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CLINICAL PROFILE OF NEW ONSET SEIZURES IN ADULTS IN A TERTIARY CARE HOSPITAL

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Abstract: **Background: New-onset seizures in adults are an important neurological presentation and may be the first manifestation of an underlying structural, infective, metabolic, traumatic, neoplastic, or idiopathic disorder. Identification of the clinical profile and etiology is essential for early diagnosis, appropriate treatment, and prevention of recurrence.**

Aim: To study the clinical profile, investigational findings, and etiological distribution of new-onset seizures in adults presenting to a tertiary care hospital.

Materials and Methods: This cross-sectional observational study was conducted among 64 adult patients presenting with new-onset seizures to the OPD, emergency department, Neuro Medicine, and Department of General Medicine at People's College of Medical Sciences & Research Centre, Bhopal. Patients aged more than 18 years with new-onset seizures were included, while patients with previous history of seizures, pregnant women, patients aged less than 18 years, and those already taking anti-epileptic drugs were excluded. All enrolled patients underwent detailed clinical evaluation, neurological examination, biochemical investigations, neuroimaging by CT/MRI brain, and EEG. Data were analyzed using SPSS, and associations were assessed using Chi-square test or Fisher's Exact Test. A p-value <0.05 was considered statistically significant.

Results: Among 64 patients, the maximum number belonged to the 36–55 years age group, 24 (37.5%), followed by 18–35 years, 22 (34.5%). Males were predominant, 41 (64.1%). Focal to bilateral GTCS was the most common seizure type, seen in 22 patients (34.4%), followed by focal seizure and GTCS in 21 patients each (32.8%). Stroke was the most common etiology, 17 (26.6%), followed by CNS infection and metabolic causes, 14 (21.9%) each. Brain MRI/CT was normal in 20 patients (31.3%), while ischemic infarct was the commonest abnormal finding, 12 (18.8%). EEG showed focal epileptiform discharges in 23 patients (35.9%). Abnormal sodium levels were seen in 23 patients (35.9%) and abnormal calcium levels in 14 patients (21.9%). MRI/CT findings showed a significant association with seizure etiology (p<0.001).

Conclusion: New-onset seizures in adults were more common among middle-aged males. Stroke, CNS infection, and metabolic abnormalities were the major etiologies. Neuroimaging, EEG, and biochemical evaluation are essential for early etiological diagnosis and appropriate management.

Keywords: **New-onset seizures; Adults; Stroke; EEG; Neuroimaging.**

1. INTRODUCTION

Seizures are among the most common neurological emergencies encountered in adult medical practice and may occur as the first manifestation of an underlying neurological or systemic disorder. A seizure represents a transient episode of abnormal, excessive, or synchronous neuronal activity in the brain, producing clinical manifestations that may involve motor, sensory, autonomic, behavioral, emotional, or cognitive symptoms. New-onset seizure in adults is clinically important because it may be the first presentation of epilepsy or may occur secondary to an acute provoking factor such as

