

**Analysis of Risk Factors and Clinical Presentation of Acute Symptomatic Seizures in Adults**Harish Sagar Kotla<sup>1</sup>, S Sathish Kumar<sup>2</sup>, J Ravikiran<sup>3</sup>, Kukatla Sadhashiv<sup>4</sup><sup>1</sup>Assistant Professor, Department of General Medicine, Government Medical College and Hospital, Wanaparthy, Telangana State<sup>2</sup>Assistant Professor, Department of General Medicine, Government Medical College and Hospital, Wanaparthy, Telangana State.<sup>3</sup>Assistant Professor, Department of General Medicine, Government Medical College and Hospital, Wanaparthy, Telangana State.<sup>4</sup>Associate Professor, Department of General Medicine, Government Medical College and Hospital, Wanaparthy, Telangana State.

Received: 25-02-2024 / Revised: 23-03-2024 / Accepted: 25-04-2024

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Conflict of interest: Nil

**Abstract:****Background:** A seizure is a sudden episode resulting from abnormal, excessive, or unsynchronized neuronal activity in the brain. Seizures can be classified as either acute symptomatic or unprovoked. Misclassifying acute symptomatic seizures as unprovoked is common due to similar age distribution and occurrence rates. Correct classification and identification of the underlying cause are vital because they influence therapeutic management, the risk of developing epilepsy, and mortality rates.**Methods:** This study included patients admitted to wards or presenting at casualty/OPD in Govt Medical College and Hospital, Wanaparthy, Telangana State with initial onset seizures, adhering to specific inclusion and exclusion criteria. Participants' demographic, social, and medical information was documented on a proforma sheet. Patients underwent neuroimaging studies, EEG, and other essential blood tests. In all instances, the type of seizure was categorized according to the ILAE Classification of 2017.**Results:** A total of 50 cases of new adult-onset seizures were reported in the duration of the study. Seizures were noted across a range of ages, peaking between 41 and 60 years with a slight male predominance. Generalized seizures were reported in 94% of cases and focal seizures in 4% of cases. Neurological causes like cerebral venous thrombosis and stroke were found in 56% of cases, while non-neurological factors like alcohol withdrawal accounted for 30%. The cause remained unidentified in 14% of cases.**Conclusion:** Accurate diagnosis and proper management are crucial to prevent future seizures and improve patients' quality of life. By taking a detailed medical history, conducting a thorough clinical examination, and utilizing available diagnostic tools, we can effectively determine the underlying cause and tailor treatment accordingly. This comprehensive approach can significantly reduce the morbidity and mortality associated with epilepsy.**Keywords:** Adult onset seizures, Generalised seizures, Focal seizures, acute seizures, Neurological causes.

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**Introduction**

The term "seizure" originates from the Latin word "Sacire," which means 'to take possession of.' Seizure disorders, commonly encountered in various medical settings worldwide, require prompt attention and treatment to address potentially harmful underlying causes. Epilepsy, a common seizure disorder, can generally be classified into idiopathic and symptomatic categories. Idiopathic epilepsies, which are not linked to brain lesions or neurological defects, tend to be self-limiting and usually respond well to antiepileptic medications. According to a recent recommendation by the International League Against Epilepsy (ILAE), an

acute symptomatic seizure is defined as a clinical seizure that occurs in close temporal association with an acute central nervous system insult, which could be metabolic, toxic, infectious, or inflammatory in nature [1]. Annually, about 150,000 adults in the United States present with a first seizure, often as an acute manifestation of such insults, and these seizures typically do not recur once the underlying issue is resolved [2]. Globally, 70 million people suffer from seizures, with nearly 12 million residing in India; this represents about one-sixth of the worldwide burden [3]. The overall incidence rate is reported to be between 0.2 and 0.6

per 1,000 population annually [4]. Seizures are among the most common neurological conditions, significantly impacting individuals, families, and healthcare systems due to their frequency [5]. The cumulative lifetime incidence of single and recurrent epileptic seizures, including febrile seizures, is estimated to be between 5-10%. Epileptic seizures account for 1% of hospital admissions and 3% of visits to emergency departments [6]. Accurately identifying the type of seizure experienced is critical for directing the diagnostic process toward specific causes, choosing the correct treatment, and offering crucial information about the prognosis. It has also been noted that there are no significant hospital-based cross-sectional studies assessing the clinical and etiological profiles of new-onset seizures in adults from developing countries. This study aimed to explore the clinical characteristics of new-onset seizures in adults aged 19 and above at a tertiary care teaching hospital, to categorize seizures according to the 2010 ILAE classification, and to ascertain the underlying causes of these new-onset seizures in adults.

