

# Seizures in Stroke Patients – A Prospective Study

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## A B S T R A C T

**Introduction:** Stroke, one of the major causes of epilepsy, accounts for up to 11% of epilepsy patients in western countries. American Stroke Association has recently reported that about one in six (15.3%) stroke survivors experience seizures within about 3.4 years after suffering brain attack. Study aimed to assess and study the incidence and prevalence of seizures in stroke patients.

**Material and Methods:** 66 patients diagnosed with CVA above 18 years of age were included in this study. A detailed clinical history and meticulous neurological examination were done. Special neurological tests like CT scan brain, MRI (in selected patients) and EEG were also carried out in stroke patients.

**Results:** Incidence of seizures in the cerebrovascular accident patients is about 15%. Seizures are common during early 48hrs of stroke (70%). Partial seizure (motor type) is the most common 80%. Incidence of Generalized Tonic-Clonic Seizures is 20%. Cortical hemorrhagic lesions cause seizures more common than infarct (20% VS 18%). Response to Anti Epileptic Drugs is good 80%. Recurrent seizures occurred in 20% of the cases.

**Conclusion:** Recognition of seizures and management in stroke patients will facilitate good recovery.

**Keywords:** Cerebrovascular Accident, Stroke, Seizure, Management

## INTRODUCTION

Cerebrovascular disease (or) stroke rank foremost among all the CNS disorders. In the West, they represent as the third leading cause of death, with an overall prevalence rate of 800 per, 1,00,000 persons. It ranks after heart disease and cancer as the third commonest cause of death.<sup>1</sup>

Every year around 5 lakh cases of stroke, with about 1,75,000 fatalities from this cause. Since the active early detection and management of hypertension, there has been a great reduction in the frequency of stroke. So this world witnessed a gross reduction in cerebral infarct about 40% and haemorrhage 30% in between 1950-54. This reduction shared both sexes. There has been no change in the frequency of aneurysmal rupture.<sup>2</sup>

Cerebral embolism is one of the important causes of stroke particularly in young patients. The incidence of cardiac embolism varies in several studies. It is as low as 3% in community studies and as high as 30% in referral centers and 15% of patients with stroke. Intra cerebral haemorrhage accounts for approximately 10-15% of stroke. The commonest risk factor being hypertension.<sup>3</sup>

Reports on the frequency of seizures following stroke vary quite widely because of, differing stroke patient populations, sample sizes studies, varying follow up periods, definitions used for stroke and seizures, use of investigation such as CT and MRI and type of statistical analysis. In most studies to date the follow-up period was less than a few weeks, so the

documentation of late-onset or recurring seizures is limited.<sup>4</sup> Study aimed to assess and study the incidence and prevalence of seizures in stroke patients.

## MATERIAL AND METHODS

All patients above 18 years of age admitted in Government Rajaji Hospital, Madurai with Cerebrovascular Accident are included in the study. Patients clinically diagnosed as CVA, above the 18 years of age were included. Exclusion criteria: Stroke and seizures due to toxemia of pregnancy are not included, venous stroke are not included. Stroke like presentation due to surgical causes like brain abscess, AVMs and CNS tumors are excluded (Primary and Secondary). CNS Infections and inflammatory vascular diseases manifesting as strokes are excluded. Strokes due to drug abuse [cocaine], poisoning and due to post-thrombolytic effects are excluded. Known seizure patients are also excluded.

A detailed clinical history and meticulous neurological examination were done. Examination of other systems was done and routine investigation like total count, differential count, HB, ESR, Chest X-ray, Electrocardiogram, Echocardiogram (selected cases), Trans-oesophageal echocardiogram (Selected cases only) were carried out. Special neurological tests like CT scan brain, MRI (in selected cases) and EEG were also carried out in stroke patients.

If the patient develops seizures, a clinical history of nature,

type and pattern of seizures were analyzed. A specific question of secondary generalization if present (or) not was also asked. Inquiry about the worsening of the existing neurological deficit was also asked. Presence of complex partial attacks (CPC) and status epilepticus (SE) was specifically enquired. Inter-ictal electro-encephalography studies were carried out in these patients. The response to the anti-epileptic drugs was assessed and tabulated. Persistence of seizures even after anti-epileptic drugs were recorded. The nature and type of seizures and the stroke pattern have collaborated subsequent development of post-stroke epilepsy was enquired and the patient was followed. Any further worsening of the neurological status was noticed and recorded.

## RESULTS

In this study 66 patients were included. The cerebrovascular disease may account for approximately 50% of new case of epilepsy in patients older than 65. In our study 2 patients who were above 75 years developed seizures following stroke. (Table 1)

Out of the total sixty-six patients 10 had seizures. 7 out of the 10 patients who developed seizures had seizures within 48 hours of the onset of stroke. 3 of the 10 patients developed delayed seizures. 1 patient developed late-onset seizures (after 2 weeks of stroke) but subsequently on imaging he was found to have multi-infarct state. None of the patients developed very late seizures (after 2 months). (Table 2) The patient just mentioned above who had multi-infarct state,

Age group	Sex		Total
	Male	Female	
18-30 years	7	5	12
31-40 years	5	3	8
41-50 years	5	3	8
51-60 years	12	10	22
61-70 years	5	2	7
70 years and above	6	3	9
Total	40	26	66

**Table-1:** Age-wise distribution of patients with stroke is as follows

Immediate (onset within 48 hours)	7
Delayed (48 hours to 2 weeks)	3
Above 2 weeks	1
Very late (2 months and above)	0
Recurrent seizures (post stroke seizures)	2

