

## Original Research

# Co-Relation Of Ct Scan Findings In New Onset Seizure Patients Presenting To Tertiary Care Centre”-A Prospective Study From Central India

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### Abstract

**Background:** The term seizure is used to describe abnormal, uncontrolled paroxysmal electrical activity of brain, literature suggests that about 8 -10% of population may experience at least one episode of seizure. Neuroimaging studies like CT scan brain is recommended in adult patients with new onset seizures to determine the underlying cause, structural abnormality, and the possibility of recurrence. Because of its capacity to quickly rule out an intracranial haemorrhage or a tumour requiring immediate neurosurgical intervention, CT scan remains the first -line imaging technology in most acute care settings.

**Aims and Objectives:** To Evaluate the CT scan study in new onset seizure and to identify a lesion in CT scan that can explain the seizure.

**Materials and methods:** Eighty-five patients (age 18 and above) were studied in the outpatient and inpatient department of medicine of a tertiary care centre of central India from 1<sup>st</sup> July 2019 to 30<sup>th</sup> June 2021. All patients fulfilling inclusion criteria were subjected to detailed clinical history, examination including neurological examination, and aetiology and characteristics of seizure were co related with CT scan findings.

**Results:** The majority of patients were presented with focal seizures 55 (55%) and with generalised seizures 45(45%). Seizures are more prevalent in age 18 to 40.the prevalence of seizures was higher in males 60% than in females 40%. The abnormal CT scan findings were found in 50.6% cases where seizure were secondary to CVA infarct in 16.5%cases, whereas CVA IP bleed was noted in 10.6% ICSOL was noted in 16.6% cases, with tuberculoma and neurocysticercosis in 5.9% and 4.7% cases respectively.

**Key words:** seizure, CT scan, Neuroimaging studies, CVA infarct, CVA IP bleed

### INTRODUCTION

The term seizure is used to describe abnormal , uncontrolled paroxysmal electrical activity of brain, it may be associated with altered behaviour, memory and also level of consciousness<sup>(1)</sup>.though the seizures are commonly observed in children, literature suggests that about 8-10% of population may experience at least an episode of seizure during their life time and among them, approximately 2-3% of patients may have epilepsy<sup>(2)</sup> .With the rise in life expectancy and burden of non communicable disease, the frequency of seizure is expected to rise. The rate of occurrence of symptomatic seizures have been linked to age and most common aetiology in older people with a first seizure is stroke; however, its exact relevance to epileptogenicity is yet to be defined.<sup>[3]</sup> New onset seizures in adulthood represents underlying aetiology such as CNS infections, trauma, intracranial space occupying lesions, metabolic disorders, cerebrovascular accident, drugs, alcohol withdrawal, high fever, electrolyte disturbances, primary and metastatic brain tumours.<sup>[4,5]</sup> Neuroimaging studies like CT head scan is recommended in adult patients with new onset seizures to determine the underlying cause, structural abnormality, and the possibility of recurrence. Because of its capacity to quickly rule out an intracranial haemorrhage or a tumour requiring immediate neurosurgical intervention, CT scan remains the first -line imaging technology in most acute care settings<sup>(6)</sup>. Literature assessing the role and use of neuroimaging in new onset seizure is lacking, especially in Indian Scenario. The present study therefore was conducted to correlate CT scan head findings to new onset seizures and to find any lesion that can explain seizure.

### MATERIALS AND METHODS

The present prospective cross-sectional observational study was performed on eighty-five patients were studied in the out-patient and in-patient department of medicine of a tertiary care center of central India from 1<sup>st</sup> July 2019 to 30<sup>th</sup> June 2021. Detailed history regarding onset of seizure, provoking factor, clinical features, past medical history, history of trauma, drug use and All the patients were subjected to detailed physical examination and systemic examination including neurological examination and findings were noted. Neuroimaging was done

in all the cases either with the help of computed axial tomography (contrast and non-contrast). Patients belonging to age range of more than 18 years and Patients with first onset seizure were included. patients with history of already known seizures and age <18 years were excluded. Complete blood picture, age, gender, serum sodium and potassium, serum calcium and cerebrospinal fluid analysis were recorded. Data was compiled using MS Excel and analyzed using IBM SPSS software version 20. Continuous data was expressed as mean and standard deviation whereas Categorical data was represented as frequency and percentage.

