Cerebrovascular Stroke Correlating Clinical Presentation with Radiological Study

Dr. Dharam singh Meena, Dr. Nasiba Khan, Dr. Lalita Meena, Dr. Anil Paliwal[*]
Resident, Dept of Medicine, SMS Medical College Jaipur

Corresponding Author: Dr. Anil Paliwal,
Resident, Dept of Medicine, SMS Medical College Jaipur. Email: nasibsn1190@gmail.com

ABSTRACT
Introduction: In recent years, with more than 1.2 billion inhabitants, India is undergoing remarkable economic and demographic changes resulting in a transition from poverty related infectious and nutritional deficiency diseases toward lifestyle related cardiovascular and cerebrovascular diseases.
Aim: To study the clinical profile and radiological parameters and its correlation with clinical examination in acute cerebrovascular accident in a tertiary care center.
Method: Study conducted on 100 patients aged 18 and above at department of General Medicine, tertiary healthcare hospital, Rajasthan after approval from Institutional Ethical Committee from June 2018 to August 2020. Patients diagnosed of stroke both ischemic and hemorrhagic by radiological studies and Patients of age 18 yrs and above were taken into study. Detailed examination of central nervous system was done. General and other systemic examination will be done in all patients and findings will be entered into CRI.
Results: The order of prevalence of site in Ischemic Stroke patients were frontal 32(40%) followed by parietal 30(37.5%), temporal 16(20%) and internal capsule 14(17.5%). Among haemorrhagic stroke, most prevalent anatomical site was basal ganglia 10(50%) Middle Cerebral Artery was the most common affected artery 10(35.7%) observed in our study.
Conclusion: Ischemic stroke has higher incidence than hemorrhagic stroke. Hypertension was amongst leading risk factors and total cholesterol and high level of serum fibrinogen were most common biochemical abnormalities in stroke.

Keywords: Cerebrovascular Disease, Ischemic Stroke, Haemorrhagic Stroke

INTRODUCTION

In recent years, with more than 1.2 billion inhabitants, India is undergoing remarkable economic and demographic changes resulting in a transition from poverty related infectious and nutritional deficiency diseases toward lifestyle related cardiovascular and cerebrovascular diseases.[1]

Stroke is a devastating and disabling cerebrovascular disease with some amount of residual deficit leading to economic loss. In 2010, the absolute numbers of people with first stroke (16.9 million), stroke survivors (33 million), stroke related deaths (5.9 million), and Disability adjusted life year (DALYs) lost (102 million) were high and had significantly increased since 1990, with most of the burden happened in low income and middle income countries.[2]

National Commission on Macroeconomics and health, estimated 1.67 million stroke cases in India by the year 2015, suggesting that stroke will be arising epidemic in India in the near future. Cerebrovascular disease is the most common cause of neurological morbidity and mortality in adults, with ischemic stroke accounting for the majority of cases (80%) globally.[3]

The etiology of stroke in majority of cases could be identified by a proper history taking, an adequate general examination and judicious use of investigations. By this study an attempt is made to find out these indices with respect to a population catered by a tertiary care hospital in urban Tamil Nadu. Many strokes can be prevented, though not all.

In present study there is clinical assessment of stroke on the basis of sign, symptoms and clinical examination give information about the type of stroke and correlating with radiological finding for early diagnosis and management. An attempt is made to find out the clinical profile of stroke in this study population. The ultimate outcome of the study population also will be seen. This study will help us for diagnosis early and manage accordingly for thrombolytic therapy.

AIM
To study the clinical profile and radiological parameters, and its correlation with clinical examination in acute cerebrovascular accident at a tertiary care center.

METHOD

This is a Cross-Sectional observational study conducted on 100 patients aged 18 and above at department of General Medicine, tertiary healthcare hospital, Rajasthan after approval from Institutional Ethical Committee from June 2018 to August 2020. Patients diagnosed of stroke both ischemic and hemorrhagic by radiological studies and Patients of age 18 yrs and above were taken into study. Traumatic causes and space occupying lesions of cerebrovascular disease, Pregnant patients, Patients who have past history of stroke, coagulation disorder, cochlearimplant, clips for brain aneurysms, metallic coils in blood vessels, all cardiac defibrillators and pacemakers and Patients who have received treatment outside mainly drugs like anticoagulants and suffering from infections etiology were excluded from study. All the investigations were done. Detailed history was taken. Then, detailed examination of central nervous system was done. Finally, general and other systemic examination will be done in all patients and findings will be entered into CRI.