**Table-2:** patients distribution according to clinical findings

Imaging findings brain ct scan	Nos	Type of seizures	Frequency
Infarct	49	Partial	7
		Generalized	2
Haemorrhagic lesion	5	Partial	1
		Generalized	0
Total	54		10

**Table-3:** Patients distribution according to imaging findings and type of seizures

Infarct	Frequency
Cortical infarct	16
Corona radiata	6
Capsuloganglionic infarct	19
Lacunar infarct	3
Thalamic infarct	1
Brainstem infarct	1
Cerebral infarct	1
Multi-infarct	2
Total	49

**Table-4:** CT Findings

Haemorrhage	Frequency
Putaminal Bleed	3
Thalamic Bleed	1
Intra Cerebral Bleed (Lobar)	1

**Table-5:** MRI Findings

Stroke-Territory	No. of cases	With seizures
Anterior (carotid)	56	9
Posterior (vertebra-basilar territory)	10	1
Total	66	10

**Table-6:** Stroke-Territory

used to get recurrent seizures (post-stroke epilepsy). 1 patient who had occipital infarct also used to get recurrent seizures, in spite of antiepileptic drugs. Rest of the other patient did not develop a recurrent seizure. (Table 3) On analyzing the distribution of imaging findings and type of seizures, out of the 49 patients with infarct 7 had partial seizures. Of the seven with partial seizures 4 had partial seizures alone, 3 had for partial seizures with secondary generalization and 2 had generalized tonic-clonic seizures. Of the 5 haemorrhagic lesions in CT brain 1 patient developed partial seizures. This shows that haemorrhagic lesion of the cortex is prone to develop seizures than infarcts. (Table 4 and 5) Of these one patient with ICH developed seizures. In the infarct group, out of 49 patients 9 developed seizures. In our study of 66 patients; strokes involving the anterior (carotid) circulation is 56 patients and strokes involving the posterior circulation is 10. Of the ten patients with post-stroke seizures; 9 cases have had stroke involving anterior circulation, and 1 case had a stroke involving posterior circulation. (Table 6)

## DISCUSSION

Stroke is the leading cause of seizures in the older population, especially beyond 60 years of age. Cerebral vascular disease (infarction (or) haemorrhage) accounts for 14 to 54% of diagnosed cases of seizures in older patients according to the most recent studies. A similar trend in the age-specific incidence of seizures was seen in the community based study in Rochester Minnesota by Hauser. This observation fits and corresponds well with our observation.<sup>5</sup>

Partial seizures predominate after cerebral infarction and haemorrhage by a study conducted by Fraught et al.<sup>6</sup> Similar to our study, partial seizures of the simple motor type which

is the most common type in our study correlated very well in the findings of other studies. 2 of our cases had GTCS. According to other studies tonic-clonic seizures are also common but it is probable, that in many the focal onset is un-witnessed or not appreciated.

Status epilepticus (SE) is rarely reported following stroke. None of our patients had SE. (both convulsive and non-convulsive SE). Lobar haemorrhages are commonly associated with SE than other types of intracerebral haemorrhage. As already mentioned CVA is one of the causes of SE in older patients. In addition, the mortality of SE increases with advancing age beyond 60 years and duration of seizures. Hence early recognition and management of seizures is very important. Important cause of SE after stroke are anti-convulsant withdrawal and non-compliance.

In an Indian study by Dhanuka 77% of post-stroke seizures occurred as early-onset seizures with 2/3 being immediate post-stroke seizures.<sup>7</sup> In comparison, our study shows 70% of post-stroke seizures occur as early-onset seizures, and 30% delayed seizures.

Dhanuka study demonstrates that recurrent seizures are less with early-onset seizures; this correlates well with our study too.<sup>7</sup>

Status epilepticus following stroke is uncommon (<10%). In correlation with our study none of the patients developed status epilepticus (SE).

The cortical lesion is a risk factor for post-stroke seizures, more with larger lesions that involve multiple lobes of the cortex. Lobar haemorrhage is considered to be the most epileptogenic in locations. Lobar haemorrhage accounts for 54% and basal ganglia bleed in 19%, in a series of 123 patients studies by Faught.<sup>6</sup> In our study out of the 5 haemorrhagic strokes 1 patient developed seizures.

According to a study by Richardson and Dodge, Arboix et al– the most consistent risk factor for seizures at the onset is following cerebral infarction or haemorrhage with cortical involvement. With respect to intracerebral haemorrhage, lobar haemorrhage carries a higher risk of seizures compared to those located sub-cortically.<sup>8,9</sup> This result correlate very well with our observation.

All of our patients with post-stroke seizures, were treated with oral Phenytoin; 8 of our patients responded very well to phenytoin alone, amounting to eighty percent of response to anti-epileptic drugs. Two of our patients still had post-stroke seizures. Of these 2 patients one was diagnosed to have multi-infarct state and continue to have seizures. None of our patients was intolerant, no adverse reactions developed to the administration of Phenytoin. Finally in pre-existing neurological deficits due to stroke, the neurological deficit may worsen after a prolonged seizure, this indicates the need for prompt seizure control.

## CONCLUSION

In conclusion the incidence of seizures in stroke is about 15%. Partial seizures are the most common seizure type. Complex partial seizure and status epilepticus were not observed. Response to conventional antiepileptic drugs is good. Recognition and management of seizures in stroke patients will facilitate recovery and decrease disability.

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