

A Cross Sectional Study to Evaluate Clinical and Imaging Profile in Patients Presenting with Seizures

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Abstract

BACKGROUND: “Epilepsy” is the condition of recurrent, unprovoked seizures. Epilepsy has numerous causes. The worldwide prevalence of active seizure is 4-10 per 1000 population. The prevalence rate in India is 5.59 per 1000. We conducted this study to evaluate clinical and imaging profile in patients presenting with seizures.

METHODOLOGY: This was a single centre hospital-based observational cross-sectional conducted in patients with seizures admitted to the department of Medicine. All patients more than 15 years of age with seizures presenting to the department and giving written informed consent were included in the study. During our study period, we got 70 cases satisfying our inclusion and exclusion criteria, so we included all 70 cases in our study. Patients with history of head injury, movement disorders, hyperventilation syndrome, syncope and psychogenic seizures were excluded.

OBSERVATIONS: There were 47 males (67.14%), mean age of participants was 52.71 ±14.16 years. 42 patients had no any addictions (60%). Sixty eight cases had GTCS type of seizure (97.14%) and one patient each (1.43%) and Partial and CPS type of seizure. 35 patients had single seizure (50%). Most common feature was past h/o seizure seen in 26 cases (37.14%) followed by headaches in 21 cases (30%). Most common Computed tomography (CT) finding was acute infarct in 7 cases (10%). 48 patients, 68.57% had normal CT findings. MRI findings shows 6 (8.57%) patients with Gliosis, followed by small vessel ischemic changes in 8 (11.43%) patients. While 49 (70%) patients had no abnormality on MRI. Majority of patients had drug Withdrawal Seizure (52.86%), followed by Cerebral-Infarct (14.29%).

CONCLUSION: More than half of the patients had single episode of seizure and rest patients had two seizure episodes, very few had three or more seizures. The most common Computed tomography finding was acute infarct (10%) followed by Gliosis (7.14%). Magnetic resonance imaging findings showed most commonly Gliosis, followed by small vessel ischemic changes. About two third of patients had normal Magnetic resonance imaging brain. Commonest etiology was drug Withdrawal Seizure.

KEYWORDS: Seizure Disorder, Etiology, Computed Tomography (CT), Magnetic Resonance Imaging (MRI)

INTRODUCTION

Seizure is defined as paroxysmal event due to abnormal excessive hypersynchronous discharges from an aggregate of CNS neurons. Although variety of factors influences the incidence and prevalence of seizure, approximately 5-10 % of population will have at least one seizure during their lifetime.¹“Epilepsy” is the condition of recurrent, unprovoked seizures. Epilepsy has numerous causes, each reflecting underlying brain dysfunction. A seizure provoked by a reversible insult (e.g., fever, hypoglycemia) does not fall under the definition of epilepsy because it is a short-lived secondary condition, not a chronic state^{2,3}. The worldwide prevalence of active seizure is 4-10 per 1000 population. The prevalence rate in India is 5.59 per 1000. There is no statistically different rates between women and men or urban and rural residence ^{4, 5}. Incidence rate varies from 38 to 49.3 per 1, 00,000 population per year from two community based studies in India Type of seizure pattern showed maximum number of cases belonged to generalized seizures, which is different from western countries where partial seizure is the commonest variety ^{6, 7}. (The proportion of generalized seizures and partial seizures was 58.8% and 30.6% respectively). The prognosis for seizure control is good and over 70% will enter remission. There is an increased risk of premature death particularly in patients with chronic epilepsy.⁸A seizure can be conceptualized as occurring when there is distortion of the normal balance between excitation (E) and inhibition (I) in the brain (Stafstrom 2010). This E/I imbalance can result from an alteration at many levels of brain function, from genes and subcellular signaling cascades to widespread neuronal circuits. The factors that alter E/I balance can be genetic or acquired.

Using a detailed history, EEG findings, and ancillary information, a physician can often categorize the seizure/epilepsy type, after which an appropriate diagnostic evaluation and treatment plan is formulated. The clinical manifestations of seizures depend on the area of cortex involved, etiology and associated medical

conditions.^{9 - 11}We conducted this study to evaluate clinical and imaging profile in patients presenting with seizures.

