

## ORIGINAL RESEARCH

### A Study of Etiological Profile of New Onset Focal Seizures in Adults

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#### ABSTRACT

**Background: Aim-** The aim of this study is to evaluate the etiological profile of new onset focal seizures in adults.

**Materials and Methods:** It was a Prospective Observation Cross sectional study. The ethical committee approval was obtained to carry out the study in the hospital. The study was carried out during the year from September 2017 to November 2019 for a period of 26 months. All Adults out- patients and in- patients in the age group of 18 – 70yrs with focal seizures admitted in hospital are evaluated during the period of Study. Total 50 were included in the study. Detailed history was taken and seizures categorized according to the classification based on new 2017 International League Against Epilepsy (ILAE) classification of seizures.

**Results:** In our study Focal Seizures with impaired awareness are the most common focal Seizure Type. The age group, most commonly affected is 18 to 30 years. Granulomatous lesions and Cerebrovascular accidents are the most common cause of Focal Seizure in younger age group in older age group patients, vascular Pathology is the most common cause of Focal Seizures. Among Central Nervous System infections/granulomatous lesions of brain, Neurocysticercosis and tuberculomas are most common. Incidence in male is more than in female. T.B. Meningitis and Cerebral Malaria can also present as focal Seizures. CECT & MRI Brain is helpful, when the CT was inconclusive. There is no significant difference in incidence of Neurocysticercosis between Vegetarians and Non – Vegetarians. All patients with cerebrovascular accidents, with focal seizures responded well with AEDs, anti-cerebral edema measures, & anti platelet drugs in ischemic strokes All patients of Ring enhancing lesions responded well to treatment with Anti-Epileptic Drugs.

**Conclusion:** It is mandatory to deal carefully with each case of adult onset seizure with a tailor-made approach. Identification and awareness about the etiological factors and seizure type help in better management of these patients. Primary care physicians play a pivotal role in identifying patients with adult onset seizures and should encourage these patients to undergo neuroimaging so as to arrive at an appropriate etiological diagnosis. In the face of recent advances in neuroimaging techniques, the future prospective management of adult onset seizures appears bright and convincing.

**Keywords:** Adult onset, focal seizures, generalized seizures, seizure.

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#### INTRODUCTION

Hippocrates recognized epilepsy as an organic process of the brain. However, many ancient writers considered seizures to be the work of supernatural forces. In fact, word epilepsy comes from a Greek word meaning “to be seized by forces from without.”

J.H. Jackson gave direction to the understanding of epilepsy<sup>1</sup> in the late 19th century by fully analyzing individual cases. From his observations, Jackson formulated the modern definition of epilepsy; “an occasional, excessive and disorderly discharge of nervous tissue.” Jackson further concluded: this discharges occurs in all degree; it occurs with all sorts of conditions of ill health at the ages, and under innumerable circumstances. His emphasis on the clinical description of a seizure, beginning with the mode of onset, led to the concept of focal epilepsy with subsequent spread of discharging cells. Epilepsy is a complex symptom caused by a variety of pathologic processes in the brain. It is characterized by occasional (paroxysmal), excessive, and disorderly discharging of neurons, which can be detected by clinical manifestations, electroencephalographic (EEG) recording or both. Paroxysmal discharges of neurons occur when the threshold for firing of the neuronal membranes is reduced beyond the capability of intrinsic membrane – threshold-stabilizing mechanisms to prevent firing. The attack may be localized and remain restricted in its focus, or it can spread to other areas of the brain. When the size of the discharging area is sufficient, a clinical seizure occurs; otherwise, it may be limited to localized asymptomatic electrical disturbance.

### **Aims and Objectives**

The aim of this study is to evaluate the etiological profile of new onset focal seizures in adults.