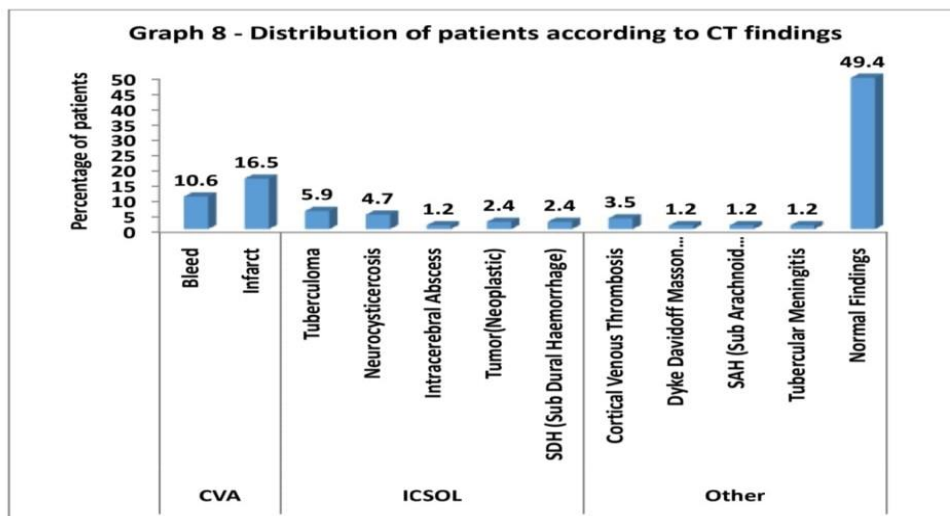
**RESULTS**

Mean age of patients in our study with new onset seizures was 37.95±16.2 years and majority i.e. 44% of the patients belonged to less than 30 years of age (p=0.28) no significant association between CT scan abnormalities and age. There was little male predominance observed for new onset seizures with male: female ratio of 1.5:1. Males made up over 60% of the patients while females made up only 40%. In our study 17 percent of patients with new-onset seizures, there was a history of hypertension and in our present study out of 85 new onset seizure patients, we observed seizure were focal in 55% cases and generalized in 45% cases.

Type of seizures	Frequency (n=85)	Percentage
Focal	47	55.0
Generalized	38	45.0

In our study CT scan was done in 85 cases. Out of them, about 50.6% cases had abnormal CT findings. Seizures were secondary to CVA infarct in 16.5% cases whereas CVA bleed was noted in 10.6% cases. ICSOL were noted in 16.6% cases, with tuberculoma and neurocysticercosis in 5.9% and 4.7% cases respectively.

CT Scan		Frequency (n=85)	Percentage
CVA	Bleed	9	10.6
	Infarct	14	16.5
ICSOL	Tuberculoma	5	5.9
	Neurocysticercosis	4	4.7
	Intracerebral Abscess	1	1.2
	Tumour (Neoplastic)	2	2.4
	SDH (Sub Dural Hemorrhage)	2	2.4
SAH (Sub Arachnoid Hemorrhage)		1	1.2
Tubercular Meningitis		1	1.2
Other	Cortical Venous Thrombosis	3	3.5
	Dyke Davidoff Masson Syndrome	1	1.2
Normal Findings		42	49.4



**DISCUSSION**

New onset seizures are paroxysmal, abnormal, uncontrolled electrical activity of the brain, that represents the abnormal excessive or synchronous neuronal activity in brain beginning in the adulthood.<sup>[7,8]</sup> Adult new onset seizures are usually secondary to underlying pathological process including cerebrovascular accident, CNS infections, intracranial space occupying lesions, high fever, trauma, metabolic disorders, drugs, alcohol withdrawal, electrolyte disturbances, primary and metastatic brain tumors etc.<sup>[4,5]</sup> Thus, complete history taking, neurological examination, and systematic evaluation should be done as soon as possible to identify the underlying cause.<sup>[9,10]</sup>

MRI is preferred for detecting cerebral abnormalities as compared to CT, but CT scans are recommended in emergency situations or when MRI is not available.<sup>[11]</sup>

The present study entitled “CO- RELATION OF CT SCAN FINDINGS IN NEW ONSET SEIZURE PATIENTS PRESENTING TO TERTIARY CARE CENTRE” was conducted on 85 patients presenting to tertiary care centre.

