

original article**CLINICAL PROFILE OF PATIENTS WITH SEIZURE AND ITS CORRELATION WITH EEG AND NEUROIMAGING**

Dr. Zalak Malav Gadani (M.D Medicine) Associate professor, **2. Dr. Hemang Suthar (M.D Medicine) (corresponding author)** Associate professor, General Medicine Department AMC MET Medical College, Maninagar, Ahmedabad, Gujarat. Email: **corresponding author Dr. Hemang Suthar :drhns21@gmail.com**

ABSTRACT:

Introduction: Seizure is a paroxysmal event due to abnormal, excessive, hyper synchronous discharges from aggregates of CNS. Epileptic seizures are episodes that can vary from brief and nearly undetectable to long periods of vigorous shaking. These episodes can result in physical injuries to the patients.

Aim: To study the clinical profile and correlations of neuroimaging and EEG in epileptic patients.

Materials and methods: This study was done at L G Hospital, Ahmedabad, Gujarat State. The patients admitted with seizures were included after considering the exclusion criteria. The seizures in these patients were classified as per the classification of International classification of epileptic seizures.

Results: Out of 142 patients, 60 patients had no abnormality on neuroimaging. 82 patients had some structural abnormality on neuroimaging. EEG was normal in 100 patients, while abnormal spike and wave and epileptiform discharge was found in 42 patients. 46 patients had normal EEG as well as normal MRI scan, while 28 patients had abnormal MRI and abnormal EEG.

Conclusion: A significant correlation was observed between EEG changes and structural abnormality on neuroimaging.

Introduction:

Epilepsy is a common and diverse disorder with many different causes. About one third of patients with a first unprovoked seizure will have further seizures within five years, and about three quarters of those with two or three unprovoked seizures have further seizures within four years. The prevalence and incidence of epilepsy in

Asia is similar to the West but reversible aetiologies such as head trauma, infections, stroke, and obstetric care are probably more important in Asia.

Seizures are an important cause of morbidity and mortality. It is therefore important to establish accurate diagnosis of seizures and its aetiologies to appropriately manage such patients. The aetiology of seizures is different in India and other developing countries as compared to the developed world. Tuberculoma and neurocysticercosis have relatively high frequency in India. EEG is used for functional or electrical mapping of brain and not used for diagnosis and confirmation of epilepsy because in as many as 50% epileptics' single interictal recording may be normal. Normal EEG does not exclude the presence of epilepsy.

In addition to its value as a diagnostic aid, EEG may be helpful in classifying the seizure, suggest an aetiology, guide clinical management as well as provide evidence of localisation when surgery is planned¹. Neuroimaging though normal in majority of the cases is an important investigation to detect and to identify the structural lesions of the brain. If the patient can undergo neuroimaging scan, it helps to identify treatable lesions like tuberculomas, cysticercosis, intracranial space occupying lesions, arterio-venous malformations, cortical dysplasia, hydrocephalus, tuberculous meningitis, so that a specific treatment can be initiated.

Neuroimaging and EEG thus provide us with a powerful combination of structural and functional methods in the evaluation of epilepsy, yielding more valuable information than can be provided with either method alone. The present study was undertaken to study clinical profile of patients with seizure. Aim of this study was to study clinical profile of patients with epilepsy. In addition we wanted to study the correlations of neuroimaging of brain and EEG in patients with seizure.

Aims and Objectives:

1. To study clinical profile of patients with seizure.
2. To study the correlations of neuroimaging of Brain and EEG in patients with seizure.

Methodology:

This is a Descriptive Cross-sectional study of 142 patients coming to medical OPDs or admitted in medical wards during period of October 2017 to November 2018.

Inclusion criteria:

- All the patients attending Outpatient department and those patients admitted to ward and ICU with seizure.

Exclusion criteria:

- Age < 15 years
- Pregnancy

Materials and Method:

This study will be conducted at L G Hospital Ahmedabad, Gujarat State. The patients admitted with seizures will be included after considering the exclusion criteria. The seizures in these patients were classified as per the classification of International classification of epileptic seizures.

Routine investigations like blood counts, blood sugar, serum electrolytes, complete urine examination, electro cardiogram (ECG), X-ray chest etc. were done. HIV, sputum for acid fast bacillus, erythrocyte sedimentation rate, Mantoux test and other special investigations were carried out wherever required.