METHODOLOGY:

This was a single centre hospital-based observational cross-sectional conducted in patients admitted to the Medical Intensive Care Unit (MICU) and general medicine wards of our institute over a period of December 2019 to March 2021. Patients with Seizures admitted in Medical Intensive Care Unit (MICU) and general medicine wards, KIMS, Karad. All patients more than 15 years of age with seizures presenting to the department and giving written informed consent were included in the study. Patients with history of head injury, movement disorders, hyperventilation syndrome, syncope and psychogenic seizures were excluded. According to a study conducted by Nwani PO et al ¹² the prevalence of symptomatic seizures in adults was 5.2% of all the medical admissions,

Sample size of 70 was considered for the study. The data for our study was collected using a semi structured pretested questionnaire, data Collected was entered in Microsoft Excel 2013. Data was represented in frequencies and percentages, charts and graphs. Mean and standard deviation of quantitative variables is shown. Appropriate statistical tests were applied using SPSS software version 21 for analysis. Chi square test was used for association and student's t-test was used for comparison between the study variables. Statistical significance is considered at $p < 0.05$.

ETHICAL CLEARANCE:

This study was approved by IEC with certificate no-223/2019-2020 Dated -30/12/2019 taken from the institutional Ethics Committee before starting the study.

OBSERVATIONS AND RESULTS:

There were 47 males (67.14%) and 23 females (32.86%) in our study. Male: Female ratio was 2.04: 1. The most common age group was more than 60 years with 20 participants (28.57%), followed by 21-30 years with 16 participants (22.86%) and 41 to 50 years and 51 to 60 years

with 9 participants each (12.86%). We observed that 17 patients were smokers (24.29%), 16 were alcoholics (22.86%) and 15 were tobacco chewers (21.43%). 42 patients had no any addictions (60%). Sixty eight cases had GTCS type of seizure (97.14%) and one patient each (1.43%) and Partial and CPS type of seizure. [Table 1]

We observed that 35 patients had single seizure (50%), 31 patients had 2 seizures (44.29%) and 4 patients had more than or equal to 3 seizures (5.71%). Most common feature was past h/o seizure seen in 26 case (37.14%) followed by headaches in 21 cases (30%), vomiting in 15 cases (21.43%), history of hypertension in 14 cases (20%) etc. [Table 2]

We evaluated laboratory parameters of the patients and found that the mean RBS was 158.58 ± 98.31 mg/dl. The mean Blood Urea was 29.91 ± 24.66 . The mean Serum Creatinine was 1.16 ± 1.20 . Mean sodium was 135.71 ± 5.92 . Mean Potassium was 3.86 ± 0.51 . Mean calcium was 8.75 ± 0.88 . Mean total bilirubin was 0.57 ± 0.45 . Most common Computed tomography (CT) finding was acute infarct in 7 cases (10%) followed by Gliosis in 5 cases (7.14%). 48 patients, 68.57% had normal CT findings. [Table 3]

In the present study, Magnetic resonance imaging (MRI) findings shows 6 (8.57%) patients with Gliosis, followed by small vessel ischemic changes in 8(11.43%) patients. Cavernous hemangioma was present in 1 (1.43%) while 49 (70%) patients had no abnormality. [Table 4]

The distribution of etiology among patient's shows, majority of patients had drug Withdrawal Seizure (52.86%), followed by Cerebral-Infarct (14.29%), Cerebral-hemorrhage (7.14%), bacterial meningitis (4.29%) and viral meningitis in one patient. [Table 5]

In the present study, it was observed that association of type of Seizure and age shows, seizure are common in age >40 years with statistical significance. ($P < 0.05$) No significant association was seen between the types of

seizure and sex or EEG findings of the patients. ($p > 0.05$).