stroke, central nervous system infection, metabolic disturbance, traumatic brain injury, brain tumor, drug toxicity, or systemic illness. Epilepsy is a major global neurological disorder, and the World Health Organization identifies it as one of the common chronic brain diseases affecting people of all ages, with a considerable burden in low- and middle-income countries.[1] Adult new-onset seizures require careful evaluation because their causes differ from those seen in childhood. In children, genetic and developmental factors are relatively more common, whereas in adults, acquired structural and metabolic causes play a greater role. The risk of seizures also changes with age due to increasing prevalence of cerebrovascular disease, neurodegenerative disorders, malignancy, chronic kidney disease, liver dysfunction, and electrolyte abnormalities. Adult patients may present with a wide clinical spectrum ranging from generalized tonic-clonic seizures to focal seizures with or without impaired awareness, focal to bilateral tonic-clonic seizures, or non-convulsive events. Accurate clinical description, preferably supported by eyewitness history, remains central to diagnosis because many seizure mimics such as syncope, transient ischemic attack, psychogenic nonepileptic events, movement disorders, sleep disorders, and metabolic encephalopathy may resemble epileptic seizures.[2] The term new-onset seizure usually refers to the first seizure or first cluster of seizures occurring within a defined period in a person without previous history of epilepsy. This distinction is essential because a first seizure does not always imply epilepsy. Some events are acute symptomatic seizures due to immediate causes such as infection, stroke, head injury, hypoglycemia, hyponatremia, uremia, or drug withdrawal. Others may represent an unprovoked seizure, where the risk of recurrence and future diagnosis of epilepsy depends on clinical, electroencephalographic, and neuroimaging findings. Therefore, adult-onset seizure should not be considered a single diagnostic entity but a clinical presentation requiring etiological classification and risk stratification.[3] Modern seizure classification has improved the approach to adult patients with first seizures. The International League Against Epilepsy emphasizes classification according to onset, awareness, motor or non-motor features, and evolution of seizure activity. This framework helps clinicians distinguish focal onset seizures, generalized onset seizures, focal to bilateral tonic-clonic seizures, and seizures of unknown onset. Such classification is clinically relevant because it guides investigation, helps identify structural brain lesions, supports selection of antiseizure medication, and improves communication among physicians. In tertiary care hospitals, where patients often present with complicated neurological and systemic illnesses, standardized seizure classification is particularly important for reducing diagnostic uncertainty and improving patient management.[4] Evaluation of new-onset seizures in adults includes detailed history, general physical examination, neurological examination, biochemical testing, neuroimaging, and electroencephalography. Initial assessment should identify acute life-threatening and reversible conditions, including hypoglycemia, electrolyte imbalance, meningitis, encephalitis, intracranial hemorrhage, stroke, and drug or toxin exposure. Laboratory investigations help detect metabolic and systemic causes, while brain imaging is necessary for identifying structural lesions such as infarct, hemorrhage, tumor, abscess, granuloma, cortical atrophy, and other focal abnormalities. Magnetic resonance imaging is generally more sensitive than computed tomography, but CT remains useful in emergency settings where rapid exclusion of hemorrhage, mass effect, or acute structural pathology is required.[5] Electroencephalography plays an important supportive role in the evaluation of new-onset seizures. Although a normal EEG does not exclude epilepsy, epileptiform discharges can support the diagnosis, help classify seizure type, and contribute to recurrence-risk assessment. EEG findings are especially useful when the clinical event is uncertain or when focal onset is suspected. In adults presenting with a first unprovoked seizure, the combination of clinical assessment, EEG, and neuroimaging provides a more complete diagnostic framework than any single investigation alone. This is particularly relevant in tertiary care settings, where patients may have overlapping neurological, infectious, metabolic, and systemic conditions.[6]

2. MATERIALS AND METHODS

The present study was a cross-sectional observational study conducted on adult patients presenting with new-onset seizures. The source of data included all patients admitted or attending OPD, emergency department, Neuro Medicine, and the Department of General Medicine at People's College of Medical Sciences & Research Centre (PCMS & RC), Bhopal, during the study period from February 2024 to August 2026, after fulfilling the inclusion criteria.

The study population comprised all adult patients presenting with new-onset seizures to the Department of General Medicine at PCMS & RC, Bhopal, during the study period. The selection was based on predefined criteria to ensure a homogeneous and appropriately representative sample. Patients presenting with new-onset seizures in OPDs and emergency department and aged more than 18 years were included in the study. Patients with previous history of seizures, pregnant women, patients aged less than 18 years, and patients taking anti-epileptic medications were excluded from the study.

The sampling method employed was consecutive sampling, also known as total enumerative sampling. All patients who presented to the designated departments during the study period and fulfilled the inclusion criteria were enrolled in the

study. This non-probability sampling technique was chosen for its feasibility and practicality in a hospital setting, as it allows inclusion of all eligible patients over a defined period. The calculated sample size was 64 participants.

