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## Corresponding Author

Rahul Kumar Vasava,  
Department of Radiodiagnosis,  
Gujarat Adani Institute of Medical  
Sciences, Bhuj, Gujarat, India  
rspace72@gmail.com

## Author Designation

<sup>1</sup>Assistant Professor

<sup>2</sup>Senior Resident

<sup>3</sup>Associate Professor

<sup>4</sup>Third Year Resident

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## Assessment of MRI Findings in Young Adult Onset Seizures: A Cross Sectional Study

<sup>1</sup>Manisha Vasava, <sup>2</sup>Maulikkumar Patel, <sup>3</sup>Parth Bharatkumar Patel and <sup>4</sup>Rahul Kumar Vasava

<sup>1,2</sup>Department of Radiodiagnosis, Nootan Medical College and Research Center, Visnagar, Gujarat, India

<sup>3</sup>Department of Orthopaedics, GMERS Medical College, Vadnagar, Gujarat, India

<sup>4</sup>Department of Radiodiagnosis, Gujarat Adani Institute of Medical Sciences, Bhuj, Gujarat, India

### ABSTRACT

Seizures are prevalent medical issues, most common in early childhood and late adulthood, affecting up to 10% of the general population. Adult-onset seizures, often linked to identifiable causes such as trauma, infections and metabolic disorders, necessitate specific attention for effective treatment. MRI plays a crucial role in diagnosing structural abnormalities that guide treatment and prognosis. Conducted over one year at an Indian medical college and hospital, this cross-sectional observational study involved young adult patients with new-onset seizures who underwent MRI and EEG. Exclusion criteria were previous seizures or mental disabilities. The study included 178 patients, predominantly aged 20-30 years, with a slight female majority. Generalized tonic-clonic seizures were most common, with metabolic disturbances being a major etiological factor. MRI and EEG abnormalities were detected in 46.07% and 39.33% of patients, respectively. Notable MRI findings included gliosis, tuberculoma and medial temporal lobe sclerosis, each accounting for approximately 5%. No single etiology predominated in young adult-onset epilepsy, emphasizing the importance of a thorough diagnostic process, including detailed clinical assessment and advanced imaging techniques.

## INTRODUCTION

Seizures are complex neurological events that have been recognized as common disorders throughout history and are encountered frequently in medical practice worldwide. These episodes, characterized by abnormal electrical activity in the brain, have a varied presentation and can occur at any age. However, their incidence is notably higher in certain age groups, with the highest occurrence seen in early childhood and late adulthood<sup>[1]</sup>. The prevalence of seizures is significant, with up to 10% of the general population experiencing at least one seizure during their lifetime. This statistic underscores the importance of understanding and addressing the underlying causes of seizures, particularly when they manifest in adulthood. Seizures that begin in adult life require special attention due to the likelihood of being linked to identifiable and treatable factors. Various factors can contribute to the onset of seizures in adults, including but not limited to trauma, central nervous system infections, space-occupying lesions such as tumors, cerebrovascular accidents (stroke), metabolic disorders and certain medications or drugs. Identifying the specific cause of adult-onset seizures is crucial as it informs treatment strategies and prognostic assessments<sup>[2]</sup>. One of the essential diagnostic steps in evaluating adult-onset seizures is neuroimaging, particularly using techniques like magnetic resonance imaging (MRI). MRI scans offer superior sensitivity and specificity in identifying structural abnormalities within the brain that may be contributing to the seizures. These imaging studies play a pivotal role in determining the appropriate course of treatment and predicting the long-term outlook for patients with adult-onset seizures<sup>[3]</sup>. The aim of the present study is to delve into the clinical profile of individuals experiencing seizures that onset during young adulthood. By examining a range of clinical data and correlating it with findings from neuroimaging studies, specifically MRI scans, this research seeks to elucidate the underlying etiology of seizures in this specific age group. Such insights are invaluable in enhancing our understanding of adult-onset seizures, refining treatment approaches and ultimately improving patient outcomes.

## MATERIALS AND METHODS

The methodology employed in this study was a cross-sectional observational design conducted over one year at an Indian medical college and hospital. Inclusion criteria comprised patients experiencing their first seizure episode during the study period, aged between 20 and 40 years and having undergone brain MRI studies. Exclusion criteria included patients below 20 or above 40 years old at presentation, those with mental disabilities or a history of seizures and individuals who declined to participate. The study

recruited 178 subjects diagnosed with seizures based on the specified criteria from both outpatient and inpatient departments. Consent from all patients were obtained. Detailed medical histories, clinical examinations, routine laboratory tests, ECGs and 2Decho exams were conducted as necessary. Additionally, all study patients underwent MRI and EEG assessments. The etiology of seizures was determined through medical history, neurological examination, MRI scans and EEG recordings. Seizure type and risk factor classification followed the guidelines of the International League Against Epilepsy<sup>[3]</sup>. Statistical analysis involved data entry in MS Excel and computations, including proportions and values, using appropriate module of Epi Info statistical software.