DISCUSSION

The present observational cross-sectional study was carried out at tertiary Institute to study the clinical and imaging profile of patients presenting with seizures. In the present study, the most common age group was more than 60 years with 20 participants (28.57%), mean age of the patients was 52.71 ± 14.16 years. We observed that association of type of Seizure and age shows, seizure are common in age >40 years with statistical significance. ($p < 0.05$) Honvar AG et al¹³ in their study with patient of seizures quoted mean age was 41.4 ± 17.25 years. ChokshiJanak et al¹⁴ in their study on seizures in adults and its clinical profile observed incidence of seizure disorder is higher in age group of 18-29 and lowest in fall in to age group of 60-69 and age >70 years. This finding was in contrast to present study. Joshi M et al in their study evaluated etiology and clinical profile of new onset seizure in adults and observed the number of patients with first seizure is more in the age group > 60 years.¹⁵ Out of 70 patients, there were 47 males (67.14%) and 23 females (32.86%) in our study. Honavar AG et al in their study on profile of adults with seizures shows there was a male predominance (63.1%).¹³ Chokshi Janak et al¹⁴ in their study on seizures in adults and its clinical profile observed prevalence of seizures in male is slightly higher in compare to female (M:F ratio 3:2). Similarly, M.M. Hirani et al¹⁶ in their study on clinical profile of new onset seizures in adults observed majority of patients were male, (66%). V Muralidhar, et al. also observed males' predominance (68%) seizures in adults.¹⁷ The type of seizure shows that out of 70 cases, 68 cases had GTCS (Generalised tonic clonic) type of seizure (97.14%) and one patient each (1.43%) and Partial and CPS type of seizure. ChokshiJanak et al¹⁴ in their study on seizures in adults and its clinical profile observed generalized tonic-clonic seizure is main seizure type (64%) followed by Focal seizures. (36%) Similarly, Sempere, et al.¹⁸ also observed that generalized tonic-clonic seizure (68.7%) is the major type of seizures in adults.

In the present study, it was observed that 35 patients had single seizure (50%), 31 patients had 2 seizures (44.29%) and 4 patients had more than or equal to 3 seizures (5.71%). It was observed that most common feature was past h/o seizure and fever seen each in 26 cases (37.14%) followed by headaches in 21 cases (30%), vomiting in 15 cases (21.43%), history of hypertension in 14 cases (20%) etc. In the present study, it was observed that, Chest radiogram findings was normal in all the cases (100%). The most common Computed tomography (CT) finding was acute infarct in 7 cases (10%) followed by Gliosis in 5 cases (7.14%). Honavar AG et al¹³ in their study on profile of adults with seizures observed Computed tomography (CT) brain was normal in 64% of patients and the radiological findings include infarct (11%), mass lesions (7%) and hemorrhage (6%) This finding was in accordance to present study. ChokshiJanak et al¹⁴ in their study on seizures in adults observed Computed tomography (CT) brain findings was normal in 76% of patients and abnormal findings include large infarct (8%), Sub arachnoid hemorrhage (6%) and glioma (2%) Similarly, Salinsky M et al¹⁹ in their study on neuroimaging for epileptic seizures observed two-thirds of Computed tomography (CT) scans were reported normal.

In the present study, Magnetic resonance imaging (MRI) findings shows 6 (8.57%) patients with Gliosis, followed by small vessel ischemic changes in 8 (11.43%) patients. Cavernous hemangioma was present in 1 (1.43%) while 49 (70%) patients had no abnormality. Honavar AG et al¹³ in their study on profile of adults with seizures observed Magnetic resonance imaging (MRI) brain was normal in 43% of patients and the radiological findings include infarct (17%), mass lesions (14%) and hemarrhoage (4%) This finding was in accordance to present study. The distribution of etiology among patients shows, majority of patients had drug Withdrawal Seizure (52.86%), followed by CVA-Infarct (14.29%), CVA-hemorrhage (7.14%) and meningitis (4.29%). Honavar AG et al¹³ in their study on profile of adults with seizures observed etiology as 41% of the patients had new-onset seizures

with common etiologies being idiopathic seizure disorder (22.6%), metabolic causes (17.9%), and acute febrile illness (14.4%) ChokshiJanak et al¹⁴ in their study on seizures in adults idiopathic seizure was commonest followed by CNS infection, that includes Neurocysticercosis, brain Tuberculoma. After that etiology in descending order is venous sinus thrombosis, post stroke seizures, postpartum, MTLE, metabolic. After 50 years of age chance of post stroke epilepsy increases. Seizure disorder is a one of major health problem in adults mostly in late adulthood in which chances of seizures are increased especially due to comorbidities like cerebrovascular stroke, degenerative disease of brain, and brain tumour. In young adult patient main etiology of seizures were CNS Infection that includes brain Tuberculoma and Neurocysticercosis and other brain infection. With the help of newer neuro-imaging modalities and EEG (electroencephalogram) it is possible to find out specific etiology of seizure, so EEG (electroencephalogram) and imaging study should be integral part of investigation work of patient with seizure disorder.^{5, 6} The development of adequate primary care systems is the need of the hour. Further steps include the use of home-based approaches, which primary healthcare workers are in a uniquely qualified position to deliver. A developing country like India, where healthcare facilities are few and far between to access, needs to improve its healthcare system, particularly at the primary care level. Increased knowledge among primary healthcare physicians of the common reversible and easily treatable causes of seizures could go a long way in improving its outcome at a community level. It would also help the direct relevant investigation and focused management in resource-strapped settings.^{6, 20, 21} The study has certain limitations. As it was conducted at a single medical centre, the patient population may be biased by patient selection and referral pattern.