Methodology

All enrolled patients underwent standardized evaluation. Clinical assessment included detailed seizure history, past medical history, and neurological examination. Neuroimaging comprised non-contrast CT in all patients, with MRI when needed. Electroencephalography was performed using the 10–20 system and interpreted by a neurologist. Biochemical evaluation included assessment of electrolytes, renal function, liver function, and blood glucose levels. Etiological classification was based on integrated findings and causes were categorized as stroke, CNS infection, metabolic, tumor, idiopathic, trauma, or degenerative.

Data collection was conducted by screening and enrolling eligible patients presenting to OPD, emergency, or inpatient wards with new-onset seizures. After explaining the study objectives, written informed consent was obtained. Each patient was assigned a unique identification number, and data were recorded in a structured proforma including demographic details, clinical history, examination findings, investigation results including hematological, biochemical, neuroimaging and EEG findings, and final diagnosis. Coordination was maintained with radiology, neurology, and central laboratory departments to ensure timely completion of investigations. Follow-up information during hospital stay was recorded when applicable. The collected data were entered into Microsoft Excel for cleaning, verification, and subsequent statistical analysis.

Ethical Considerations

Informed and written consent was taken from all enrolled patients after detailed counseling. The contents of the consent were read out or documented to the patient in his or her own language. Validity was ensured by rigorous inclusion and exclusion criteria, standardized data collection using pre-tested forms, and seizure and etiology classification based on ILAE standards. Information bias was reduced by obtaining history from both patients and relatives. Reliability was maintained through standard operating procedures for all diagnostic tests. Neuroimaging was performed on consistent high-quality equipment with blinded radiologists. EEG was interpreted by a single neurologist to minimize inter-rater variability, while objective laboratory investigations further enhanced data reliability.

Data Analysis

Data were analyzed using SPSS. Descriptive analysis was used to summarize categorical variables such as sex, seizure type, and etiology as frequencies and percentages, while continuous variables such as age and serum sodium were reported as mean ± standard deviation with 95% confidence intervals. Inferential analysis was performed using Chi-square test for associations where expected frequencies were adequate, and Fisher's Exact Test when assumptions were violated. Cramér's V was used to measure effect size. A p-value of less than 0.05 was considered statistically significant for all tests.

3. RESULTS

Table 1: Demographic Distribution of Study Participants

A total of 64 adult patients with new-onset seizures were included in the study. The age distribution showed that the largest proportion of participants belonged to the 36–55 years age group, accounting for 24 patients (37.5%). This was followed by the 18–35 years age group with 22 patients (34.5%), while 18 patients (28.1%) were aged 56 years or above. These findings indicate that new-onset seizures were more commonly observed in middle-aged adults. Regarding sex distribution, males constituted the majority of the study population with 41 patients (64.1%), whereas females accounted for 23 patients (35.9%).

Table 2: Clinical Profile and Etiology of Seizures Among Study Participants

Analysis of seizure types revealed a relatively uniform distribution among the study participants. Focal to bilateral generalized tonic-clonic seizures (GTCS) were the most common presentation, observed in 22 patients (34.4%). Both focal seizures and generalized tonic-clonic seizures were reported in 21 patients each (32.8%). This distribution highlights that focal-onset seizures, either remaining focal or progressing to bilateral tonic-clonic seizures, constituted a substantial proportion of new-onset seizure presentations. Regarding etiology, stroke emerged as the most common cause of new-onset seizures, accounting for 17 cases (26.6%). Central nervous system (CNS) infections and metabolic causes were the second most common etiologies, each contributing to 14 cases (21.9%). Tumors were identified in 8 patients (12.5%), while

idiopathic epilepsy and traumatic causes were noted in 5 patients each (10.9% and 7.8%, respectively). Degenerative disorders were the least common etiology, observed in only one patient (1.6%).