Statistical analysis: was done by using SPSS Software 22.0 version as descriptive and inferential statistics using Chi Square test and as mean ± SD as student's t test, $p<0.05$ is considered as level of significance.

RESULT

In the present study, types of the stroke were divided as Ischemic Stroke and Hemorrhagic Stroke with 80 (80%) and 20 (20%) respectively.

Table 1: Age and Sex Wise Distribution

Age in Years	Ischemic Stroke(80)	Hemorrhagic Stroke (20)	Total
18-30	4 (5%)	0	4 (4%)
31-40	11 (13.75%)	2 (10%)	13 (13%)
41-50	23 (28.75%)	6 (30%)	29 (29%)
51-60	11 (13.75%)	3 (15%)	14 (14%)
61-70	24 (30%)	7 (35%)	31 (31%)
>70	7 (8.75%)	2 (10%)	9 (9%)
Mean Age(yrs)	53.28±13.94	56.35 ±11.73	53.9 ±13.53
P value	0.3667		
Gender			
Male	52 (65%)	11 (55%)	73 (73%)
Female	28 (35%)	9 (45%)	37 (37%)
Pvalue	0.4075		

Out of 100 patients of stroke 54(54%) were from older age group of 51-80 years and 46(46%) patients were from younger and adult age group of 18-50 years. The mean age of the study was 53.9 ±13.53 years. In Ischemic Stroke and Hemorrhagic stroke mean age were 53.28±13.94 year and 56.35 ±11.73 year respectively with clinical insignificant (p=0.3667).

Out of 100 patients, male patients were predominantly higher 73 (73%) as compared to female 37 (37%) patients. The male: female ratio was 1.97:1. Incidence of Ischemic Stroke was higher 52 (65%) in male patient while in Hemorrhagic stroke 11(55%) patients were male. (p=0.4075).

Table 2. Clinical features

Symptoms	IschemicStroke (n=80)	Hemorrhagic Stroke (n=20)	No of patients(n=100)
Altered sensorium	40 (50%)	16 (80%)	56 (56%)
Headache	4 (5%)	16 (80%)	20 (20%)
Vomiting	12 (15%)	8 (40%)	20 (20%)
Facial Palsy	34 (42.5%)	10 (50%)	44 (44%)
Speech disorder	52 (65%)	16 (80%)	68 (68%)
Hemiplegia	68 (85%)	14 (70%)	82 (82%)
seizure	20 (25%)	14 (70%)	34 (34%)
Involuntary urination and defecation	14 (17.5%)	8 (40%)	22 (22%)

In the present study, most common presenting symptom was hemiplegia 82(82%) followed by speech disorder 68(68%) and altered sensorium 56(56%). Other symptoms such as Facial Palsy 44 (44%), seizure 34 (34%), Involuntary urination and defecation 22 (22%), Headache 20 (20%) and Vomiting 20 (20%) were also found commoner in our study.

However, prevalence of symptoms such as altered sensorium, hemiplegia, speech disorder were found higher in hemorrhagic stroke as compared to ischemic stroke.
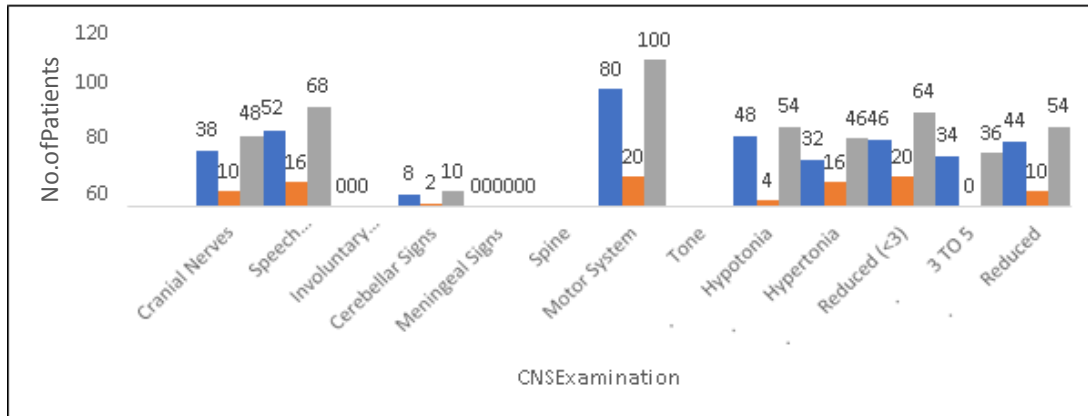
FIGURE 1:CNS EXAMINATION PARAMETER IN STROKE

In present study, on detailed CNS examination, all of the patients had motor system abnormalities 100(100%). This finding was followed by speech abnormality 68(68%),cranial nerves involvement 48(48%). Cerebellar signs 10(10%) in neurological examination. However, none of the patients had involuntary movements, meningeal signs and spine abnormality. In motor system examination, hypertonia, hyporeflexia were higher in hemorrhagic stroke than ischemic stroke. This may be due to neuronal shock.