### **MATERIALS & METHODS**

**Subjects:** Patients presenting with new onset focal seizures were the study subjects

**Study design:** A Prospective Observation Cross sectional study.

**Ethical Committee approval:** The ethical committee approval was obtained to carry out the study in the hospital.

**Study Setting:** Mahatma Gandhi Memorial Hospital, Warangal, Telangana (MGMH).

**Study Duration:** September 2017 to November 2019 for a period of 26 months.

**Sample size:** All Adults out- patients and in- patients in the age group of 18 – 70yrs with focal seizures admitted in hospital are evaluated during the period of Study. Total 50 were included in the study. Detailed history was taken and seizures categorized according to the classification based on new 2017 International League Against Epilepsy (ILAE) classification of seizures

Thorough Clinical Examination performed to detect any abnormality in the nervous system and also to screen the systemic disease with special attention to Tuberculosis, CVA and Neurocysticercosis. Diagnosis was verified by Neuroradiological and pathological test and Immunodiagnostic tests.

CT scan was done in all cases at the time of admission to the hospital.

Contrast CT, MRI & EEG were done in evaluating the etiology.

CSF analysis done in patients who presented with fever and neck rigidity and raised ICT signs.

### **Inclusion Criteria**

Age more than 18yrs and up to 70 yrs patients are included in the study.

Only new onset seizures are included.

Patients with focal seizures are included.

### **Exclusion Criteria**

Infants and children less than 18yrs and more than 70 yrs age group patients are excluded from the study.

Patients who presented with generalized tonic clonic seizures are excluded.

## RESULTS

Total 50 patients of adult onset focal seizures were studied in age group of 18-70 years.

### Epidemiology

#### Age and Sex Distribution

In the age group of 18-70 yrs maximum cases were seen between 18-30 yrs (48%), 51-60 yrs (18%), 41-50 – (18%), 31-40 yrs–(14%), &61-70 yrs - (2%).

### Epidemiology

#### Age and Sex Distribution

In the age group of 18-70 yrs maximum cases were seen between 18-30 yrs (48%), 51-60 yrs (18%), 41-50 – (18%), 31-40 yrs–(14%), &61-70 yrs - (2%).

**Table 1: ?**

Age in yrs	No. of patients	Male	Sex	Female	Percentage
18 –30	24	18		6	48.0%
31 –40	7	5		2	14.0%
41 –50	9	6		3	18.0%
51 –60	9	7		2	18.0%
61 –70	1	1		0	2.0%

**Table 2: Sex Incidence**

No. of Patients	Male	Female
50	37(74.0%)	13(26.0%)

### Socio Economic Status

The departments of General Medicine and Neurology in Mahatma Gandhi Memorial hospital are a referral centers for low and middle class in our society. Patients with focal seizures belong to mostly low – middle class. These patients were mainly from neighboring villages of Warangal city. 95% were non vegetarian and 3% were pork eaters.

### Clinical Features

90% patients presented within one week of onset of seizures. 18 (36.0%) were focal seizures with intact awareness, 28 (56%) were focal seizures with impaired awareness, 4 (8%) were secondary generalized seizure

**Table 3: ?**

Type of seizures	No. of patients	Sex		Percentage
		Male	Female	
FocalseizureswithIntactawareness	18	11	7	36.0%
FocalseizureswithImpairedawareness	28	17	11	56%
Secondarilygeneralized	4	4	0	8%

### Sex incidence

Seizures were more on right side than left side. One case presented with visual symptoms only. Seizures started mainly from one side of body involving Upper Limb and Lower Limb in 94% of cases. CT scan showing localization to the Parietal lobe in 36.1% cases.

CT scan showing localization to the Parietal lobe in 36.1% cases.

The associated symptom of headache is seen in 13.8% cases. Vomiting in 16.6% cases. Fever in 25% of cases. Loss of consciousness in 8.3% of cases. Automatisms are seen in 4% of cases.