Table 3: Brain MRI/CT and EEG Findings of Study Participants

Neuroimaging findings demonstrated that a normal MRI/CT scan was the most frequent observation, seen in 20 patients (31.3%). Among abnormal findings, ischemic infarcts were the most common, detected in 12 patients (18.8%), followed by meningeal enhancement in 9 patients (14.1%) and neoplastic space-occupying lesions in 8 patients (12.5%). Infective space-occupying lesions, hemorrhagic strokes, and mild cortical atrophy were each observed in 5 patients (7.8%). Electroencephalographic evaluation revealed focal epileptiform discharges in 23 patients (35.9%), making it the most common EEG abnormality. Abnormal EEG findings suggestive of generalized seizure disorder were observed in 22 patients (34.4%), while 19 patients (29.7%) had a normal awake EEG.

Table 4: Biochemical Profile of Study Participants

The mean serum sodium level among the study participants was 135.76 ± 5.16 mEq/L, with values ranging from 113 to 144.6 mEq/L. The 95% confidence interval for the mean serum sodium level was 134.47–137.05 mEq/L. Most patients (64.1%) had normal sodium levels, whereas 23 patients (35.9%) exhibited abnormal sodium values. The mean serum calcium level was 9.34 ± 0.90 mg/dL, ranging from 6.6 to 10.9 mg/dL, with a 95% confidence interval of 9.12–9.56 mg/dL. Normal calcium levels were observed in 50 patients (78.1%), while 14 patients (21.9%) had abnormal calcium values.

Table 5: Association of Selected Variables with Type of Seizure Among Study Participants

The association between EEG findings and seizure type was analyzed and found to be statistically non-significant ($p = 0.179$). Among patients with focal to bilateral GTCS, abnormal EEG suggestive of generalized seizure disorder was the most common finding (11 cases), whereas focal epileptiform discharges predominated among patients with focal seizures (9 cases). Normal EEG recordings were more frequently observed among patients with GTCS (9 cases). Similarly, no statistically significant association was observed between brain MRI/CT findings and seizure type ($p = 0.176$). Normal neuroimaging findings were common across all seizure categories, particularly among GTCS patients, where they accounted for 57.1% of cases. The relationship between serum sodium status and seizure type was also non-significant ($p = 0.627$). Abnormal sodium levels were observed in 8 patients with focal to bilateral GTCS, 6 patients with focal seizures, and 9 patients with GTCS. Age group distribution according to seizure type likewise did not demonstrate a significant association ($p = 0.610$). Patients aged 36–55 years represented the largest proportion among focal to bilateral GTCS (45.5%) and focal seizure groups (42.9%), whereas GTCS was more common among younger patients aged 18–35 years (42.9%).

Table 6: Association of Brain MRI/CT Findings with EEG Findings and Etiology of Seizures Among Study Participants

The association between EEG findings and MRI/CT abnormalities was evaluated and found to be statistically non-significant ($p = 0.349$). Patients with meningeal enhancement and infective space-occupying lesions most frequently exhibited abnormal EEG findings suggestive of generalized seizure disorders. Focal epileptiform discharges were commonly associated with ischemic infarcts and cortical atrophy, whereas normal EEG findings were more frequently seen in patients with hemorrhagic stroke and neoplastic lesions. Despite these trends, the distribution did not reach statistical significance. In contrast, a highly significant association was observed between MRI/CT findings and seizure etiology ($p < 0.001$). All patients with CNS infections demonstrated either meningeal enhancement (64.3%) or infective space-occupying lesions (35.7%) on neuroimaging. Patients with stroke predominantly showed ischemic infarcts (70.6%) or hemorrhagic strokes (29.4%).

Table 1: Demographic Distribution of Study Participants (n = 64)

Variable	Category	Frequency (n)	Percentage (%)
Age group	18–35 years	22	34.5
	36–55 years	24	37.5
	≥56 years	18	28.1
	Total	64	100
Sex	Male	41	64.1
	Female	23	35.9
	Total	64	100

Table 2: Clinical Profile and Etiology of Seizures Among Study Participants (n = 64)

Variable	Category	Frequency (n)	Percentage (%)
Type of seizure	Focal to bilateral GTCS	22	34.4
	Focal seizure	21	32.8
	GTCS	21	32.8
	Total	64	100
Etiology	Stroke	17	26.6
	CNS infection	14	21.9
	Metabolic	14	21.9
	Tumor	8	12.5
	Idiopathic epilepsy	5	10.9
	Trauma	5	7.8
	Degenerative	1	1.6
	Total	64	100