#### Material and Methods

This cross-sectional study was conducted in the Department of General Medicine, Government Medical College, and Hospital, Wanaparthi, Telangana State. Institutional Ethical approval was obtained for the study after duly following the proforma for human research as per the Helsinki Declaration. Written consent was obtained from all the participants of the study after explaining the nature of the study in the vernacular language. The samples were collected by convenience sampling method.

**Inclusion Criteria:** This study included participants aged 19 and older who presented with new onset seizures as evidenced by history and demonstrated EEG abnormalities. Only those who provided valid informed consent were eligible.

**Exclusion Criteria:** Individuals with a previous history of seizures or those experiencing pregnancy and postpartum seizures were excluded from the study.

**Procedure:** Participants were thoroughly briefed about the study's procedure before proceeding with the interview schedule. All eligible participants were interviewed according to a predefined

proforma, and a detailed clinical examination was conducted. Data on demographics, social, and medical details were collected using a proforma sheet. Participants underwent an EEG, along with other necessary blood tests. The type of seizure was classified based on the International League Against Epilepsy (ILAE) classification, using descriptions provided by patients or their attendants. The etiology of the seizures was determined through medical history, neurological examinations, EEG, and neuroimaging studies. All data collected were systematically recorded and analyzed.

#### Laboratory and Diagnostic Parameters Analyzed:

The following parameters were analyzed: complete blood count, random blood sugar, renal function tests, liver function tests, serum electrolytes, brain computed tomography (plain and contrast as required), electroencephalogram, cerebrospinal fluid analysis, magnetic resonance imaging of the brain, and arterial blood gas analysis, depending on clinical needs.

**Statistical Analysis:** Data analysis was conducted using SPSS software version 21.0 (IBM SPSS, US), equipped with regression modules. Descriptive statistics were reported as mean, standard deviation, and percentages for continuous variables. The categorical variables were calculated by the Chi-square test/Fisher exact test. The values were used to determine associations, with a significance level set at  $p < 0.05$ .

#### Results

A total of 50 cases of new adult-onset seizures were included in the study. Table 1 describes the age distribution of 50 patients included in a study on new-onset seizures. The 41-50-year-old age group represents the most prevalent demographic (32%), followed closely by the 51-60-year-old group (30%). Seizures were observed across a broad range of ages, from 18 to over 60 years old however more common in the older age group (>45 years) as compared to the younger age group population. There seems to be a slight male predominance (35 males vs. 15 females) in the overall study population. This suggests that new-onset seizures can occur at various stages of life, with a potential peak incidence between 41 and 60 years old.

**Table 1: Showing the distribution of 50 cases of new-onset seizures included in the study**

Age group in years	Frequency		Total (%)
	Male	Female	
18 – 20	1	0	1 (2%)
21 – 30	3	0	3 (6%)
31 – 40	4	3	7 (14%)
41 - 50	10	6	16 (32%)
51 - 60	11	4	15 (30%)
> 60	6	2	8 (16%)
Total	35	15	50(100)

Seizure Semiology: In our study, the most prevalent seizure type observed was generalized, occurring in 94% of cases, while focal seizures made up about 6%. The majority of seizures lasted between 2.1 and 3.02 minutes. 40% of patients experienced a single seizure episode, while 2% of cases presented with status epilepticus.

Table 2 details the frequency and percentage of various symptoms reported among the 50 patients with new-onset seizures included in the study. *Most Frequent:* Tongue biting (52%) emerged as the most common symptom, followed by headache

(12%) and urinary incontinence (20%). *Less Frequent:* Temporary confusion (10%), loss of consciousness (4%), focal deficits (weakness or sensory changes in a specific body part) (2%), fear/anxiety (10%). The presence of tongue biting in over half the cases suggests potential motor involvement during the seizures for a significant portion of patients. Urinary incontinence and temporary confusion are also notable symptoms experienced by some individuals. The low occurrence of loss of consciousness (aura or blackout) might not be representative of the entire new-onset seizure population.

