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AN OBSERVATIONAL STUDY ON CLINICAL AND RADIOLOGICAL PROFILE OF POST-STROKE SEIZURES PATIENTS

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ABSTRACT

Aims: To evaluate the incidence of early versus late post stroke seizures, and its type as well as its relation with different type of stroke and location of the involvement and correlation with different risk factors along with to know occurrence early versus late post stroke seizures in young versus old stroke patients. **Methodology:** All the patients with the diagnosis of post-stroke seizures were included. Those with known epilepsy, sepsis, electrolyte imbalance, patient having old stroke presenting with fresh stroke and any other reversible precipitating factors were excluded. Data collected regarding the age, co-morbid conditions, details of seizures and radiological findings including type and location of stroke. **Results:** Total of 150 subjects with post-stroke seizures were included. 61% were males while 39% were females. Mean age of the study population was 53.2 ± 12 years. 22 patients had young stroke (<45 years) whereas rest 128 patients had age > 45 years. Early post-stroke seizures were seen in 51% of patients. Rest of the patients i.e. 49%, had late-seizures. GTCS were the most common type of seizures seen in 65% patients, followed by partial motor with secondary generalization and partial motor seen in 25% and 10% of the patients respectively. 69% of the patients had multiple episodes of seizures i.e. two or more than two episodes while 31% had only single episode of seizure. Only 3% had status epilepticus. 82% of the patient had Ischemic stroke while hemorrhagic stroke was seen in 18% of the patients. Also 65% of the patient had cortical location of stroke while 35% had subcortical location. Comparison between early and late onset seizures revealed significant association between ischemic heart disease (IHD) and hypertension with late onset seizures ($p < 0.05$). **Conclusion:** Post-stroke seizures were more frequent in male population, elder people with comorbid illness like hypertension, and with cortical ischemic strokes. Early seizures, multiple episodes and generalized tonic clonic seizure type were more common. History of ischemic heart disease and hypertension showed a strong relationship with the occurrence of late onset seizures. Long term prospective studies are essential to identify whether control of hypertension and IHD may lead to fall in incidence of post stroke seizures.

KEYWORD: Seizures, Stroke, Early versus Late Post stroke seizures.

INTRODUCTION

Stroke is one of the most common reasons of morbidity and mortality across the world and is liable for 5-6 million reported deaths every year. The association between seizures and stroke was first documented by John Hughling Jackson more than a century ago.[1] The rate of post stroke seizures ranges from 2-4%.[2] Stroke is one of the foremost cause of symptomatic epilepsy in adult population.

Like stroke, post-stroke seizures (PSS) are also more prevalent in older patients and can occur after ischemic, hemorrhagic or any type of stroke. It may present in either early i.e. within 2 weeks or late i.e. after 2 weeks of stroke. Number of risk factors for post stroke seizures have been recognized in the past like male gender, age > 65 years, cortical location of lesion, larger lesion and anterior circulation infarction. Other reported risk factors are hemorrhagic infarcts, cerebral venous infarcts and stroke recurrence. Most studies done in past show preponderance of early over late post stroke seizures and majority presenting with focal onset seizures. The early seizure is associated with a high risk of status epilepticus and an increased incidence of death. Post-stoke seizures are related with substantial functional disability and mortality. Studies regarding relationship of risk factors for stroke with occurrence of early and late post stroke seizures are very less. There are also only few studies done in our country about stroke sub types.

The present study is aimed to know the incidence of early versus late post stroke seizures, and its type and time of occurrence after the stroke as well as its relation with different type of stroke and location of the involvement and correlation with different risk factors.

SUBJECTS AND METHODS

150 patients who were admitted to the Neurology ward at a tertiary care hospital with post stroke seizures from 2017-18 were included in the study. Patients with known case of epilepsy, electrolyte imbalance, sepsis, patient having old stroke presenting with fresh stroke or any other precipitating factors and those refusing to give informed consent for study were excluded from the study. All the patients were explained and informed consent was taken. Ethical clearance was taken from Ethical committee of the Institute.

