



A Study of Profile of Seizures in Intensive Care Unit Patients of a Tertiary Care Hospital

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Abstract

Background: Seizures are a common Neurological complication in Medical and post-surgical patients admitted to the Intensive care unit resulting in significant morbidity and mortality. The present study aimed to study the clinical profile of seizures in Intensive care unit patients. **Methods:** This prospective study was conducted in the Intensive care unit of Prathima Institute of Medical Sciences, Naganoor, Karimnagar. N=50 Patients were admitted patients who had seizures developed during their stay in ICU over a period of 2 months were included. **Results:** the commonest one in 26% of cases followed by Medication-related as well as idiopathic in 20% cases. In infective cases, out of n=13 cases, septic encephalopathy was found in n=6 cases and Neurocysticercosis was found in 4 cases, Meningoencephalitis in n=1 case, cerebral malaria in n=2 cases. Out of n=10 cases of the medication-related subtherapeutic drug, levels were found in n=7 cases AED withdrawal in n=2 cases and cefepime induced in n=1 case. **Conclusion:** the occurrence of seizures is more common among the younger < 40 years aged patients admitted in ICU. Most of the seizures were new-onset seizures. The commonest cause of seizures was neuroinfections. Generalized Tonic-Clonic Seizures were the most common type of seizure and patients with status epilepticus generally tend to have a poor prognosis.

Keywords: Intensive care unit, Generalized Seizures, Simple Partial Seizures, Complex

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Date of Acceptance: 03/09/2021

Introduction

Seizures are a very common neurologic complication in ICU patients, postsurgical patients and commonly arise from coexisting conditions associated with a critical illness. The number of situations in which seizures are precipitated, particularly in an intensive care unit (ICU) setting, recapitulates the systems of the body and how their altered functions affect the nervous system (and other systems).^[1] The brain responds to extreme malfunction of any system in a variety of ways, one of which is almost always the possibility of seizure. Understanding the way this might occur, and the

many approaches to diagnosis and treatment are critical to progress in intensive care. Regardless of seizure type, the medical management in an ICU and the environment itself, unfortunately, present unique challenges and difficulties regarding the etiology, diagnosis, and treatment of seizures. Patients are critically ill, and the common scenario of multisystem organ dysfunction presents a variety of potential etiologies for cerebral disturbance, often predisposing to seizures. Also, hindering the neurological examination are treatment with sedatives, to provide comfort to the patient, and administration of paralytic agents to optimize therapy.^[2] Medications used in an ICU, particularly psychotropic medications,

antibiotics, and stimulants, may also lower the seizure threshold. [3,4] Anticonvulsants and other medications may alternatively sedate the patient or enhance toxic responses, further delaying neurological recovery from the seizure episode. [5] Such difficulties may lead to additional diagnostic studies and prolongation of ICU stay. Seizures may be accompanied by conditions that render the patient into a coma, such as severe encephalopathy, trauma, or stroke. [6-11] Recurrent or continuous seizure activity may prevent arousal, and in such cases, EEG assessment is necessary for correct diagnosis. More seriously, recurrent seizures and SE are more difficult to suppress than simple focal or generalized convulsions and can be life-threatening when they occur as complications of primary neurological or other visceral organ diseases. Finally, the ICU itself is an area with considerable electrical field dispersion, often preventing optimal EEG recording. The need to diagnose and effectively treat recurrent seizure activity is imperative. Multiple seizure events or convulsive SE may lead to acidosis, hyperthermia, rhabdomyolysis, pulmonary aspiration, ventilatory support, and trauma, with consequent higher morbidity and mortality and prolonged ICU stay. [12] This study was conducted to study the complete profile of seizures occurring in ICU, identifying the etiological factors and the outcome.

Materials and Methods

This Cross-sectional study was conducted in the ICU of Prathima Institute of Medical Sciences, Naganoor, Karimnagar. Institutional Ethical Committee approval was obtained for this study. Consent was obtained from the relative or guardian of the patient included in the study after explaining the nature of the study.