Table 3: Brain MRI/CT and EEG Findings of Study Participants (n = 64)

Investigation	Findings	Frequency (n)	Percentage (%)
Brain MRI/CT	Normal study	20	31.3
	Ischemic infarct	12	18.8
	Infective space-occupying lesion	5	7.8
	Neoplastic space-occupying lesion	8	12.5
	Meningeal enhancement	9	14.1
	Hemorrhagic stroke	5	7.8
	Mild cortical atrophy	5	7.8
	Total	64	100
EEG	Focal epileptiform discharges noted	23	35.9
	Abnormal EEG suggestive of generalized seizure disorder	22	34.4
	Normal awake EEG recorded	19	29.7
	Total	64	100

Table 4: Biochemical Profile of Study Participants (n = 64)

Parameter	Mean	Standard Deviation	Minimum	Maximum	95% Confidence Interval of Mean	Normal n (%)	Abnormal n (%)
Serum sodium	135.76	5.16	113	144.6	134.47–137.05	41 (64.1%)	23 (35.9%)
Serum calcium	9.34	0.90	6.6	10.9	9.12–9.56	50 (78.1%)	14 (21.9%)

Table 5: Association of Selected Variables with Type of Seizure Among Study Participants (n = 64)

Variable	Category	Focal to Bilateral GTCS n (%)	Focal Seizure n (%)	GTCS n (%)	Total	p-value
EEG findings	Abnormal EEG suggestive of generalized seizure disorder	11	5	6	22	0.179
	Focal epileptiform discharges noted	8	9	6	23	
	Normal awake EEG recorded	3	7	9	19	
	Total	22	21	21	64	
Brain MRI/CT findings	Mild cortical atrophy	4 (18.2%)	2 (9.5%)	5 (23.8%)	11	0.176
	Ischemic infarct	3 (13.6%)	5 (23.8%)	1 (4.8%)	9	
	Normal study	8 (36.4%)	6 (28.6%)	12 (57.1%)	26	
	Meningeal enhancement	3 (13.6%)	2 (9.5%)	0 (0.0%)	5	
	Space-occupying lesion	2 (9.1%)	4 (19.0%)	2 (9.5%)	8	
	Hemorrhagic lesion	2 (9.1%)	2 (9.5%)	1 (4.8%)	5	
	Total	22 (100%)	21 (100%)	21 (100%)	64	

Serum sodium status	Abnormal sodium	8	6	9	23	0.627
	Normal sodium	14	15	12	41	
	Total	22	21	21	64	
Age group	≥56 years	6 (27.3%)	5 (23.8%)	7 (33.3%)	18	0.610
	18–35 years	6 (27.3%)	7 (33.3%)	9 (42.9%)	22	
	36–55 years	10 (45.5%)	9 (42.9%)	5 (23.8%)	24	
	Total	22 (100%)	21 (100%)	21 (100%)	64	

Table 6: Association of Brain MRI/CT Findings with EEG Findings and Etiology of Seizures Among Study Participants (n = 64)

