CARE CENTRE OF CENTRAL INDIA

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ABSTRACT The commonly used prognostic markers of acute ischemic stroke as age, infarct volume and National Institute of Health Stroke Scale (NIHSS) score and described the use of Neutrophil lymphocyte ratio as inexpensive prognostic marker. . The study included patients of Stroke aged 18 years & more. All patients admitted in ED over one year period (01 December 2017 to 30 November 2018) with history and CT findings of Stroke. A total of 73(47 males, 26 females) cases admitted in emergency department during one year period. The patient age group divided into three groups viz., 18-44 years,45-65 years and >65 years, which respectively included 03(2 Males, 1 Female), 38(26 Males, 12 Females) and 32(19 Males, 13 Females). Elevated neutrophil to lmphocyte ratio(normal reference 0.78-3.53) was found in 37 males i.e., 50.68% and 20 females i.e., 27.39%. A thirty day mortality noted total 11 deaths i.e.,15.06% (six bleed i.e., 8.21% and five infarct i.e.,6.84%). Statistically significant difference in survival as per the types of strokes (p=0.001). Lymphocyte count and Neutrophil to lymphocyte ratio among survived and dead patients was found to be statistically significant (p=0.022 and 0.032 respectively). Significant age difference among different types of stroke patients found (p=0.05). Statistically significant Neutrophil to lymphocyte ratio among different types of stroke patients noted(p=0.005).

KEYWORDS : Stroke, Neutrophil to lymphocyte ratio

INTRODUCTION
There are two types of stroke- ischemic (85%) and hemorrhagic (15%).Ischemic stroke is due to athero-embolic, cardio-embolic, lacunar and other causes. Hemorrhagic stroke comprises of intracerebral haemorrhage and atraumatic subarachnoid haemorrhage.[1] Non contrast computed tomography head differentiate the two types of stroke.[1,3]

Neutrophil to Lymphocyte ratio normal reference range is 0.78 to 3.53.[3] Elevated Neutrophil to Lymphocyte ratio plays significant role as a prognostic indicator.[4-8]

Yen-Nan Fang, Meng-Shen Tong et al. mentioned commonly used prognostic markers of acute ischemic stroke as age, infarct volume and National Institute of Health Stroke Scale (NIHSS) score and described the use of Neutrophil lymphocyte ratio as inexpensive prognostic marker.[5] Immune reaction plays important role in acute hemorrhagic stroke and inflammatory markers like fever, increased leukocyte count, interleulin-6 and C-reactive protein are associated with worse outcome.[7]

The need of the study is to describe the clinical profile of stroke patients and also to evaluate the Neutrophil to Lymphocyte ratio in stroke patients as prognostic inflammatory marker.

MATERIALS & METHODS
The retrospective observational study was conducted at L.N.Medical College & Research Centre and associated J.K Hospital Bhopal. The study included patients of Stroke aged 18 years & more. All patients admitted in ED over one year period (01 December 2017 to 30 November 2018) with history and CT findings of Stroke. Criteria for diagnosis of Stroke based on CT Brain supported by clinical background & routine investigations. Those patients who have history suggestive of cerebrovascular accident but CT Brain refusal were excluded from study.

Data was managed by entering it into MS office and analysed by using Epi-Info software for windows, Version 7. Centre for Disease Control, Atlanta, USA. Chi- Square, Unpaired t test was used to see significance and association. A p value <0.05 for confidance interval of 95% was considered as statistically significant.

RESULTS
A total of 73(47 males, 26 females) cases admitted in emergency department during one year period. The patient age group divided into three groups viz., 18-44 years,45-65 years and >65 years, which respectively included 03(2 Males, 1 Female), 38(26 Males, 12 Females) and 32(19 Males, 13 Females) patients.

Table 1. Clinical and demographic characteristics of stroke patients

Characteristics		Frequency (%)
Gender	Male	47 (64.4%)
	Female	26 (35.6%)
Comorbidity	CAD	12 (16.4%)
	Hypertension	50 (68.5%)
	Diabetes Mellitus	21 (28.8%)
Stroke type	Acute Ischemic Stroke	59 (80.8%)
	Acute hemorrhagic stroke	14 (19.2%)
Patient Outcome	Survive	62 (84.9%)
	Died	11 (15.1%)

Total 59 infarct cases i.e. 80.82% (40 males and 19 females) while total 14 haemorrhage cases i.e.,19.17% (Ten males i.e., 13.69% and four females i.e.,5.47%).