## RESULTS AND DISCUSSIONS

The majority of patients in our study fell within the age group of 20-30 years, with the remaining patients aged between 31-40 years. Out of the total 178

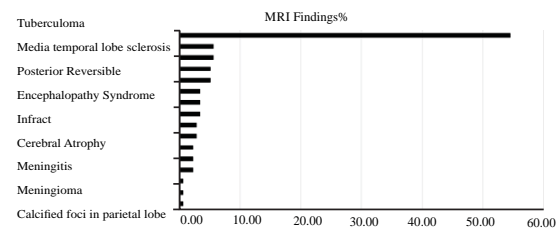


Fig. 1: MRI Findings in young Adult onset Seizures

Table 1: Baseline variables of study participants

Variable	n	Percentage
Age groups		
20-30 years	103	57.87
31-40 years	75	42.13
Mean Age	28.5 ± 5.67	
Gender		
Males	83	46.63
Females	95	53.37

Table 2: Type of seizures in study population

Type of Seizures	n	Percentage
Generalised Tonic clonic seizure	104	58.43
Secondary generalized seizure	37	20.79
Complex partial seizure	18	10.11
Simple Partial Seizure	10	5.62
Myoclonic seizure	6	3.37
Status Epilepticus	3	1.69

Table 3: Prevalence of metabolic risk factors in study population

Risk Factor	n	Percentage
Hyperglycemia	4	2.25
Uremic Encephalopathy	4	2.25
Hypertensive Encephalopathy	7	3.93
Hypoglycemia	8	4.49
Hyponatremia	8	4.49
Hypocalcemia	13	7.30
Hepatic encephalopathy	22	12.36
Alcohol Withdrawal	23	12.92

Table 4: Correlation between MRI and EEG findings

EEG	MRI		Total
	Normal	Abnormal	
Normal	90 (50.56)	18 (10.11)	108 (60.67)
Abnormal	6 (3.37)	64 (35.96)	70 (39.33)
Total	96 (53.93)	82 (46.07)	178 (100)

patients, the majority were females (Table 1). Regarding seizure types, most patients experienced generalized tonic-clonic seizures. A smaller number of patients presented with simple partial seizures, complex partial seizures, secondary generalized seizures, myoclonic seizures and status epilepticus (Table 2). Our study identified metabolic causes as a significant etiology of adult-onset seizures, constituting 50% (n = 89) of cases. These metabolic causes included alcohol withdrawal, hepatic encephalopathy, hypocalcemia, hypoglycemia, hyponatremia, hypertensive encephalopathy, hyperglycemia and uremic encephalopathy (Table 3). Abnormal EEG findings were observed in 39.33% (n = 70) of patients, while 46.07% (n = 82) had abnormal MRI findings. The correlation between MRI and EEG results is detailed in (Table 4). Specifically, 54.49% of patients had normal MRI results, whereas the remaining patients exhibited various abnormal MRI findings such as gliosis, cerebral atrophy, calcified foci, CVST, hyper intense lesions in the parietal lobe, infarcts, meningiomas, medial temporal lobe sclerosis or hippocampal abnormalities, neurocysticercosis, subdural hemorrhages, cerebral edema, tuberculoma, meningitis, posterior reversible encephalopathy syndrome, SAH, ICH (Fig. 1).

Epilepsy is a well-recognized disorder that has been known since ancient times and is frequently encountered in medical practice. Up to 10% of the general population experience at least one seizure in their lifetime, with the highest incidence occurring in early childhood and late adulthood. Seizures that start in adulthood require special attention regarding their causes because they are likely to stem from identifiable sources such as trauma, central nervous system infections, space-occupying lesions, cerebrovascular accidents (CVA), metabolic disorders and drug-related issues. Conversely, seizures starting in childhood are more likely to be idiopathic. The etiology and clinical profile of seizures in adults necessitate different decisions regarding the initiation and discontinuation of pharmacotherapy compared to younger patients<sup>[1,2]</sup>. All patients experiencing adult-onset seizures should undergo neuroimaging studies to identify underlying structural abnormalities. Magnetic resonance imaging (MRI) has been shown to be superior to computed tomography (CT) scans in detecting cerebral lesions causing seizures in adults with new-onset seizures. The significance of adult-onset seizures lies in their frequent association with secondary causes. Proper analysis of the etiology through history, clinical examination and appropriate investigations, including neuroimaging, allows for tailored treatment of presenting seizures, thereby reducing associated morbidity and mortality.

In our study, we found that majority of subjects belonged to the age group of 20-30 years, next common belonged to the age group of 30-40 years, correlating with findings from previous studies<sup>[4-10]</sup>. The

gender-wise distribution revealed a higher prevalence of epilepsy among females compared to males, although more research is needed to understand this discrepancy fully. Metabolic causes were the leading etiology of adult-onset seizures in our study, consistent with findings from other studies<sup>[4]</sup>. EEG findings showed abnormal patterns in 39.33% of cases, while 46.07% had abnormal MRI findings, supporting MRI as the preferred investigation due to its higher conclusiveness. Generalized tonic-clonic seizures were the most common type encountered, occurring in 58.5% of patients, consistent with findings from other studies reporting a higher prevalence of this seizure type in adults<sup>[11-17]</sup>. Other seizure types observed included complex partial seizures, secondary generalized seizures, secondary partial seizures, status epilepticus and myoclonic seizures.

## CONCLUSION

Epilepsy is a chronic non-communicable neurological disorder and approximately 80% of individuals affected by epilepsy reside in low and middle-income countries. The risk of premature mortality among individuals with epilepsy is significantly higher compared to the general population. In our study we observed that there is no specific predominant etiology in patients with epilepsy onset during young adulthood, indicating a multi factorial nature. Therefore, a comprehensive diagnostic approach including thorough medical history assessment, clinical evaluation and radiological investigations is essential for accurate diagnosis and management of young adults with epilepsy.

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