The incidence of types of focal seizures, in variable age groups, are shown here as follows:

**Table 4: ?**

SEX	SEIZURE TYPE	18-30 YRS	31-40 YRS	41-50 YRS	51-60 YRS	61-70 YRS
<b>Female</b>						
	<b>Focal seizure with intact awareness</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>-</b>
	<b>Focal seizure with impaired awareness</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>-</b>
<b>Male</b>						
	<b>Focal seizure with intact awareness</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>-</b>
	<b>Focal seizure with impaired awareness</b>	<b>7</b>	<b>3</b>	<b>6</b>	<b>1</b>	<b>-</b>

Focal seizures with impaired awareness are commonly seen in 18-30 yr age groups, with equal incidence in males and females in this age group in our study.

Focal seizures with impaired awareness are seen in 2nd large number in males in between 41-50yrs age group.

**Age & sex wide distribution of focal seizures in different etiologies as follows:**

**Table 5: ?**

S.NO	DISEASE	SEX	18-30 YRS	31-40 YRS	41-50 YRS	51-60 YRS	61-70 YRS
<b>1</b>	<b>CVA</b>						
<b>a)</b>	<b>INFARCT</b>	<b>Male</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>0</b>
		<b>Female</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>
<b>b)</b>	<b>HEMORRHAGE</b>	<b>M</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>
		<b>F</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
<b>2</b>	<b>TUBERCULOMA</b>	<b>M</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
		<b>F</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
<b>3</b>	<b>NCC</b>	<b>M</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>
		<b>F</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>4</b>	<b>OLIGODENDROGLIOMA</b>	<b>M</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
		<b>F</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>5</b>	<b>METS IN BRAIN</b>	<b>M</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
		<b>F</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>

S. NO	DISEASE	SEX	18-30 YRS	31-40 YRS	41-50 YRS	51-60 YRS	61-70 YRS
<b>6</b>	<b>SAH</b>	<b>M</b>		<b>1</b>			
		<b>F</b>			<b>1</b>		
<b>7</b>	<b>DKA</b>	<b>M</b>			<b>1</b>	<b>1</b>	
		<b>F</b>		<b>1</b>	<b>1</b>		
<b>8</b>	<b>SUPERFICIAL GLIOMA</b>	<b>M</b>			<b>1</b>		
		<b>F</b>					
<b>9</b>	<b>MENINGITIS</b>	<b>M</b>	<b>1</b>				
		<b>F</b>	<b>2</b>				
<b>10</b>	<b>HIV</b>	<b>M</b>					
		<b>F</b>	<b>1</b>				
<b>11</b>	<b>CEREBRAL MALARIA</b>	<b>M</b>					
		<b>F</b>	<b>1</b>				

CVA, ischemic infarcts have more incidences in males than females, in all age groups. Tuberculomas shows more female predilection in 18-30yrs age group. Young males show more incidence for NCC.

#### Incidence of Types of Focal Seizures in Male & Females in Various age Groups:

Table 6: ?

S.NO	DISEASE	SEX	SEIZURE TYPE	18-30 YRS	31-40 YRS	41-50 YRS	51-60 YRS	61-70 YRS
<b>1</b>	<b>CVA</b>							
<b>a)</b>	<b>INFARCT</b>	<b>M</b>	<b>S</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	-
			<b>C</b>	<b>1</b>	-	<b>1</b>	<b>3</b>	-
		<b>F</b>	<b>S</b>	<b>1</b>	-	-	<b>1</b>	-
			<b>C</b>	<b>1</b>	<b>1</b>	<b>1</b>	-	-
<b>b)</b>	<b>HEMORRHAGE</b>	<b>M</b>	<b>S</b>	<b>1</b>	-	-	-	-
			<b>C</b>	-	-	<b>1</b>	<b>1</b>	-
		<b>F</b>	<b>S</b>	-	-	-	-	-
			<b>C</b>	-	-	-	<b>1</b>	-