Inclusion Criteria

1. Patients developing seizures in ICU
2. Patients admitted to ICU with seizures
3. 18 years of age
4. Patients admitted to ICU with seizures

Exclusion Criteria

1. Patients less than 18 years of age
2. Patients with Head injury and Patients who have undergone neurosurgical procedures.
3. Patients with Non-convulsive seizures and Non-convulsive status epilepticus

Based on the inclusion and exclusion criteria during the study period, n=50 cases were identified and included in the study. A detailed history including the history of past illnesses was obtained. The history of the seizure was categorized based on witness presentation clinical findings. A complete clinical examination was done. The Investigations included Complete Blood Count, Random Blood Sugar, Renal Function Tests, Serum Electrolytes (Na, K, Ca, Mg), Liver Function Tests, Chest X-Ray, CSF, EEG, Imaging: CT Brain /MRI Brain, Toxicology work-up (if required). All the available data was uploaded on an MS Excel spreadsheet and analyzed by SPSS version 19 on Windows format for descriptive and analytical statistics.

Results

Out of the total n=50 cases included in the study n=34(68%), were male and n=18(32%) Based on the age-wise grouping of the cases as depicted in table 1 a critical analysis of table reveals that 50% of cases were younger aged individuals from 18 – 30 years. And if the total from 18 years to 50 years age group had 72% of cases of the study. The mean age of the patients was 37.5 years.

Table 1: Age-wise distribution

Age in Years	Male	Female	Total (%)
18-30	10	03	13 (26)
31-40	07	05	12 (24)
41-50	07	04	11 (22)
51-60	05	02	07 (14)
61-70	02	01	03 (06)
71-80	02	01	03 (06)
> 80	01	00	01 (02)
Total	34	16	50 (100)

Table 2: Existing Comorbidities

Comorbidities	Frequency	Percentage
Hypertension	12	24
Diabetes Mellitus	10	20
Cerebrovascular Accidents	02	04
Ischemic Heart Disease	03	06
BA/COPD	00	00
Chronic Kidney Disease	01	02
Others	03	06

Existing comorbidities were reported in 62% of cases depicted in table 2. The most common comorbidity was hypertension in 24% of cases followed by Diabetes Mellitus in 20% of cases. Ischemic heart disease (migraine and arthritis) was found in 6% of cases respectively. Based on the type of seizures the most common type of seizure detected was Generalized Tonic-Clonic Seizure (GTCS) in 80% of cases and Partial seizures with Secondary generalization were detected in 12% and other types of seizures have been shown in (table 3). New-onset seizures were found in 60% of cases and 40% were cases with recurrence. In this study, single seizures were found in 64% of cases followed by seizure clusters were found in 30% of cases and 6% were cases of status epilepticus.

Table 3: Type of Seizure

Type of seizure	Frequency	Percentage
GTCS	40	80
Partial seizure with Secondary generalization	6	12
PS	1	2
Myoclonic jerks	2	4
Status Epilepticus	1	2

The etiology of seizures is given in table 4 which shows that infective etiology is the commonest one in 26% of cases followed by Medication-related as well as idiopathic in 20% of cases. In infective cases, out of n=13 cases, septic encephalopathy was found in n=6 cases and Neurocysticercosis was found in 4 cases, Meningoencephalitis in n=1 cases, cerebral malaria in n=2 cases. Out of n=10 cases of the medication-related subtherapeutic drug, levels were found in n=7 cases AED withdrawal in n=2 cases and cefepime induced in n=1 cases. Cerebrovascular accidents were the cause in n=8 cases out of which infarction was found in 5 cases and cortical thrombosis in n=2 cases and hemorrhage in n=1 case. Out of n=7 metabolic and alcohol-related cases, n=3 were hyponatremia and alcohol-related and n=1 case was due to hypoglycemia.