Our study revealed 50.6% of cases had abnormal CT scan findings

That can explain new onset seizure in this regard kotisaari et al in 2017 performed a CT scan in 416 patients among them 49(12%) had emergent CT imaging findings in CT Scan<sup>[12]</sup>

Our study findings were concordant to the findings of **Mahmoud MH et al (2021)** in which neuroimaging was found to be abnormal in 75% patients.<sup>[13]</sup> in another study from India kumar et al, 49% of cases had abnormalities in their CT Scan<sup>[14]</sup>

Adult onset seizures were secondary to cerebrovascular accident (including bleeding and infarct) in majority of cases on CT scan (27.1%). CVA infarct were predominant cause of new onset seizures as compared to CVA bleed and tuberculomas were predominant causes amongst ICSOL.

Similarly, **Mahmoud MH et al (2021)** documented ischemic infarct in 41.76% cases, intracranial hemorrhage in 2.5% and ICSOL in 10% cases. **Ho K et al (2013)** reported stroke, post-traumatic, or neoplastic lesions as most common neuroimaging findings in patients with new onset seizures.<sup>[15]</sup> Our study findings were also supported by findings of **Shariff EM et al (2017)** in which occult cerebrovascular disease (CVD) are the major cause of adult onset seizures identified on neuroimaging.<sup>[16]</sup> **Kaur S et al (2018)** also documented stroke as the most common cause followed by idiopathic seizures and CNS infection as the other common causes of seizures.<sup>[17]</sup> The Mean age of the patients was 37.95±16.2 years and majority belonged to less than 30 years of age. New onset seizures were observed in higher proportions of males (60%) in our study with male: female ratio of 1.5:1. **Dam AM et al (1985)** in their study observed that 25% of the patients may have their first onset of seizure after 25 years of age.<sup>[18]</sup> Similarly, mean age of patients with first onset seizure in a study of **Hakami T et al (2013)** was 42.2 years with 61% males.<sup>[19]</sup> **Bharuchcho NE et al (2003)** also documented there was no significant statistical difference in rate of adult onset seizures between women and men.<sup>[20]</sup> Majority of seizures were focal (55%) whereas remaining 45% were Generalised seizures. Kaur S et al (2018) observed increased in risk of focal seizures were associated with stroke.<sup>[17]</sup>

Mean systolic and diastolic blood pressure in patients with seizures was 122.1±16.17 and 79.32±10.48 mmHg respectively. In our study Hypertension was documented in 17% of the patients as per JNC 8th Classification. We have considered SBP ≥140 as Hypertension and correlated with neuroimaging studies. However, hypertension, on the other hand, was found in a much larger proportion of patients who had a normal neuroimaging scan. The link of hypertension with new onset seizures have been associated to stroke, as hypertension is a risk factor for CVA which is associated with seizure, severe uncontrolled hypertension may increase the risk of seizures in adults.<sup>[21]</sup> **Gasparini S et al (2019)** reported the role of Renin-angiotensin system as a direct link between hypertension and epilepsy, however, other mechanisms have also been documented. Hypertension related brain lesions reported in the reference study are small vessel disease, large-artery stroke, and PRES which may produce seizures and epilepsy by indirect mechanisms.<sup>[22]</sup>

## CONCLUSION

Adult onset seizures are reported by substantial proportions of patients seeking care at our study centre. In most cases of new-onset seizures, the seizures are secondary to underlying etiological reasons. Most common cause of adult onset seizures is cerebrovascular accident and intracranial space occupying lesions, predominantly infarct and tuberculoma respectively. Metabolic causes, though missed in radiological investigations are also observed in few cases of new onset seizures. Early identification of underlying etiology of new onset seizures in adults and its timely management may assist in lowering the morbidity, disability as well as mortality among patients with new onset seizures.

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