S.N O	DISEASE	SEX	SEIZURE TYPE	18-30 YRS	31-40 YRS	41-50 YRS	51-60 YRS	61-70 YRS
<b>2</b>	<b>TUBERCULOMA</b>	<b>M</b>	<b>S</b>	<b>1</b>	<b>1</b>	-	-	-
			<b>C</b>	<b>2</b>	-	<b>1</b>	-	-
		<b>F</b>	<b>S</b>	<b>2</b>	-	-	-	-
			<b>C</b>	<b>2</b>	-	-	<b>1</b>	-
<b>3</b>	<b>NCC</b>	<b>M</b>	<b>S</b>	<b>1</b>	<b>1</b>	-	-	-
			<b>C</b>	<b>2</b>	-	<b>1</b>	-	<b>1</b>
		<b>F</b>	<b>S</b>	<b>1</b>	-	-	-	-
			<b>C</b>	<b>1</b>	-	-	-	-
S.N O	DISEASE	SEX	SEIZURE TYPE	18-30 YRS	31-40 YRS	41-50 YRS	51-60 YRS	61-70 YRS
<b>4</b>	<b>OLIGODENDROGLIOMA</b>	<b>M</b>	<b>S</b>	-	-	-	-	-
			<b>C</b>	-	-	<b>1</b>	-	-
		<b>F</b>	<b>S</b>	-	-	-	-	-
			<b>C</b>	-	-	-	-	-
<b>5</b>	<b>METASTASIS IN BRAIN</b>	<b>M</b>	<b>S</b>	-	-	-	-	-
			<b>C</b>	-	-	-	-	-
		<b>F</b>	<b>S</b>	-	-	-	-	-
			<b>C</b>	-	-	-	<b>1</b>	-

Focal seizures with intact awareness and impaired awareness are more common in males in ischemic infarcts.

Tuberculomas have equal incidence in male and female, regarding to simple & complex focal seizures.

### Clinical Signs

Patients presenting with focal seizures showed very minimum clinical signs even after thorough clinical examinations

Speech abnormality seen in 12% cases, Cranial nerves involvement seen in 5% cases,

Signs of raised ICT are seen in 24% cases, Hemiplegia seen in 16.6% cases.

**Investigations:**

CBP: 6 cases had Eosinophilia. ESR raised in 13 cases

X- Ray chest showing infiltrates in 8.3% cases.

CSF Analysis: TB meningitis in 2 cases, Bacterial meningitis in 1 case

**CT Scan:**

CT scan was taken in all cases. It was abnormal in 46(92.0%) cases and normal in 4 (8.0%) cases.

The CT lesions suggestive of Ring enhancing lesions are 20 (40.0%) cases out of which neurocysticercosis are 10 cases and 10cases are Tuberculomas. Calcified lesions are seen in 8 (16.0%) cases. Infarcts (ischemic/hemorrhagic) are seen in 18(36.0%) cases. Tumors seen in 3 cases. Perilesional oedema was mild in NCC, more in Tuberculoma and in Infarct.

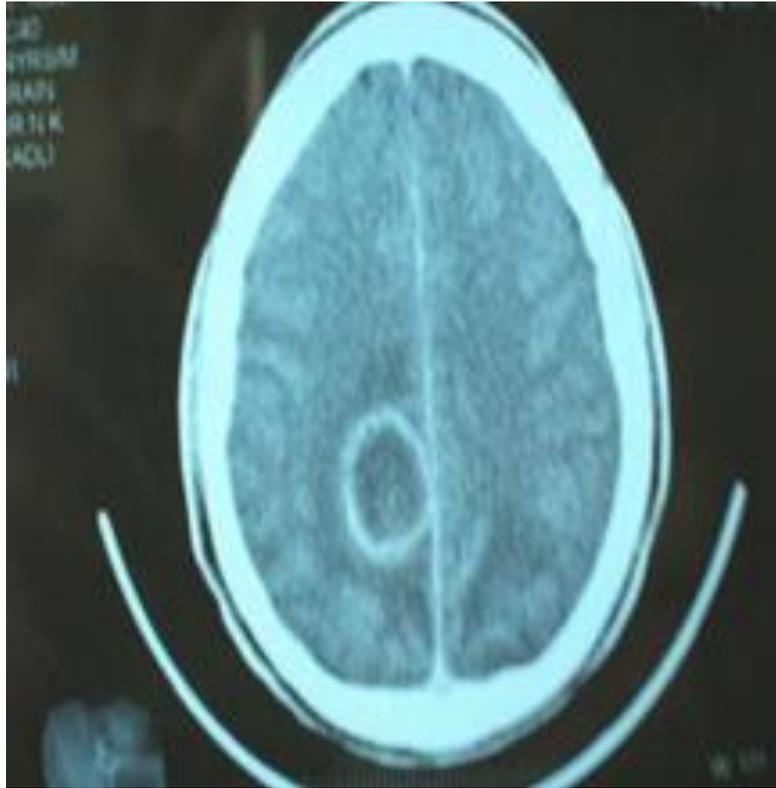
**Incidence of Aetiology of Seizures Correlating with CT****Table 7:**

