Exploring the Diverse Etiological Landscape of epileptic Seizures in the adults admitted in tertiary care centre: A cross-sectional study

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Abstract

Introduction: The knowledge of etiological spectrum of adult-onset seizures is important because of their frequent association with secondary causes. The present study was designed to explore the clinical and etiological spectrum of seizures in adults admitted to a tertiary care centre.

Materials and Methods: We conducted a cross-sectional, hospital-based study on the adult patients admitted to a tertiary care centre with seizures from June 2022 to February 2024.

Results: The mean age of the study population was 37.2 ± 7.7 years (range: 18–86 years), and 65.4% (68) of cases were men. The most common seizure type was focal to bilateral tonic- clonic seizure in 61.5% (64) of cases. Among them, 50% (52) were of acute symptomatic seizures, 38.8% (32) cases were of convulsive status epilepticus (CSE), and 19% (20) cases were of epilepsy. Amid the CSE cases, 56.2% (18) cases presented with new-onset CSE. Overall, the most common etiologies in adults were CNS infection in 52% (54), stroke in 17.3% (18), and post-traumatic 11.5% (12), followed by metabolic causes in 7.7% (8) of cases.

Conclusion : Acute-symptomatic seizures and CSE in adults' patients were found to be mostly related to CNS infections and strokes. The present study highlights the significance of promptly identifying and addressing these underlying disorders.

Key Words: Acute symptomatic seizures; CSE; Epilepsy; Epileptic seizures.

Introduction

Epileptic seizures are a complex and multidimensional neurological disease characterized by short bursts of abnormal electrical activity in the brain. Seizures can manifest clinically in a variety of ways, ranging from brief lapses in consciousness to prolonged convulsions that have a significant impact on the quality of life of individuals affected.[1] The presence of co-morbid conditions, variations in forms of seizure, and varying treatment responses all add to the complexity of epileptic seizures in adults. Genetic vulnerability, structural brain abnormalities, metabolic diseases, and infections are all potential causes of seizures. External factors such as substance abuse and severe brain damage worsen the clinical picture.[2]Additionally, decisions about the start and stop of medication must be made differently for adult patients due to the etiology and clinical characteristics of seizures.[3]

The goal of this study is to look into the causes of epileptic seizures in adults in hospitalised patients in a tertiary care setting, with an emphasis on the prevalence of various causes, demographic correlations, and clinical implications. By identifying the primary etiological factors and their implications, this study intends to improve diagnostic and therapy choices, ultimately improving patient care and outcomes in this challenging and complex disorder. The outcomes of this study are expected to expand our understanding of the complexities of epilepsy and provide insights into more targeted and effective adult epilepsy management strategies.

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Material and Methods

We conducted a cross-sectional, hospital-based prospective study on adult (≥18 years of age) patients admitted in the neurology ward of a tertiary care centre.

Inclusion criteria: Adult patients admitted either with epilepsy or epileptic seizure, convulsive status epilepticus (CSE), or experienced epileptic seizure after being admitted for other neurological disorders were included.

Exclusion criteria: Patients with nonconvulsive status epilepticus or pseudo-seizures were excluded.

Patients were divided into three groups based on: epilepsy, acute symptomatic seizures, and CSE [new-onset CSE (NOCSE)] or with pre-existing epilepsy].

Epilepsy is defined as a condition characterized by two or more unprovoked seizures occurring 24 hours apart. The diagnosis of epilepsy and epileptic seizures was established under the guidelines of the 2017 International League Against Epilepsy.[4] CSE is defined as continuous seizure activity or two or more discrete seizures between which there is incomplete recovery of consciousness lasting ≥5 min. [5]

Acute-symptomatic seizures are defined as clinical seizures that occur in close temporal correlation with an acute insult to the central nervous system (CNS). These insults can be vascular, metabolic, toxic, structural, infectious, or inflammatory.[6]

Demographic data: age, gender, seizure description, duration of epilepsy, circumstances of seizures, duration and aetiology of seizures, neurological findings, treatment and duration of hospital stay were recorded. The investigative data included laboratory tests (e.g., blood gas analysis, blood glucose, electrolyte levels, liver, renal function tests and CSF examination). Patients underwent electroencephalography (EEG) using a Nihon Kohden equipment. The recordings were meticulously examined for abnormalities. Computed tomography (CT) of the head was used in all cases and contrast-enhanced CT and 1.5 Tesla MRI with standard epilepsy protocol was performed if needed. Besides these, patients underwent evaluation with chest X-ray, ultrasound abdomen and echocardiography wherever considered necessary.

Statistical analysis: Data being collected, stored, cleaned, and entered into an Excel sheet. And were analysed with the help of IBM SPSS v. 25. Coding of different variables was done and results were displayed in the form of percentages.

Results

During the study period, 104 cases were recruited.

Age and gender

The mean age of the study population was 37.1 ± 7.7 years (range: 18–86 years); 65.4% (68) were men. The majority 67.3% (70) of cases were under 40 years, and 11.5% (12) were over 60 years old. 91% of cases belong to the lower middle and lower socioeconomic classes.

Seizure semiology

The most common seizure type was focal to bilateral tonic clonic seizure in 61.5% (64) of cases, followed by tonic-clonic seizures in 23% (24) of cases. The demographic and clinical characteristics of patients are shown in Table 1.

