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Research Article

### AN OBSERVATIONAL STUDY ON EEG FINDINGS IN POST STROKE SEIZURES

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**Abstract:**

**Objective:** Stroke is an important cause of epilepsy, especially in the elderly. We conducted an observational study at a tertiary care Hospital to describe the different EEG results in patients who experienced post-stroke seizures.

**Place and Duration:** In the Medicine and Neurology Unit-II of Jinnah Hospital Lahore for six months duration from February 2020 to July 2020.

**Methodology:** We reviewed all EEGs that were performed for evaluation of seizures after stroke and retrospectively recorded demographic data, side of stroke, type of seizures and EEG findings. All this information was entered on a specially designed proforma.

**Results:** A total of 41 patients with post-stroke seizures were included, which was evaluated and analyzed. Of these patients, 51.2% (n = 21) were male (mean age 60.7 years; range 22-84 years) and 48.8% (n = 20) were female (mean age 63 years; range 3-90) years). The most common seizure semiology was generalized seizure in 56.1% (n = 23), focal seizures in 36.6% (n = 15), and focal with secondary generalization in 7.3% (n = 3) of patients. 51.2% (n = 21) had hemispheric involvement, 26.8% (n = 11) had left hemisphere involvement, and 22% (n = 9) of patients had no side stroke identified. The most common symptom on EEG was generalized slow waves observed in 39.0% (n = 16) of patients. Other found abnormalities were focal slowing in 19.5% (n = 8), focal sharp and slow waves in 9.8% (n = 4), focal spikes and slow waves in 4.9% (n = 2), focal sharp waves in 4.9% (n = 2) of patients. Focal peak waves in 2.4% (n = 1) and PLEDS was found in 2.4% (n = 1) of patients. 17.1% (n = 7) of patients had normal EEG recordings.

**Conclusions:** Generalized seizures and generalized slowing on EEG were the most common symptoms in our patients who experienced post-stroke seizures. The most common epileptic discharges were focal sharp and slow waves observed in 9.8% of patients with post-stroke attacks.

**Keywords:** stroke attacks, EEG, convulsions.

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**INTRODUCTION:**

Post-stroke seizures were described over a century ago by John Hughling Jackson. To this day, stroke is considered an important cause of epilepsy, especially in the elderly. The reported frequency of seizures ranges from 2–33% [1-2]. The community registry shows that a patient with a first-ever stroke had a 2% risk of a seizure at the time of stroke and an 11% risk of a later seizure within the first 5 years of follow-up. Patients with intracerebral and subarachnoid hemorrhages were at increased risk of a post-stroke attack. Post-stroke attacks were classified according to their temporal relationship with the onset of stroke immediately after (within 24 hours), early and late onset [3-4]. Early-onset seizures were defined as occurring within a week or two of the stroke. Late-onset seizures occur one or two weeks after the stroke. Seizures following a stroke significantly increase morbidity and mortality, and further deteriorate the already contained quality of life [5-6]. Early-onset seizures have poor prognosis and a high in-hospital mortality rate. The EEG can help identify the type of seizure and the location of the epilepsy focus. Also, some EEG patterns are predictive of patients who may experience late-onset seizures [7-8]. We conducted an observational study at a tertiary reference center to describe the different EEG results in patients who experienced post-stroke seizures.

**METHODOLOGY:**

This study was held in the Medicine and Neurology Unit-II of Jinnah Hospital Lahore for six months duration from February 2020 to July 2020. We analyzed all EEGs that were performed to evaluate post-stroke seizures and retrospectively recorded demographics, stroke site, seizure type and EEG results. All this information was entered on a specially designed proforma. EEG electrodes were placed according to the international 10-20% system. Activation procedures such as hyperventilation and photic stimulation were performed.

**RESULTS:**

A total of 41 post-stroke patients who underwent an EEG in our laboratory were evaluated and analyzed. Of these patients, 51.2% (n = 21) were male and 48.8% (n = 20) were female. The mean age was 61.8 years. 36.6% (n = 15) of patients were awake, 26.8% (n = 11) were sleepy, 17.1% (n = 7) were sedated, 4.9% (n = 2) were semi-conscious, 12.2% (n = 5) were unconscious and 2.4% (n = 1) were asleep. The most common seizure semiology was generalized in 56.1% (n = 23), focal in 36.6% (n = 15) and focal with secondary generalization in 7.3% (n = 3) of patients. 51.2% (n = 21) of patients had right hemisphere involvement, 26.8% (n = 11) of left hemisphere, and 22% (n = 9) of patients had no identified side of stroke. Table I.