Table 4: Etiology of Seizures

Etiology	N	%
Infective	13	26
Medication-Related	10	20
CVA	8	16
Idiopathic	10	20
Metabolic & Alcohol	7	14
Others	2	04

Discussion

The incidence of seizures in ICU varies widely it has been reported as low as 3.3% to as high as 34%. Determining the approach to isolated or multiple seizures depends on reported history and clinical assessment as well as electroencephalogram (EEG) and supportive testing. A good history of prior seizures, epilepsy, and antiepileptic drugs (AED) is very helpful but is commonly not available to the ICU team. Since patients in ICU are often intubated and sedated, hence accurate history is not available most of the time. In the current study, we found the majority of patients between age group 18 – 40 years 50% of the cases with the mean age of 37.5 years. Sander et al.,^[13] in a similar study in the United Kingdom found 51% of cases aged in the 3rd and 4th decade. Narayanan JT et al.,^[14] in a study in Hyderabad, India found the mean age of 49 years, and 36% of the cases were > 60 years old. New-onset seizures were found in 60% of cases and 40% were cases with recurrence. In this study, single seizures were found in 64% of cases followed by seizure clusters were found in 30% of cases and 6% were cases of status epilepticus. Narayanan JT et al.,^[14] study found n=52(79%) patients with single seizure, n=10(15%) patients had seizure cluster, and n=4(6%) patients with SE in close approximation with our observations. In this study, we found Generalized Tonic-Clonic Seizure (GTCS) in 80% of cases, and partial seizures with secondary generalization were detected in 12%, Partial seizures in 2%, Myoclonic jerks in 4%, and status epilepticus in 2% cases. GTCS were the common type of seizures as observed in other studies by Murthy et al.,^[15] Mirski et al.,^[2] Tiamkao S et al.,^[16] Like most of the studies in developing nations, in our study Infections was the most common Etiological/precipitating factor occurring in n=13(26%) patients' medication-related n=10(20%), and Cerebrovascular accidents accounted for n=8(16%) patients each. n=7(14%) patients had Metabolic and Alcohol-related causes, and Idiopathic was in n=10(20%) patients. Of the infective cases, septic encephalopathy was found in n=6 cases Sander et al.,^[13] found Neuroinfection in 2% of the patients in ICU with seizures. Annegers JF

et al.,^[17] found 15% cases of neuroinfections in cases of ICU patients. Narayanan JT et al.,^[14] found 32% of cases with neuroinfections. It has been shown that the most common etiological cause or precipitating factor in developing nations is infections. sepsis with encephalopathy was the commonest rather than Neuroinfections per se indicating the complex factors involved in sepsis with associated multiorgan dysfunction and therapeutic medications decreasing seizure threshold in such patients. Among the medication-related factors, we found Out of n=10 cases of medication-related subtherapeutic drug levels were found in n=7 cases AED withdrawal in n=2 cases and cefepime induced in n=1 case. Krumholz A et al.,^[18] found 56.5% of patients with subtherapeutic AED levels and Huff JS et al.,^[19] reported 49% cases of seizures due to subtherapeutic AED levels. Tiamkao S et al.,^[16] Low AED level was the main precipitating factor. Out of n=7 metabolic and alcohol-related causes. N=3 were hyponatremia and alcohol-related and n=1 case was due to hypoglycemia. Alcohol-related seizures occurred in 9% of the patients in Sander et al.,^[13] study and 11% in Annegers JF et al.,^[17] Status Epilepticus occurred in 2 patients and n=1 expired.

Conclusion

Within the limitations of the current study, it can be concluded that the occurrence of seizures is more common among the younger < 40 years aged patients admitted in ICU. Most of the seizures were new-onset seizures. The commonest cause of seizures was neuroinfections. Generalized tonic-clonic seizures were the most common type of seizure and patients with status epilepticus generally tend to have a poor prognosis.

Conflict of Interest: None
Source of support: Nil
Ethical Permission: Obtained

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