CONCLUSION

Generalized tonic clonic seizures was the most common type of seizure (97.14%) cases followed by Partial and complex partial type of seizures. More than half of the patients had

single episode of seizure and rest patients had two seizure episodes, very few had three or more seizures. The most common computerized tomography finding was acute infarct (10%) followed by Gliosis (7.14%). Magnetic resonance imaging findings showed most commonly Gliosis, followed by small vessel ischemic changes. About two third of patients had normal Magnetic resonance imaging brain. Commonest etiology was drug Withdrawal Seizure followed by cerebral Infarction and cerebral haemorrhage. Present study concludes that older patients and patients with history of addictions, drug withdrawal, Cerebral infarction and cerebral haemorrhage should be anticipated for seizures and prompt evaluation, diagnosis and treatment should be started, as and when required.

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TABLES

Table 1: Distribution of study populations according to different types of Seizures

Type of Seizure	No. of Patients (n=70)	Percent
GTCS	68	97.14%
Partial	01	1.43%
CPS	01	1.43%
Total	70	100%

Table 2: Distribution of patients with seizures according to clinical features:

Clinical features	No. of Patients (n=70)	Percent
Headache	21	30.00%
Vomiting	15	21.43%
Past H/o seizure	26	37.14%
Past H/o Hypertension	14	20.00%
Past H/o DM	11	15.71%
Past H/o CVA	08	11.43%
Fever	06	8.57%
CNS (Unconsciousness)	04	5.71%
Others	04	5.71%

Table 3: Distribution of study populations with seizures according to (CT:

Computed tomography (CT) findings	No. of Patients (n=70)	Percent
Acute infarct	07	10.00%
Chronic Infarct	01	1.43%
Lacunar Infarct	02	2.86%
Subacute Infarct	01	1.43%
Calcification	01	1.43%
Diffuse Cortical Atrophy	01	1.43%
Gliosis	05	7.14%
Intracerebral Hemorrhage	02	2.86%
Subarachnoid Hemorrhage	01	1.43%
Subdural Hemorrhage	01	1.43%
No abnormality	48	68.57%
Total	70	100.00%

Table 4: Distribution of study populations with seizures according to Magnetic resonance imaging (MRI) findings

Magnetic resonance imaging findings	No. of Patients (n=70)	Percent
Gliosis	06	8.57%
Cavernous Hemangioma	01	1.43%
Postictal Edema	01	1.43%
Corpus Callosum Agenesis	01	1.43%
Lacunar Infarct	01	1.43%
Hypoplasia	01	1.43%
Sagittal Sinus Thrombosis	02	2.86%
Small Vessel Ischemic Changes	08	11.43%
No abnormality	49	70.00%

Table 5: Distribution of study populations with seizures according to etiology

Etiology	No. of Patients (n=70)	Percent
Drug Withdrawal Seizure	37	52.86%
Cerebral- Infarct	10	14.29%
Cerebral-Hemorrhage	05	7.14%
Meningitis	03	4.29%
Sagittal Sinus Thrombosis	02	2.86%
Epilepsy	01	1.43%
Hypoglycemia Induced Seizure	01	1.43%
Hyponatremia Induced Seizure	01	1.43%
Post-Partum Eclampsia	02	2.86%
Scar Epilepsy	01	1.43%
Seizure Secondary to Brain Metastasis	01	1.43%
Seizure Secondary to Hamartoma	01	1.43%
Subarachnoid Hemorrhage	01	1.43%
Uremic Encephalopathy	01	1.43%