Cause	No. of Patients	Percentage
CerebroVascularAccidents	18	36.0
Neurocysticercosis	10	20.0
Tuberculoma	10	20.0
Meningitis	3	6.0
SAH	2	4.0
Gliomas	1	2.0
Tumors	1	2.0
Oligodendroglioma	1	2.0
NormalCT	4	8.0

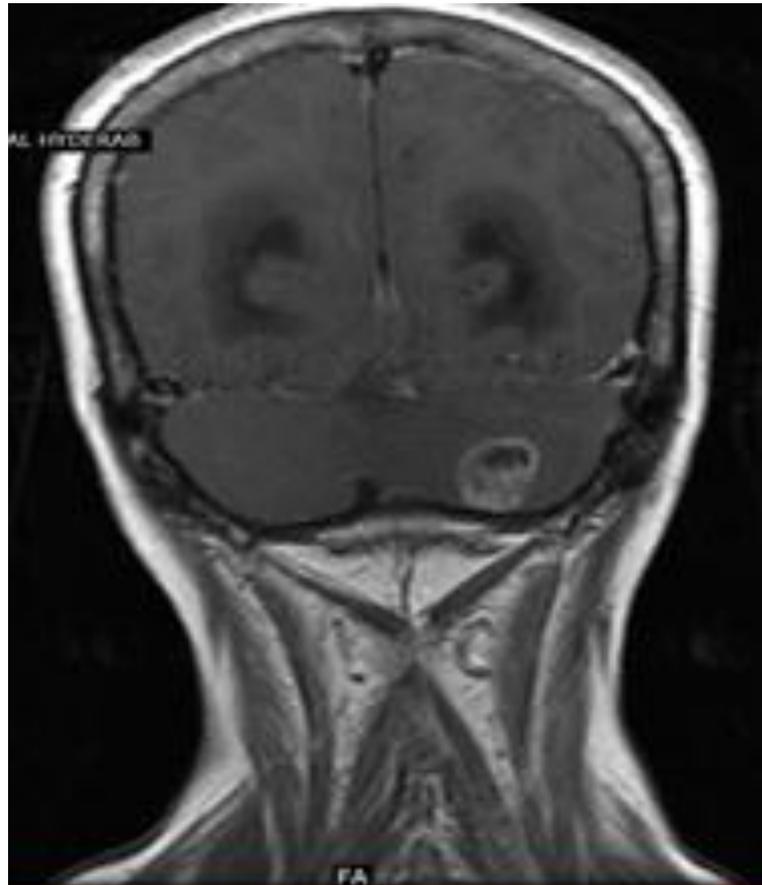
**Correlation of Type of Seizures with CT****Table 8: ?**

Type of Seizures	No. Patients	Abnormal	C.TNormal
Focalseizures withintactawareness	18	16	2
Focalseizures withimpairedawareness	28	26	1
Secondarilygeneralized	4	3	1