Early seizures were defined as seizures occurring within 2 weeks of stroke while late seizures were seizures which occurred 2 weeks after the stroke. Detail clinical history and examination was done in every patient. Imaging in form of plain CT brain and/or MRI brain was performed in every patient. MRI was performed on 1.5 Tesla GE machine. EEG was also done all cases to localize epileptiform foci.

All the data was collected regarding onset, type and frequency of the seizure; gender and co-morbidities, radiological findings regarding type, location and nature of stroke. All the information gathered from history, examination and neuroimaging either computed tomography (CT scan) or magnetic resonance imaging (MRI), was entered in a predefined proforma designed for the study.

Data was analyzed using SPSS 21 statistical software. Pearson chi square test was used to find relationship between the time of onset of post-stroke seizures and other variables. Significance level of 95% with $p<0.05$ was considered statistically significant.

RESULTS

In our study around 150 subjects with post-stroke seizures were included. 61% were males while 39% were females. Mean age of the study population was 53.2 ± 12 years. 22 patients had young stroke (<45 years) whereas rest 128 patients had age > 45 years. Early post-stroke seizures were seen in 51% of patients. Rest of the patients i.e. 49%, had late-seizures. GTCS were the most common type of seizures seen in 65% patients, followed by partial motor with secondary generalization and partial motor seen in 25% and 10% of the patients respectively. 69% of the patients had multiple episodes of seizures i.e. two or more than two episodes while 31% had only single episode of seizure. Only 3% had status epilepticus. 82% of the patient had Ischemic stroke while hemorrhagic stroke was seen in 18% of the patients. Also 65% of the patient had cortical location of stroke while 35% had subcortical location. (Table 1). Twenty six patients had a history of Ischemic heart disease while 22 had a history of Diabetes and 62 had history of hypertension. Dyslipidemia was found in 24 patients.

Table 1: Characteristics of post-stroke seizures (n=150).

Clinical characteristics	**Frequency**
Onset	
Early (<2 weeks)	51%
Late (>2 weeks)	49%
Type	
Generalized	65%
Partial with secondary generalization	25%
Partial motor	10%
Frequency	
Single	31%
Multiple	69%
Status epilepticus	
Yes	3%
No	97%
Radiological characteristics	**Frequency**
Type of stroke	
Ischemic	82%
ICH	18%
Location	
Cortical	65%
Subcortical	35%

More patients had systemic hypertension and Ischemic heart disease in the late post stroke seizure as compared to early seizure group, which was statistically significant with p value 0.037 and 0.023 respectively. Other comorbidities like diabetes mellitus and dyslipidemia were not statistically differed in early and late post stroke seizures groups. Similarly age and sex had no influence on occurrence of early and late post stroke seizure group. Ischemic stroke was seen in 42 patients in early seizure group as compared to 26 patients in the late post stroke seizure group, which was statistically insignificant likewise location of lesion had no influence on occurrence of early and late post stroke seizures. (Table 2).

Table 2: Characteristics of early and late onset seizures (n=150).

Variable	Early seizures (N=76)	Late seizures (N=74)	P-Value
Gender			
Female	32(43%)	27(36%)	0.59
Male	44(57%)	47(64%)	
Age			
Young (<45 years)	13(17%)	9(13%)	0.88
Old (>45 years)	63(83%)	65(87%)	
Comorbidities			
Ischemic heart disease			
Yes	42(55%)	26(35%)	**0.037**
No	34(45%)	48(65%)	
Diabetes mellitus			
Yes	14(18.5%)	19(26.1%)	0.36
No	62(81.40	55(73.9%)	
Hypertension			
Yes	39(51.8%)	55(73.9%)	**0.023**
No	35(48.1%)	19(26.1%)	
Dyslipidaemia			
Yes	17(22.2%)	19(26.1%)	0.20
No	59(77.7%)	55(73.9%)	
Radiological characters			
Location			
Cortical	52(68%)	45(61%)	0.37
Subcortical	24(32%)	29(39%)	
Type			
Ischemic	65(85.5%)	58(78%)	0.54
ICH	11(14.5%)	16(22%)	