Thorough physical examination with emphasis on neurological examination was done in all patients and the details were noted.

All the patients in the study were subjected to EEG and Neuroimaging of brain with or without contrast. Neuroimaging has made possible the visualization of intracranial lesions without discomfort and risk to the patient.

All the findings were recorded and results were analysed by standard statistical methods.

OBSERVATION

In this study, total 142 cases of epilepsy were enrolled and their demographic profile and precipitants of seizure were noted and evaluated with neuroimaging and EEG.

Table 1:

Age wise distribution of patients

Age	Number of Patients
<20	20
20-40	86
41 -60	14
>61	22
Total	142

Out of 142 patients, most commonly affected age group is 20 -40 years. (n=86). Second most commonly affected age group is age >60 years.

Table 2:

Demographic profile of patients with epilepsy

Parameters	Mean value
Age in years	22.5 years
Haemoglobin	16.5 gm%
Total count	11,655/cumm
Platelet count	3.55/cumm
RBS	126 mg%
Urea	21mg%
Creatinine	1.1mg%
Serum sodium	139 meq/l
Serum potassium	4.15meq/l
SGPT	22.5IU
Serum calcium	8.5 mg%

In our study, males are more affected than females, with male to female ratio 3.43. 66 patients were on mixed diet while rest of the patients were lacto vegetarian. Positive risk factors for seizures were found in 30 patients, alcoholism in 14 patients, bhang addiction in 2, head trauma in 4, history of neurosurgery in 4, CNS Tuberculosis in 4, CNS tumour in 2. Total 38 patients were known case of seizure. Most common seizure type is generalised tonic clonic seizure (n=178). Partial seizure was found in only 6 cases. Hypoglycaemia (RBS <55) was found in 6 cases. Electrolyte derangements in form of hypo and hypernatremia and hypo and hyperkalemia were found in 72 cases. Hypocalcemia (<8.5mg%) was noted in 20 cases.

Table 3

Neuroimaging findings

Neuroimaging finding	Number of patients
Gliosis	24
Ischemia	22
Granulomatous lesion	22
Meningoencephalitis	2
Focal cortical dysplasia	2
Tumours	4
Normal	52
Chronic bleed	2

MRI brain is preferred over CT brain. But those patients who are not affording for MRI brain, CT scan brain was carried out. Normal neuroimaging was found in 52 patients. Gliosis was most common finding (n=24), follow by ischemia (n=22) and granulomatous lesion (n=22). **Table 4:**

Correlation of EEG and Neuro-imaging

	Abnormal MRI	Normal MRI	TOTAL
Abnormal EEG	28	14	42
Normal EEG	54	46	100
TOTAL	82	60	142
Chi square value : 1.9449	ODDS RATIO: 1.7		
P value : 0.163138	CI of OR: 0.8028 to 3.6158		
Result is not significant	Significance: 0.6521		

	z statistics : 1.388

Out of 142 patients, 60 patients had no abnormalities on neuroimaging. 82 patients had some structural abnormality on neuroimaging. EEG was normal in 100 patients while abnormal spike and wave and epileptiform discharge was found in 42 patients. 46 patients had normal EEG as well as normal MRI scan, while 28 patients had abnormal MRI and abnormal EEG.

Chi square value is 1.9449 at df 1 and p value is 0.163138 which is not significant. So there is no statistical association between abnormal EEG changes and abnormal MRI findings. However when odds ratio was calculated, the value was 1.7, indicating that abnormal EEG was 1.7 times more amongst the patients having abnormal MRI findings. This difference was also not statistically significant. (OR CI:0.8028to 3.6158, p value:0.1652).

Discussion

Epilepsy is a chronic disorder characterized by recurrent seizures, medical and psychosocial implications. Cause of epilepsy varies in different age groups and geographical locations. In older children and young adults, hippocampus sclerosis, drug abuse and trauma are important causes; in the elderly population, vascular aetiology is a common cause¹. History and physical examination, laboratory investigations, lumbar puncture and cerebrospinal fluid (CSF) analysis to know about the acute or chronic infectious cause or subarachnoid haemorrhage, CT scan/MRI brain and EEG are used as investigation modalities. EEG remains a major technique for investigation of epilepsy. Easy availability and cost effectiveness has made EEG a very useful tool in cases of epilepsy but also in several neurological conditions like encephalitis, sleep disorders, dementias, encephalopathies of metabolic origin. In cases of epilepsy, interictal and ictal EEG recordings provide useful information. Ictal EEG is always abnormal in general tonic-clonic seizures but it is difficult to record during the event as the seizure activity is unpredictable. Interictal EEG plays an important role in the diagnosis and treatment of epilepsy, which is a disorder of cortical hyperinstability².