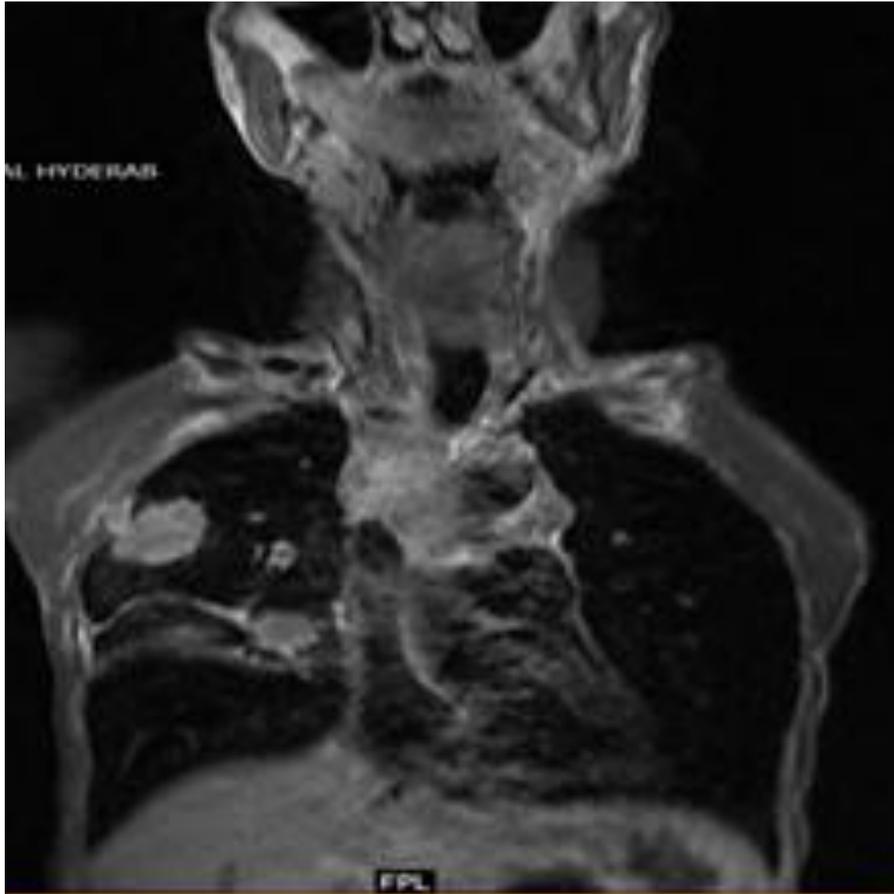
**Figure 1: Multiple ring enhancing lesions- Neuro cysticercosis**



**Figure 2: Solitary single ring enhancing lesion- Tuberculoma**



**Figure 3: Metastatic Brain tumour**



**Figure 4: Lung – Primary tumour**

## **DISCUSSION**

In this study, a total of 50 patients with new onset focal seizures were included.

### **Sex ratio**

There was a slight male preponderance (M: F=1.17:1) in this study as quoted by other studies on epilepsy in United States and Europe (Granieri et al, 1983).

### **Age distribution**

In our study, maximum number of patients were in age group of 18- 30 years, but in a similar study done by Pradeep et al,<sup>2</sup> mean age of patients was 41years. Post stroke epilepsy was common in patients of more than 51- 60 yrs.<sup>[1]</sup>

### **Type of seizures**

In the current study, focal seizures without secondary Generalization accounted for 92% of the cases. Focal seizures with Secondary generalization accounted for 8.0% of the cases.

### **Etiology of epilepsy**

In our study, Post stroke epilepsy (36%) was the commonest cause, followed by, tuberculoma (20%), neurocysticercosis (20%), brain tumor (8.0%),Diabetic keto acidosis (8%) and meningitis (6.0%).