DISCUSSION

The incidence of post-stroke seizures differs in various studies between 4.4 to 13.8%.[6] However slightly greater frequency i.e. 13% is reported from India by Dhanuka et al.[7] Early post stroke seizures has been demarcated in numerous studies as seizure occurring between first 24 h to the first 4 week post-stroke. Generally early post stroke seizures occur at the onset of stroke in 1.8–15% of patients and constitute the majority of post-stroke seizures.[6] The reported incidence of late post stroke seizure is approximately 2.5–15%,[7] Recurrent seizures or post stroke epilepsy can occur in 4–9% of patients.[8] Cerebrovascular disease is the most common cause of seizures in the older population: it is the cause of spontaneous seizures in about 36.6% of patients.[9] Most of the post stroke seizures are focal onset and are of the simple partial Type,[10] followed by primary generalized seizures. These results are similar to our study. Complex partial seizures are less common.

The mean age was 53 years in our study which is comparable with the previous studies which reported higher incidence of post stroke seiures in middle aged or elderly patients.[4] Post stroke epilepsy is rarely seen in young ischemic stroke survivors.[11] Whereas a study in India by Dhanuka *et al* have found a younger age at first seizure after stroke[7] (mean 45.41 years). but they had wide spectrum of patients (age range of 5 months to 76 years). In our study, males were seen more frequently as compared to females (61% vs 39%) as seen in the previous international as well as study reports.[11] Whereas another study done by Bhojo et al. had equal frequency of post stroke seizures in males and females.[12]

In our study it showed minor difference of early post stroke seizures compared to late post stroke seizures. (51 % vs 49%), this was different from study done by Dhanuka[7] et al. and Black et al.[13] However a study done by Sung et al showed more chances of late seizures as compared to early seizures.[10]

In our study most frequent type of seizure was generalized as compared to partial or secondary generalized seizures as expected in symptomatic epilepsy like PSS. In one of previous data showing a preponderance of partial seizures in PSS,[10] this may be related to low education status of study population who are unable to report partial or secondary generalized seizures and misinterpret them to be generalized. In our study 69% had multiple seizures. This is in accordance with study from India by Dhanuka *et al*. in which 60 % had multiple seizures.[7] Also in our study 3% of patients had history of status epilepticus (SE), and all occurred in patients having early post stroke seizures. Frequency of SE is different in different studies. It was reported 14% by Milandre et al[14] whereas it was reported 10% by Lo et al.[15]

In our study, majority of patients (82%) had ischemic stroke in sharp contrast to the international data which reported an increased incidence of Post seizure stroke following ICH.[16] Long term follow up Prospective studies are required to know precise incidence following ischemic and hemorrhagic stroke. Also in our study both early and late seizures were more common with cortical lesions as compared to subcortical lesions (65% vs 35%) This is supported by previous studies in which both early and late seizures were seen more frequently seen in cortical ischemic strokes.[17]

On comparing the prevalence of different risk factors and comorbidities between early and late post stroke seizures it was found that the Ischemic heart disease (IHD) and hypertension (HTN) were significantly related with post stroke seizures which was also statistically significant or in other words those patients who are having HTN have more chance of late post stroke seizures and IHD have more chances of early post stroke seizures. In study done in fifty patients done by Shaista et al also had similar findings.[18] Even in the absence of clinically detected stroke, hypertension with left ventricular hypertrophy may increase the risk of unprovoked seizures. In our study the increase risk of late post stroke seizures in patient with hypertension may be because of HTN acting as independent risk factor for seizures.

Our study has a number of limitations like observational study and relatively small sample size. Therefore, large prospective studies are required to see the exact relationship between various comorbidities and post stroke seizures.

CONCLUSION

In this study post-stroke seizures were more common in males as compared to females, older age, cortical ischemic strokes and with history of hypertension. Early post stroke seizures, primary generalized seizures and multiple episodes were more common. Patients with history of ischemic heart disease, and hypertension had strong association with the occurrence of Post stroke seizures. Long term prospective studies are required to know whether control of hypertension and IHD may lead to decrease incidence of post stroke seizures.

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