Among them, 50% (52) cases were of acute symptomatic seizures, 38.8% (32) cases were of CSE, and 19.2% (20) cases were of epilepsy. Amid the CSE cases, 56.2% (18) cases presented with NOCSE.

Aetiology Overall, the most common etiologies in adults were CNS infection in 52% (54), followed by stroke in 17.3% (18), post-traumatic in 11.5% (12), and metabolic causes in 7.7% (8) of cases (Table 2). In cases of acute symptomatic seizures, CNS infection 76.8% (meningoencephalitis in 34.7% (18) and NCC in 27% (14) cases,) followed by metabolic 15.2% (hyperglycemia, hypocalcaemia, alcohol), and stroke 7.6% were important etiologies. Among CSE cases, the important etiologies were old infarct in 25% (8) cases, posttraumatic lesion in 25% (8) cases, and a calcified lesion in 18.7% (6) cases. Table 3

Age-wise distribution Common aetiologies in the elderly were stroke and CNS infection in adults. Table: 4 Etiological spectrum of new onset seizures in various studies

EEG

EEG was done on 82.6% (86) patients and was abnormal in 43.6% (45) cases. 19.2% (20) cases showed epileptiform (spike wave, polyspike wave, or sharp wave) discharge, and 24% (25) cases showed focal or generalized slowing.

Discussion

In the present study the most common seizure presentation in adult admitted patients were acute symptomatic seizures in 50 % (52) of cases, followed by CSE in 31 % (32) cases, and epilepsy in19 % (20) cases.

In the current study 67.3% of patients were aged below 40 years. Similarly different studies has demonstrated that highest proportion of patients were aged less than 40 years i.e Kaur et al.(47%) 7 , Chalasani et al.(46.9%)8 , Muralidhar et al.(64%)9, Hirani et al. (54%) 10 , and Saha et al. (40%).[11]

Focal to bilateral tonic clonic seizure were the predominant seizure type present in majority of cases 62 %. In contrast other studies had reported generalized tonic–clonic seizures in majority of cases ranges from 55- 70 %. [12,13,14] In the adults most of seizures are due to secondary causes. This contrast in our study may be due to increased ease with which seizure semiology can be localized and lateralized when ictal events are recorded on mobile cameras.

In our study 50% of cases were of acute symptomatic seizures. Majority of cases were adult and the most common aetiology was CNS infections in 77.1 % of cases. Among the infection meningoencephalitis and neurocysticercosis were the most common causes of CNS infections, with 34.7% and 27% of cases, respectively. The high frequency of viral causes emphasizes the critical role infections play in the aetiology of seizures among the adults. In addition, tuberculoma and tuberculous meningitis (TBM) accounted for 15.4 % of cases. These findings are consistent with previous research, which has shown that infections are a primary cause of acute symptomatic seizures in endemic locations.

CNS infections are the major cause of new-onset seizures and acquired epilepsy in the developing world.15 Quraishi et al.[16] observed that the most common causes of adult-onset seizures were CNS infections (38%), stroke (30%), and idiopathic (20%).

A Mexican study reported neurocysticercosis as the cause in 50% of their participants.[17] Vemulapalli et al. conducted a study on acute symptomatic seizures in a tertiary care hospital by analyzing the data of 138 patients over two years. They found that stroke and neuroinfections were the primary causes of acute symptomatic seizures. This highlights how important it is to quickly diagnose and treat conditions like neuroinfections and stroke in acute symptomatic seizures [18]. Kaur et al. reported that strokes are the most common cause, followed by idiopathic and CNS infections. [7]

In our group, stroke accounted for 17% of cases, as the maximum cases was below 40 years old, and elderly, where only 11.6% of cases, as stroke is a common etiology in the elderly population. Metabolic disorders were found to be the cause in 7.6% of instances; hypocalcemia and hyperglycemia were the initial causes. These results demonstrate that timely identification and treatment of metabolic abnormalities is necessary for the management of new-onset seizures. There have been four occurrences of alcohol-related seizures reported, underscoring the significance of alcohol as a seizure trigger in adults. Similarly, in another study Mahmoud et al. reported, 11% of patients had acute symptomatic seizures due to metabolic causes. Five patients were diagnosed with hypocalcemia; three patients had hyperglycemia; one patient had uremia; and one patient had hyponatremia.[19] Sivakumaran K et al. reported the commonest etiology of new-onset seizures were metabolic causes (41%), cerebrovascular diseases (32%), and alcohol-related seizures (10%).[20] In another study the most common causes of new-onset seizures in younger patients were CNS infections such as tubercular and pyogenic meningitis and cerebral malaria are whereas in elderly patients, stroke was the leading cause.[21]

In our study, 30.8% of cases presented with CSE. The etiologies related to it were old infarcts, post-traumatic lesions, and calcified lesions. In another study, CNS infection and anti-seizure medication noncompliance were identified as the major causes of CSE in adults. [22] According

to Kaur et al., 17% of patients had SE, with metabolic disorders accounting for the most common cause (35.3%), followed by stroke (17.5%), CNS infections (11.8%), and brain tumors (11.8%). 7Similar results were also observed by Narayanan and Murthy. [13]

Overall, this study highlights the diverse etiological landscape of acute symptomatic seizures and CSE in admitted adult cases. Significant risks included CNS infections, stroke, post-traumatic, post traumatic and metabolic-related seizures, emphasizing the importance of detecting and treating these underlying disorders as soon as possible. And it also underscores the necessity for a multidisciplinary approach to their diagnosis and management.

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