It was very difficult to differentiate between tuberculoma and NCC based on CT findings. We did chest X ray PA view and TB ELISA for patients suspected of tuberculoma. There was a history of chronic cough in one patient. Another patient who was diagnosed to have pulmonary tuberculosis 1 year back had taken anti tubercular drugs for about 3 months and

now he presented with focal seizures with secondary generalization. The CT scan showed 3 large ring enhancing lesions which were more than 20 mm in size.<sup>[2]</sup>

Imaging and clinical features of tuberculoma are exceedingly similar to that of neurocysticercosis and it is difficult to differentiate between these two conditions.<sup>20</sup> The distinction between the two is an important issue because single cysticercus granuloma is a benign and self-limiting condition, whereas tuberculoma is an active infection that requires prolonged therapy with potentially toxic drugs.<sup>[3]</sup>

The incidence of post stroke epilepsy in India is 13%.<sup>[4]</sup> Post stroke seizures can be classified as early onset seizures,<sup>[5]</sup> occurring within two weeks following stroke onset, and late onset seizures occurring after two weeks. It is important to differentiate as it helps to determine the need and duration to treat these patients with anti epileptic drugs.<sup>[6]</sup>

Predictive factors of early seizures like hyperglycemia, hypoglycemia, hypernatremia, hyponatremia, hypocalcaemia, hypomagnesaemia, renal failure and infections increases the incidence of seizures.<sup>[7]</sup>

Patients with large hemorrhagic stroke, cortical infarcts and lesions involving more than one lobe are at higher risk of developing seizures later.<sup>[8]</sup>

Phenytoin and carbamazepine have high treatment success in post stroke epilepsy.<sup>[9]</sup>

During the initial phase of the Tuberculoma, edema and necrosis may appear as low attenuating areas on CT scan.<sup>[10]</sup>

Tuberculomas typically “enhance” after the intravenous administration of gadopentetate dimeglumine in a solid or ring pattern.<sup>[11]</sup> Tuberculomas often have an irregular outline.

Cysticercus granuloma, pyogenic abscess, metastases, fungal granuloma, and at times glioma may be indistinguishable from tuberculoma.<sup>[12]</sup>

Brain tumors are the most common localized intra cranial lesions likely to be mistaken for tuberculoma, especially oligodendrogliomas that are more likely to calcify and produce a hyper dense lesion demonstrable on CT scan.

### **Ring Enhancing Lesion**

Ring enhancing lesion seen in 20 (40.0%) cases out of which 10 cases were NCC and 10 cases were Tuberculomas.

Duration of convulsion mainly ranges from 10 – 15 minutes. Muscle weakness was absent in 85% of cases. Signs of raised ICT are seen in only 8.3% cases. Perilesional edema was absent in all cases of NCC. Localization of lesion was parietal in 36% of cases. Anticonvulsants along with albendazole and steroids are given in all 10 cases of NCC for 6 weeks and repeat CT scan done after 6 weeks. 2 cases shown disappearance of ring enhancing lesion. 1 case shown calcification of lesion. All cases responded well to treatment and recurrence of seizures is not seen in any case of NCC.

Out of 10 cases of Tuberculomas, 2 case associated with bilateral pulmonary apical fibrosis and CSF examination suggestive of TB meningitis. In one case lesion associated with severe cerebral edema and patient was treated with mannitol I.V, Antituberculosis treatment and anti-epileptic drugs. Patient responded well to treatment.

Calcified lesions are seen in 4 patients (8.0%) and all patients presented with new onset seizures and all patients treated only with anti-epileptic drugs.

Out of 50 cases, in 4 cases (8.0%) CT scan was inconclusive and EEG was abnormal in only 2 cases (4.0%) 1 case of bacterial meningitis (confirmed by CSF examination) presented with focal seizures and responded to treatment with anti-epileptic drugs.

1 case of T.B. meningitis (confirmed by CSF examination) presented with right complex focal seizures. And patient was treated with Tab. Carbamazepine 300 mg Bid and anti tuberculosis drugs. Patient recovered. In our study we found focal seizures to be primarily a disorder of the young.

Most patients belongs to the age group between 18 – 30 years (48.0%), this is similar to the study done S.Misra, R.Verma, O.P. Lekhra.<sup>[13]</sup> They studied 1023 patients with focal seizures and correlated with C.T. scan.

The seizure type in our study were mainly focal with impaired awareness, this was seen in 56% of the cases studied.

The incidence of focal seizures with intact awareness was 36.0%, is similar to the Rochester study done by Hauser and Kurland, which reported the incidence of focal seizures with impaired awareness to be 42%, International League against epilepsy also quotes similar results.