Table 2. Demographic, Clinical & laboratory differences between surviving and dead patients

Variable	Surviving Patients (62)	Dead Patients (11)	P Value
Age (Years;mean:SD)	62.92: 12.39	73.36: 8.12	0.009
Gender			
Male	37	10	0.034
Female	25	1	
Stroke Type			
AIS	54	5	0.001
AHS	8	6	
Co-morbid disease			
CAD	9	3	0.293
Hypertension	41	9	0.302
Diabetes Mellitus	17	4	0.546
Neutrophil count (Mean:SD)	76.72: 5.00	77.18: 7.31	0.062

| Lymphocyte count (Mean: SD) | 19.87: 4.66 | 19.63: 7.35 | 0.022 |
| NLR (Mean: SD) | 4.05: 1.15 | 4.48: 1.79 | 0.032 |

A history of Hypertension was found in 26 males i.e.,35.61% and 16 females i.e., 21.91%. Type-2 Diabetes mellitus was found in 13 males i.e., 17.80% and seven females i.e.,9.58%. Coronary artery disease found in twelve patients(16.43%).

Elevated neutrophil to lymphocyte ratio (normal reference 0.78-3.53) was found in 37 males i.e., 50.68% and 20 females i.e., 27.39%.

A thirty day mortality noted total 11 deaths i.e.,15.06% (six bleed i.e., 8.21% and five infarct i.e.,6.84%). In this study we found statistically significant age difference among surviving and dead patients(p=0.009).We also found statistically significant survival rate among males and females (p=0.034).

Table 3. Demographic, Clinical & laboratory differences between AIS & AHS patients

Variable	AIS (n=59)	AHS (n= 14)	P Value
Age (Years;mean:SD)	63.86:13.24	67.14:7.68	0.056
Gender			
Male	38	9	0.993
Female	21	5	
Patient Outcome			
Survive	54	8	0.001
Died	5	6	
Co-morbid disease			
CAD	11	1	0.297
Hypertension	38	12	0.123
Diabetes Mellitus	18	3	0.5
Neutrophil count (Mean:SD)	76.61:4.97	77.57:6.91	0.123
Lymphocyte count (Mean: SD)	20.08:4.62	18.78:6.82	0.081
NLR (Mean: SD)	4.01:0.96	4.59:2.11	0.005

Also noted, statistically significant difference in survival as per the types of strokes (p=0.001).

Table 4. NLR level of our surviving and dead patients in terms of stroke type

NLR among stroke patients	Surviving Patients (62)	Dead Patients (11)	P Value
AIS (Mean: SD)	3.97:0.88	4.42:1.68	0.325
AHS (Mean: SD)	4.6:2.32	4.54:2.03	0.939

Lymphocyte count and Neutrophil to lymphocyte ratio among survived and dead patients was found to be statistically significant (p=0.022 and 0.032 respectively). Significant age difference among different types of stroke patients found (p=0.05). Statistically significant Neutrophil to lymphocyte ratio among different types of stroke patients noted(p=0.005).

DISCUSSION
The main findings of this study describe the co-morbid factors and the elevated Neutrophil to lymphocyte ratio in stroke patients. Asuman Celikbilek, Sevda Ismailogullari et al. mentioned Neutrophil to lymphocyte ratio is higher in patients with acute ischemic stroke and its use to predict mortality.4 Yen-Nan Fang,Meng-Shen Tong et al. discussed that the Neutrophil to lymphocyte ratio as an accessory biomarker for risk stratification of acute ischemic stroke.5 Gonul Varul, Sadiye Gumusyayla et al. discussed Neutrophil to lymphocyte ratio elevated in every type of stroke and so considered as a predictor of prognosis in stroke patients. It is cheap and widely available tool.8 Although neutrophil to lymphocyte ratio can also be elevated in Hypertension, Type 2Diabetes mellitus, Coronary artery disease and cancer considered as systemic inflammatory marker were not excluded.4,5,9,10

S.Gokhan,A.Ozhasenekler et al.mentioned Neutrophil to lymphocyte ratio higher in both acute ischemic stroke and acute hemorrhagic stroke.11 In this study demographic, clinical and laboratory differences between surviving patients and dead patients with p values cited in the tables.

We consider Neutrophil lymphocyte ratio as a cheap, novel marker and can be used for prognostication of stroke patients. However, co-morbid factors like Hypertension, Diabetes mellitus and Coronary artery disease etc. also has the impact on the inflammation.

Limitation of Study
The retrospective study with data taken from the medical record department with some missing data pose the limitation .Neutrophil to lymphocyte ratio can also be elevated in Hypertension, Type 2Diabetes mellitus, Coronary artery disease and cancer considered as systemic inflammatory marker were not excluded.4,5,9,10 Also, no comparison of Neutrophil to Lymphocyte was made with other markers of inflammation. Moreover, this study did not measure the patient's brain infarct volume and so no correlation with Neutrophil to lymphocyte ratio was done.

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