	Category	Meningeal Enhancement	Infective SOL	Normal Study	Ischemic Infarct	Hemorrhagic Stroke	Neoplastic SOL	Mild Cortical Atrophy	Total	p-value
EEG findings with Brain MRI/CT findings	Abnormal EEG suggestive of generalized seizure disorder	6 (66.7%)	3 (60.0%)	6 (30.0%)	4 (33.3%)	0 (0.0%)	3 (37.5%)	0 (0.0%)	22	0.349
	Focal epileptiform discharges noted	1 (11.1%)	1 (20.0%)	9 (45.0%)	5 (41.7%)	2 (40.0%)	2 (25.0%)	3 (60.0%)	23	
	Normal awake EEG recorded	2 (22.2%)	1 (20.0%)	5 (25.0%)	3 (25.0%)	3 (60.0%)	3 (37.5%)	2 (40.0%)	19	
	Total	9 (100%)	5 (100%)	20 (100%)	12 (100%)	5 (100%)	8 (100%)	5 (100%)	64	
Etiology with Brain MRI/CT findings	CNS infection	9 (64.3%)	5 (35.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	14	<0.001
	Idiopathic epilepsy	0 (0.0%)	0 (0.0%)	7 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7	
	Stroke	0 (0.0%)	0 (0.0%)	0 (0.0%)	12 (70.6%)	5 (29.4%)	0 (0.0%)	0 (0.0%)	17	
	Metabolic	0 (0.0%)	0 (0.0%)	12 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12	
	Tumor	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8 (100%)	0 (0.0%)	8	
	Degenerative	0 (0.0%)	0 (0.0%)	1 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1	
	Trauma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (100%)	5	
	Total	9	5	20	12	5	8	5	64	

4. DISCUSSION

In the present study, the maximum number of patients belonged to the 36–55 years age group, 24 cases (37.5%), followed by 18–35 years, 22 cases (34.5%), and ≥56 years, 18 cases (28.1%). This shows that new-onset seizures were more frequent in middle-aged adults. Male predominance was also observed, with 41 males (64.1%) and 23 females (35.9%). These findings are comparable to Kaur et al. (2018), who studied 100 adult-onset seizure patients and reported male predominance of 65%; they also found that adult-onset seizures were common in young and middle-aged adults, with 38% each in the 21–40 and 41–60 years age groups. Thus, the present study and Kaur et al. both show that adult new-onset seizures are more common among males and commonly affect the economically active adult age group.[7] In this study, focal to bilateral GTCS was the most common seizure type, seen in 22 patients (34.4%), while focal seizures and GTCS were seen in 21 patients each (32.8%). This indicates that focal-onset seizures, either remaining focal or progressing to bilateral tonic-clonic seizures, formed a major proportion of adult new-onset seizures. In comparison, Hosalli et al. (2022) reported generalized seizures as the most common type, accounting for 95% of cases, while focal seizures were much less frequent. Their study also found that most patients were in the 41–60 years age group, similar to the present study. The lower proportion of purely generalized seizures in the present study may be due to better clinical classification, neuroimaging evaluation, and recognition of focal onset before secondary generalization.[8] Regarding etiology, stroke was the most common cause in the present study, accounting for 17 cases (26.6%), followed by CNS infection and metabolic causes, each contributing 14 cases (21.9%). Tumors were found in 8 cases (12.5%), idiopathic epilepsy in 5 cases (10.9%), trauma in 5 cases (7.8%), and degenerative disease in 1 case (1.6%). This pattern shows that most adult new-onset seizures were due to acquired