On symptom analysis we found that Ring enhancing lesion presented mainly with 3 – 4 episodes of focal seizures. Headache and vomiting was seen in 16.0% of cases. Speech abnormality is seen in 12% of cases. Hemiplegia was seen in 36.0% of cases, Cranial nerve involvement in 5% cases.

On analyzing patient with ring enhancing lesions severe weakness with focal neurological deficit was seen only in 2 cases. Bhatia et al also reported similar findings with respect to ring enhancing lesion.

The overall C.T. abnormality is detected in 92.0% of cases, this is in correlation with study done by S. Misra and R.Verma and O.P. Lekhra<sup>32</sup> showing 79.3%, various studies in the past reported C.T. abnormalities in 25 – 70% of focal seizures. Normal C.T. scan is found in 4.0% of cases.

The C.T. abnormality of ring enhancing lesion was seen in 20 cases (40.0%) in our study, but it is not correlating with the studies done by S. Misra et al,<sup>[1]</sup> in which they found 63.3% incidence. In a study from West India, Wadia et al found single small enhancing lesion in 26% of patients with focal seizures. In a study from north India, Bansal et al,<sup>[14]</sup> found this lesion in 39.5% patients with focal or generalized seizures. In the present study neurocysticercosis & tuberculomas are the causes of ring enhancing lesion in 20.0% & 20.0% of cases respectively. This is not fully correlating with the study done by Dr. Rajashekar,<sup>[15]</sup> where the incidence of neurocysticercosis in ring enhancing lesion is 60%.

In 50% of cases (5 out of 10 cases) location of ring enhancing lesion is in parietal lobe, Rajashekar et al,<sup>[15]</sup> found 82.5% of neurocysticercosis occurs in parietal lobe. In 1980 Bhargava and Tandon,<sup>[16]</sup> reported tuberculoma was the most common cause of ring enhancing lesion.

All patients with ring enhancing lesion responded well to treatment with anti-epileptic drugs with mono therapy. There was no recurrence of seizures in all patients in our study. In a study done by Rajashekar 14.5% of patients had recurrence of seizures, in most of the patients seizure control was achieved with mono therapy, 12% of patients required second anti-epileptic drug.<sup>[15]</sup> Murthy and Reddy achieved good seizure control in all of their 102 patients with mono therapy.<sup>[17]</sup>

In our present study we treated all 5 patients of neurocysticercosis with Albendazole and Steroid for 4 – 6 weeks, repeat CT scan was done after 6 weeks, 2 cases showed disappearance of lesion. In 1 case, lesion calcified. Rajashekar et al studied 11 patients, they found resolution of lesion in 2 patients in repeat C.T. scan and more the 50% reduction in size in 2 patients, in their second study on 43 patients 20 patients (46.5%) responded positively. 9 Murthy and Reddy suggested Albendazole therapy in patients with C.T. scan showing Scolex.<sup>[17]</sup>

In our present study no patient had side effects. Calcified lesions were found in 11% of cases. This is in correlation with the study done by R. Mishra and Verma et al. Vascular lesions were found in 16.6% cases.<sup>[13]</sup>

## CONCLUSION

The incidence of generalized seizures showed a falling trend as the age advances whereas focal seizures show reverse trend with advancing age. Overall, the most common etiology of adult onset seizures is stroke. Other causes in descending order are idiopathic seizures, CNS infections, metabolic causes, and brain tumors. Gliosis, CVT, ADEM, MS, and PRES are the less common causes. MRI is superior to CT for the diagnosis of conditions such as acute infarcts, neurocysticercosis, tuberculomas, encephalitis/meningitis, CVT, MS, ADEM, and PRES. However, MRI brain can be normal in up to 30% patients with adult onset seizures. It is mandatory to deal carefully with each case of adult onset seizure, and in addition to proper history, physical and neurological examination, each patient must get EEG, CT/MRI brain, and other ancillary investigations to exclude structural or metabolic causes of adult onset seizures.

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