**Table 2: showing the frequency of symptoms reported in 50 cases of new-onset seizures**

Symptom	Frequency	Percentage
Headache	6	16
Temporary confusion	5	10
Loss of consciousness	2	4
Tongue bite	26	52
Urinary incontinence	10	20
Focal deficits	1	2
Fear/Anxiety	5	10

Table 2 explores the past medical history of the 50 adult patients included in the study on new-onset seizures. *High Prevalence:* Hypertension (high blood pressure) was the most prevalent pre-existing condition, affecting 40% of the patients. Diabetes Mellitus (diabetes) was identified in 32% of the cases. Substance abuse of alcohol/tobacco was also present in 40% of the patients. *Lower Prevalence:* Other medical conditions like a history of stroke (cerebrovascular accident, CVA) were reported in

14% of cases. Retroviral disease (likely HIV) was identified in 6%. Head injury history and tuberculosis were both present in only 4% of the cases. The high prevalence of hypertension, diabetes, and substance abuse highlights potential risk factors for new-onset seizures in adults. These conditions can contribute to an increased risk of seizures by affecting the brain's blood flow, metabolic balance, or overall health.

**Table 2: Showing the medical history of the 50 cases of new-onset seizures in adults included in the study**

Medical History	Frequency	Percentage
Hypertension	20	40
Diabetes Mellitus	16	32
H/o CVA	7	14
Retroviral disease	3	6
History of head injury	4	8
Tuberculosis	2	4
Substance abuse Alcohol/Tobacco	20	40

Table 3 displays the specific neurological causes behind the new-onset seizures experienced by 28 patients out of the 50 in the study. The table

highlights a variety of neurological conditions potentially contributing to the seizures. No single cause appears to be overwhelmingly prevalent.

*Most Frequent:* Cerebral venous thrombosis (blood clot in a cerebral vein) and scar epilepsy (seizures arising from a brain scar) were the most frequent causes, each seen in 4 out of 50 total cases (8% of the entire study population). *Less Frequent:* Other

identified causes include cerebrovascular accident (stroke), Intracerebral Sclerosis (abnormal brain tissue), tuberculoma (brain mass caused by tuberculosis), and less common conditions.

**Table 3: Distribution of etiology among neurological causes among 50 cases of new-onset seizures**

Etiology among neurological cause	N	%
Cerebral venous thrombosis	7	14
Scar epilepsy	4	8
Cerebro vascular accident	4	8
ICSOL (non-infectious)	4	8
Tuberculoma	3	6
Hypoxic ischaemic encephalopathy	1	2
Cryptococcal meningitis	1	2
Basal ganglia calcification	2	4
Hypertensive encephalopathy	1	1
Meningoencephalitis	1	1
Total	28	56

Table 4 shows the non-neurological causes identified in a subset of 50 patients with new-onset seizures. *Most Frequent:* Alcohol withdrawal was the most prevalent non-neurological cause, identified in 7 patients (14% of the total study

population). *Less Frequent:* Other identified causes include Uraemia in 4 patients (8%) Hyperglycemia in 2 patients (4%) Hyponatremia in 2 patients (4%) *Unknown etiology:* the total number of cases with unidentified causes was 7(14%).

**Table 4: Distribution of etiology among non-neurological causes.**

Etiology among non-neurological cause	Frequency	Percentage
Alcohol withdrawal	7	14
Uraemia	4	8
Hyperglycemia	2	4
Hyponatremia	2	4
Total	15	30

New-onset seizures can occur at different ages in adults and present with a variety of symptoms. Underlying medical conditions and both neurological and non-neurological factors can contribute to their development. A significant portion of cases, however, have unidentified causes, highlighting the need for further research into less well-understood etiologies.

## Discussion

This study was conducted in a teaching Hospital to understand the etiology and presentation of new-onset adult seizures. Such data did not exist previously in this area. The Age of onset is a valuable clue in pinpointing the cause of epilepsy. However, in adults (over 18), the underlying reasons for developing epilepsy become much more diverse, both in type and frequency. This vast variability can be attributed to a combination of environmental factors, genetic predisposition, and even socioeconomic status. Through a comprehensive approach that includes detailed medical history, clinical examination, and relevant investigations (including brain imaging), doctors can often determine the cause of epilepsy. This

accurate diagnosis allows for targeted treatment, potentially reducing the severity and frequency of seizures, along with their associated social, health, and even life-threatening consequences. In this study, 22% of patients were under 40 years old, while 78% were over 40. Comparatively, other studies have reported the range from 40% to 60.99% in new-onset seizures occurring before the age of 40 years [7-11]. Although findings from other studies typically show the first episode of seizures more commonly in individuals under 40, this study observed a higher incidence in the 40-60 age group, representing 66%, which differs from other similar research. This deviation may be attributed to the recent increase in the middle-aged population in India and improvements in healthcare compared to previous years.