Most common risk factor was Hypertension 70(70%), followed by Diabetes mellitus 50(50%), Smoking 48(48%) and alcohol 40(40%). Thus, hypertension, diabetes and history of smoking were significant risk factors for stroke

In the present study, majority of the patients had anemia with mean Hb (11.25 ± 1.95). However, blood urea, serumcreatinine were normal. Total cholesterol (mean cholesterol 210.13 ± 29.58) and serum fibrinogen level (mean fibrinogen 414.9 ± 152.21) were found higher in stroke patients as compared to other laboratory parameters.

Table. 3. CT findings

CT Finding	Ischemic Stroke (n=80)	Hemorrhagic Stroke (n=20)	No of patients (N=100)
Frontal	32 (40%)	2 (10%)	34 (34%)
Mid brain	10 (12.5%)	4 (20%)	14 (14 %)
Temporal	16 (20%)	2 (10%)	18(18%)
Occipital	10 (12.5%)	2 (10%)	12 (12%)
Parietal	30 (37.5%)	4 (20%)	34 (34%)
Pons	8 (10%)	6 (30%)	14 (14%)
Medulla	6 (7.5%)	2 (10%)	8 (8%)
Internal capsule	14 (17.5%)	4 (20%)	18 (18%)
Basal ganglia	14 (17.5%)	10(50%)	24 (24%)
Cerebellum	8 (10%)	4 (20%)	12 (12%)
Thalamus	10 (12.5%)	8 (40%)	18 (18%)
White matter	8 (12.5%)	2 (10%)	10 (10%)

Out of 100 patients, most common anatomical site of infarction was frontal 32(40%) followed by parietal 30(37.5%), temporal 16(20%) and internal capsule 14(17.5%). Among haemorrhagic stroke, most common anatomical site of haemorrhage were basal ganglia 10 (50%) thalamus 8(40%), pons 6(30%) and cerebellum 4(20%). In present study, it was found that more than one site were involved as multiple areas are being supplied by the involved artery.
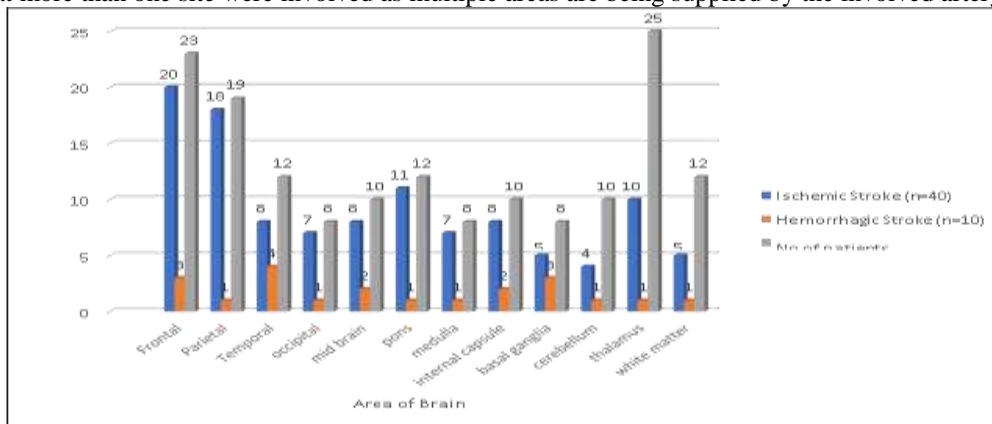

Fig. 2 MRI Findings

MRI brain was done in 50 patients. Most common anatomical site of infarction was frontal 20(50%). Most common anatomical site of haemorrhage was basal ganglia 5(50%),thalamus 3(30%),internal capsule 2(20%) and cerebellum 2(20%). Sites which were missed on CT SCAN were better assessed by MRI SCAN.

Out of 100 patients, 76(76%) had normal echo and 24(24%) had left ventrical dysfunction. Ischemic stroke patients had higher LV dysfunction 20(25%) than hemorrhagic stroke 4(20%).