The study was conducted to assess the role of EEG and neuroimaging in patients with partial or generalized seizures and to make out any correlation between these two investigations, if possible. In this study, total 142 cases of epilepsy were evaluated with neuroimaging and EEG.

In this study most commonly affected age group is 20-40 years followed by age more than 60 years. In Dilli Ram Kafle et al and Krishna Kumar Oli et al study, most commonly affected age group was 20 -40 years(53.3%)³. In adolescent and early adulthood, causes

are idiopathic and genetically based epilepsy. Other causes are CNS infections, tumours, drug abuses, alcohol withdrawal and head trauma. In older age group (age >65years), cerebrovascular diseases, neurodegenerative diseases, trauma, tumours are common causes¹.

6 patients admitted with seizure had hypoglycaemia (RBS < 55 mg%) at time of admission, out of them 4 patients were chronic alcoholic and admitted with acute alcohol intoxication and two patients were cases of type 2 DM. Total 18 patients had hyponatremia at the time of admission. Metabolic disturbances like electrolyte imbalance, renal failure, hepatic failure can occur at any age¹.

30 patients were reported to have one or more precipitants for their seizure. Total 38 patients were known case of seizure. The presence of precipitants that were noncompliant to medication had significantly higher seizure frequency than those patients who were compliant to their medication. E Balamurugan et al also found missing medication, sleep deprivation, fatigue, and emotional stress to be important triggers for seizure onset⁴.

138 patients had generalised tonic clonic seizures and only 6 patients had partial seizures. Primary generalised tonic clonic seizures are main seizure type in 10% of all persons with epilepsy. They are also most common seizure type resulting from metabolic derangements and therefore frequently encountered in many different clinical setting¹.

Almost all patients with new onset seizures should have a brain imaging study to determine whether there is underlying structural abnormality that is responsible. MRI has been shown superior to CT for detection of cerebral lesions. In the patients with suspected infections or structural abnormality if MRI is not possible than CT scan should be advised¹.

Structural abnormality on neuroimaging was found in 70 patients. Gliosis, ischemia and granulomatous lesions are most common finding. EEG is abnormal in only 40 patients. EEG if done within 48 hrs of seizure, chances of abnormal EEG are higher than if done after 48 hrs. Even in individual who is known case of epilepsy, the initial routine EEG may be normal up to 60% of time. EEG was found to be normal in 55% of patients (83 out of 150 cases), and abnormal in 45% (67 out of 150), Brechet R, et al⁵.

28 patients had abnormal MRI and abnormal EEG. If both EEG and MRI scan show abnormality chances of recurrent seizures are high as compared to if both are normal.

Chi square value is 1.9449 and p value is 0.163138 which is not significant, suggestive of no association between abnormal EEG and abnormal MRI finding. OR is 1.7. This difference is also statistically not significant. The reason for this can be a long gap between dates of EEG (EEG done with a gap period of around 7 to 10 days after onset of seizure. Probability for EEG to come abnormal is more if done within 48 hours of onset

of seizure) and date of MRI (which is usually carried out immediately). If EEG can be planned within 48 hours of onset of seizure activity, may be more patients can show association between abnormal EEG and abnormal MRI findings.

Secondly our study population is very small, and more in depth studies and large multicentric studies are required to prove any association between these two parameters.

Conclusion

Thus, in the light of above facts, despite relatively less number of cases in our study, we can recommend that every case of seizures must be evaluated with EEG as well as CT scan/MRI brain as there are nearly 50% chances of finding some structural cerebral lesion, and also because EEG is a useful tool to screen out patients with seizure disorders and it may have some predictive value in determining co-existing CT/MRI abnormalities. Moreover, the evaluation of generalised seizures is not complete without a neuroimaging since most of patients with idiopathic generalised seizures also had an abnormality in CT scan/MRI, which may have therapeutic and prognostic significance.

Limitations of study:

1. Sample size is very small.
2. Because of heavy backlog for EEG in our institute, it is not possible to carry out EEG within 48 hours which is the ideal time for EEG

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