Similarly, for patients aged over 60, the current study recorded a prevalence of 12%. Other studies have shown the range from 22.5% to 45.45% [8, 12-14] whereas studies by Chalasani et al. [10] and Joshi et al. [11] showed lower percentages of 15.3% and 18.3%, respectively in near agreement with the current study. The higher incidence of first seizures in those over 60 in Indian studies aligns

with local findings but contrasts with studies from developed countries. This difference is likely due to higher life expectancy, better healthcare facilities, and greater awareness in developed nations. In developing countries such as India, seizures are often underreported due to limited awareness, social stigma, and financial constraints. Additionally, seizures in the elderly may be overlooked more frequently than in younger populations. In various studies, the prevalence of generalized seizures percentage was reported from as low as 31.9% to as high as 77.57% [7, 8 15, 16]. Focal seizures reported from various studies ranged from 24.91% to 43% [7,10,15,17] In this study, generalized seizures, including two cases of generalized status epilepticus, were seen in 94% of patients, while focal seizures were observed in 6%. The high incidence of generalized seizures aligns with many of the aforementioned studies. However, this contrasts with findings of other studies from foreign countries [14,18,19] which report a higher prevalence of focal seizures, this study's findings may be attributed to the literacy level of bystanders and their knowledge, attitudes, and practices regarding the disease. Locally, the more noticeable tonic-clonic movements are commonly recognized as seizures, while other forms are often overlooked, potentially explaining the disparity in the incidence of seizure types reported here.

In the current study, we found neurological causes in 56% of cases followed by non-neurological causes in 30% of cases, and idiopathic causes in 14% of cases. Other studies by Rao et al. [16] In a sample of 100 patients, neuro-infections were found in 36%, vascular causes in 25%, non-neurological causes in 12%, unknown causes in 6%, and CNS tumors in 4%. Rajadhyaksha et al. [15] With 260 patients, neuro-infections accounted for 35%, idiopathic causes for 28%, cerebrovascular accidents (CVA) for 12%, and non-neurological causes for 10% and Sheik et al. [7] Of the 144 patients studied, CVAs were observed in 48.6%, neuro-infections in 18.7%, CNS tumors in 12.5%, and non-neurological causes in 10.4%. In the current study among the non-neurological causes alcohol withdrawal was most frequent in 14% of cases uremia in 8% of cases and hyperglycemia and hyponatremia in 4% of cases each (table 4). In a study by Rao et al. [16] alcohol withdrawal seizures were observed in 33% of cases, with hypoglycemia and hyponatremia each at 22%, and hyperglycemia and hypocalcemia both at 11%. Rajadhyaksha et al. [15] reported that alcohol withdrawal seizures accounted for 46% of non-neurological causes, followed by hypoglycemia at 22%, hepatic encephalopathy at 18%, hyponatremia at 12%, and hypokalemia at 2%. Kanitkar et al. [20] noted that alcohol withdrawal was the most common non-neurological cause of adult-onset seizures, seen in

31% of cases. These findings underscore that alcohol-related seizures are the predominant non-neurological cause in the present study, aligning with observations made by other studies.

### Conclusion

Our study highlights significant differences in the causes of new-onset seizures compared to developed countries. Geographic factors, cultural practices (like alcohol consumption patterns), and even social stigma surrounding seizures all contribute to this variation. Accurate diagnosis and proper management are crucial to prevent future seizures and improve patients' quality of life. By taking a detailed medical history, conducting a thorough clinical examination, and utilizing available diagnostic tools, we can effectively determine the underlying cause and tailor treatment accordingly. This comprehensive approach can significantly reduce the morbidity and mortality associated with epilepsy. Notably, our study found a higher incidence of seizures in adults from semi-urban and rural areas, potentially linked to substance abuse, particularly alcoholism.

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