TABLE 4:MRANGIOGRAPHY FINDING

MRAngiographyFinding	Ischemic Stroke (n=28)	Hemorrhagic Stroke (n=2)	No of patients (n=30)
Normal	2(7.1%)	2(7.1%)	4 (13%)
Middlecerebral artery	10(35.7%)	0	10 (35.7%)
Posteriorcerebralartery	6 (21.4%)	0	6 (21.4%)
Internalcarotid artery	4 (14.2%)	0	4 (14.2%)
Anteriorcerebralartery	2 (7.1%)	0	2 (7.1%)
Vertebro-basilarartery	4(14.2%)	0	4 (14.2%)

In the present study, MR Angiography Brain were done in 30 patients. Out of these,Middle Cerebral Artery was the most common affected artery 10(35.7%) followed by posterior cerebral artery 6(21.4%) and least common was anterior cerebral artery 2(7.1%) in ischemic stroke.

TABLE 5 .CLINICAL AND RADIOLOGICAL CO RELATION

Siteoflesion	Altered sensorium (n=56)	Hemiplegia (n=82)	Speech disorder (n=68)	Facialpalsy (n=42)
Frontal	20(35%)	26(31%)	22(32%)	8(19%)
Midbrain	6(10%)	8(9.7%0	6(8.8%)	4(9.5%)
Parietal	18(32%)	22(26%)	10(14.7%)	6(14%)
Occipital	12(21%)	4 (4.8%)	6(8.8%)	2(4.7%)
Temporal	10(17%)	14((17%)	18(26%)	2(4.7%)
Pons	12(21%)	10(12%)	8(11%)	10(23%)
Medulla	6(10%)	8(9.7%)	6(8.8%)	4(9.5)
Internalcapsule	4(7.1%)	10(12%)	12(17%)	16(38%)
Gangliocapsular	2(3.5%)	16(19%)	2(2.9)	2(4.75)
Thalamus	4(7.1%)	6(7.3%)	4(5.8%)	4(9.5%)

In present study, most common symptoms was hemiplegia (82). Among patient presented with hemiplegia most common site of lesion was frontal 26(31%). In present study, it was found that In patients presented with altered sensorium, most common site of lesion was frontal 20(35%). Among patient presented with speech disorder, most common site of lesion was frontal 22(32%)
Facial palsy was most commonly seen in stroke involving internal capsule 16(30%) followed by pons 10(23%).

DISCUSSION

In the present study, type of the stroke were divided as Ischemic Stroke and Hemorrhagic Stroke with 80% and 20% respectively. Similar was reported by PV Kumar et al[4]. The maximum incidence of stroke in this study was observed in the 51-80 yrs age group (54%).The mean age of the study was 53.9 ±13.53 years. Similarly seen in KP Swain et al.[5]

The male to female ratio in this study was 1.97:1. In a study by KP Swain et al.[5] male to female ratio was 1.7:1, which was lower compare to this study. In the study by Kabi S et al[6] the male to female ratio in acute strokes was 1.46:1, which correlates well with this study.

In the present study, most common presenting symptom was hemiplegia 82(82%) followed by
speech disorder 68(68%) and altered sensorium 56(56%)**.** Similar study was done by Patne SV et al[7]
In the present study, MRI BRAIN was done in 50 patients. Most common anatomical site of Ischemic stroke was frontal 20(50%) followed by parietal 18(45%) and pons 11(27.5%).Other less common sites were temporal 8(20%), midbrain 8(20%), white matter 5(12.5%) and cerebellum 4(10%). Most common anatomical site ofhaemorrhagewas basal ganglia 5(50%), thalamus 3(30%), internal capsule 2(20%) and cerebellum 2(20%) which is similar to study done by Patne SV et al[7].

In the present study, MR Angiography finding described that in ischemic stroke involvement of Middle cerebral artery, Posterior cerebral artery, Anterior cerebral artery and Vertebrobasilarartery were found as 35.7%, 21.4%, 7.1% and 14.5% respectively Similar study done by Parida K et al[8].

Higher fibrinogrn level was associated with ischemic and hemorrhagic stroke. Moreover, A Chitsaz*et al*,[9] MurthyPSVR *et al*.[10] and KP Naik *et al*[11] have found higher level of serum fibrinogen associated with stroke.

CONCLUSION

Ischemic stroke has higher incidence than hemorrhagic stroke. The prevalence of stroke increases with age. Males were more affected than females in ischemic stroke but for hemorrhage, incidence was almost equal. Hypertension was amongst leading risk factors for both types. Total cholesterol and high level of serum fibrinogen were most common biochemical abnormalities in stroke.

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