structural or metabolic causes. Nwani et al. (2016), in their study of acute symptomatic seizures among adults, reported infections as the commonest etiology in 34 cases (36.2%), followed by stroke in 28 cases (29.8%) and metabolic causes in 12 cases (12.8%). Compared with their study, the present study showed stroke as the leading cause, while CNS infection remained an important contributor, reflecting regional variation in etiological patterns.[9] Neuroimaging in the present study showed that 20 patients (31.3%) had normal MRI/CT findings, while ischemic infarct was the commonest abnormal finding in 12 patients (18.8%). Meningeal enhancement was seen in 9 patients (14.1%), neoplastic SOL in 8 patients (12.5%), and infective SOL, hemorrhagic stroke, and mild cortical atrophy in 5 patients each (7.8%). EEG showed focal epileptiform discharges in 23 patients (35.9%), abnormal EEG suggestive of generalized seizure disorder in 22 patients (34.4%), and normal awake EEG in 19 patients (29.7%). Sheikh et al. (2017) reported abnormal MRI findings in 59.7% and abnormal EEG findings in 52.8% of adult-onset seizure patients. In comparison, the present study also showed a high diagnostic yield of neuroimaging and EEG, with abnormal neuroimaging in nearly two-thirds of cases and abnormal EEG in about 70% of cases.[10] The biochemical profile of the present study showed that the mean serum sodium level was 135.76 ± 5.16 mEq/L, with abnormal sodium levels in 23 patients (35.9%), while the mean serum calcium level was 9.34 ± 0.90 mg/dL, with abnormal calcium levels in 14 patients (21.9%). Thus, metabolic abnormalities, especially sodium imbalance, were present in a considerable proportion of patients. Habib et al. (2022), in a study of 100 adult patients with acute symptomatic seizures, found metabolic encephalopathy as the commonest etiology, accounting for 42.0% of cases, followed by acute cerebrovascular disease in 31.0% and CNS infection in 16.0%. They further reported hyponatremia as an important metabolic abnormality. Compared with Habib et al., metabolic causes were less frequent in the present study, but sodium and calcium abnormalities still formed an important reversible component in adult new-onset seizures.[11] In the present study, MRI/CT and EEG evaluation played an important role in the diagnostic workup. Normal MRI/CT was seen in 31.3%, while abnormal findings included ischemic infarct, meningeal enhancement, SOL, hemorrhagic stroke, and cortical atrophy. EEG was abnormal in 45 patients (70.3%) when focal epileptiform discharges and generalized seizure disorder patterns were combined. Ponnatapura et al. (2018), in a prospective study of 129 patients with new-onset seizures, reported that MRI detected potentially epileptogenic lesions in 59 patients (47%), with infection and inflammation being the commonest lesion type (28%). They also reported EEG abnormality in 39 of 126 patients (31%) and MRI–EEG concordance in only 18%. Compared with their study, the present study had a higher EEG abnormality rate but a similar emphasis on the importance of neuroimaging in detecting structural causes.[12] In the present study, associations of seizure type with EEG findings, MRI/CT findings, serum sodium status, and age group were statistically non-significant. EEG findings showed $p = 0.179$, MRI/CT findings showed $p = 0.176$, serum sodium status showed $p = 0.627$, and age group showed $p = 0.610$. Although focal epileptiform discharges were more common among focal seizures and normal EEG was more frequent among GTCS, these differences were not statistically significant. King et al. (1998), in a study of 300 consecutive first-seizure patients, demonstrated that EEG and MRI together are useful in classifying first seizures and identifying epileptogenic lesions; they reported 38 epileptogenic lesions on neuroimaging, including 17 tumors, and found no lesions among patients in whom generalized epilepsy was confirmed by EEG. Compared with King et al., the present study showed similar clinical usefulness of combined EEG and imaging, but statistical association with seizure type was not significant, possibly due to smaller sample size.[13] The present study found no significant association between EEG findings and MRI/CT abnormalities ($p = 0.349$), but a highly significant association was observed between MRI/CT findings and seizure etiology ($p < 0.001$). All CNS infection cases showed either meningeal enhancement or infective SOL, stroke cases showed ischemic infarct or hemorrhagic stroke, tumor cases showed neoplastic SOL, and traumatic cases were associated with cortical atrophy. This confirms that neuroimaging was strongly linked with etiological diagnosis. Sinha et al. (2012), in elderly patients with new-onset seizures, reported focal lesions on CT in 98 patients (48.8%) and focal lesions on MRI in 24 of 43 patients (55.8%); they also found that focal imaging lesions were significantly associated with partial seizures, symptomatic epilepsy, focal neurological deficit, focal EEG slowing, and seizure recurrence. Compared with Sinha et al., the present study similarly supports neuroimaging as a key investigation for etiological classification, even though EEG–imaging association was not statistically significant.[14]

5. CONCLUSION

New-onset seizures in adults were more commonly observed among middle-aged males, with focal to bilateral GTCS being the most frequent seizure type. Stroke was the leading etiology, followed by CNS infections and metabolic causes. Neuroimaging and EEG were useful in identifying structural and functional abnormalities, while biochemical evaluation helped detect reversible metabolic factors. A significant association was found between MRI/CT findings and seizure etiology, highlighting the importance of early etiological diagnosis for appropriate management.

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