	No.	%
Mean Age in years		
Male	61.8	
Female	60.7	
Gender		
Male	21	51.2
Female	20	48.8
Seizure semiology Generalized	23	56.1
Focal	15	36.6
Focal with secondary	3	7.3
Generalization State of the patient Awake	15	36.6
Drowsy	11	26.8
Sedated	7	17.1
Semiconscious	2	4.9
Asleep	5	12.2
Hemispheric involvement Right	21	51.2
Left	11	26.8
Not identified	9	22

The most common EEG symptom was generalized slow waves observed in 39.0% (n = 16) of patients. Other found abnormalities were focal slowing in 19.5% (n = 8), focal sharp and slow waves in 9.8% (n = 4), focal spikes and slow waves in 4.9% (n = 2), focal spikes in 2.4% (n = 1), focal sharp in 2.4% (n = 1), and PLEDS in 1.1% (n = 1) of patients. 17.1% (n = 7) of patients had normal EEG recordings. Fig-1.

focal sharp waves in 4.9% (n = 2) of patients. Focal peak waves in 2.4% (n = 1) and PLEDS was found in 2.4% (n = 1) of patients. 17.1% (n = 7) of patients had normal EEG recordings. Fig-1.

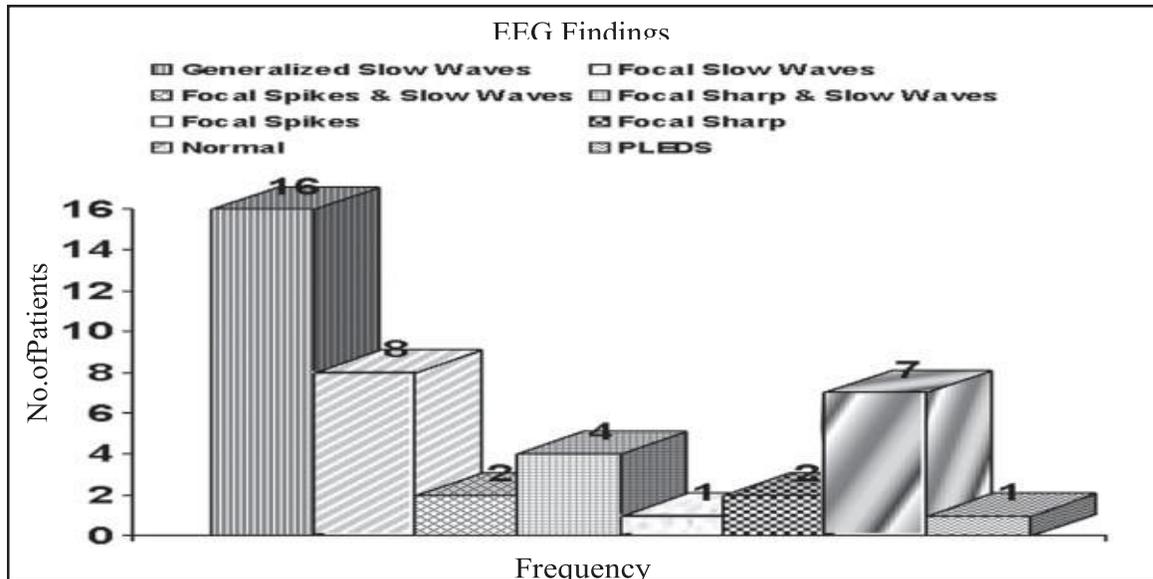


Figure-1: EEG findings

### DISCUSSION:

Despite their high prevalence, especially in old age, stroke-related seizures are the most neglected topic. The most common seizure pattern observed in our cohort is generalized seizure in 56%, followed by focal seizures in 36% of patients, in contrast to what other authors describe. Only one study reported an increased incidence of generalized seizures [9-10]. This could be because relatives did not notice the starting event or it was not properly listed in the record. Most of our patients were elderly and the mean age was 61 years, similar to another studies [11-12]. More than half of the patients had right hemisphere involvement. The most common finding in EEG was generalized slow waves (39%), while focal slowing was seen in 19%. Focal sharp and slow waves were observed in 9.8% [13-14]. This is similar to other studies. The EEG results also correlated with the seizure semiology, according to which generalized seizures were more frequent in our cohort. Epilepsy-like periodic discharges have been shown to be associated with acute stroke and subsequent seizure development in many studies. However, in our cohort, PLEDS was seen in only one patient, which is similar to what Dhanuka et al. Report limitations: Our study is deficient due to its retrospective nature [15]. Further extensive prospective population studies are needed to answer

the many still unanswered questions about stroke attacks, such as pathophysiology, epidemiology, risk factors, and treatment of stroke attacks.

### CONCLUSIONS:

Generalized seizures and generalized EEG slowdown were the most common symptoms in our patients who experienced post-stroke seizures. The most common epileptic discharges were focal sharp and slow waves observed in 9.8% of patients with post-stroke attacks. Large prospective observational studies are needed to define the prognostic factors for stroke attacks in specific stroke subtypes.

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