

**NEW ONSET SEIZURES- A CLINICAL, AETIOLOGICAL AND RADIOLOGICAL PROFILE**

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**ABSTRACT****BACKGROUND**

New onset seizures are a common occurrence in any hospital. An early aetiological diagnosis is mandatory for adequate treatment of the patient.

Aim of the Study- To evaluate the aetiological profile of new onset seizures in adults with the help of laboratory and neuroimaging studies in a tertiary care hospital in Chengalpattu.

**MATERIALS AND METHODS**

200 Cases of new onset seizures were included in the study. The aetiology was determined by neuroimaging and appropriate investigations were done.

**RESULTS**

Within the age group of 12-85 yrs., maximum cases were seen between 21-40 yrs. and 40-60 yrs. 122 (61.0%) were GTCS, 40 (20%) were focal with secondary generalized, 28 (14%) were simple focal.

**CONCLUSION**

Metabolic causes are the most common followed by CNS infection. Incidence in male is more than in female.

**KEY WORDS**

GTCS (Generalised Tonic Clonic Seizures).

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**BACKGROUND**

A seizure is a paroxysmal event due to abnormal, excessive or synchronous neuronal activity in the brain.<sup>[1]</sup>

The aetiology of seizures may be idiopathic or related to a particular disease. There are significant differences in the aetiology of patients with new onset seizures and those with recurrent seizures and epilepsy.<sup>[2]</sup>

**Acute Symptomatic Seizures Show Clearly Differentiated Characteristics with Regard to True Epileptic Seizures**

1. A clearly identified causal association,
2. Generally, tend not to recur,
3. Usually long-term antiepileptic drug (AED) treatment is not necessary.<sup>[3]</sup>

The aetiological spectrum of new-onset seizures and outcome may be different in developing countries when compared to developed countries. Studies in developing countries suggest that the incidence is nearly 100 per 100,000. While several studies have been published in the developed countries regarding aetiology of seizures, there is limited published data on aetiology of seizures in Asia.

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Hence this study is being carried out to find reversible aetiologies of acute symptomatic seizures before considering pharmacotherapy and to distinguish unprovoked and provoked seizures during diagnostic procedure.

**Aims and Objectives**

1. To analyse the aetiological factors in patients >12 years of age presenting with acute symptomatic seizures.
2. To study the incidence of potentially curable causes of seizures.
3. To study the pattern of seizures and associated features.

**MATERIALS AND METHODS****The Study Group**

The study was conducted with patients admitted in medical wards and IMCU of Chengalpattu Medical College Hospital, Chengalpattu.

**Study Design**

Cross sectional study for a period of one year between October 2016 to September 2017

**Inclusion Criteria**

- Patients admitted with first episode of seizure.
- Age more than 12 years.

**Exclusion criteria**

Hyperventilation, TIA, psychogenic seizures, movement disorders (Choreoathetosis, tic disorder).

**Methods**

Patients with new-onset acute symptomatic seizure admitted in medical wards and IMCU of Government Hospital, Chengalpattu were studied.

A detailed history was recorded from the relatives about the details of the seizure event and, associated symptoms like fever, headache, vomiting, weakness or loss of consciousness. Complete neurological examination was done to find out any aetiological factors, focal neurological deficits or complications. Fundus examination was done to look for papilledema, or retinopathy.

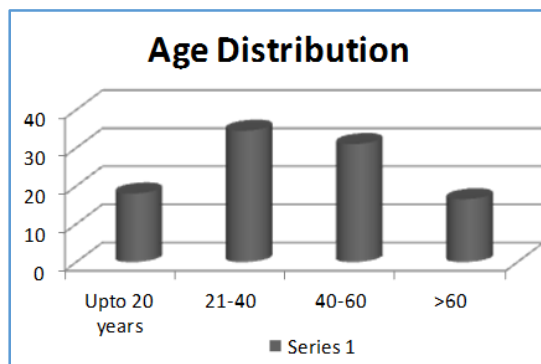
Baseline investigations were done to find out metabolic changes like renal and liver function/electrolyte imbalances. CSF analysis was done for indicated patients. CT brain was done for all patients with seizures. MRI brain was done only when CT was normal or in case of doubtful diagnosis like brain tumours, and for imaging of sinuses and venous system.

CT or MR angiogram was done for patients with CVT, AVM or other vascular abnormalities Patients were treated according to type of seizure and underlying aetiology. EEG was done routinely for all patients in the interictal period.

Results were analysed depending on the age group, causes and investigations used for the study. The outcome of the study is as follows:

**RESULTS**

Age of patients varied from 12 to 85. Age distribution of patients is given in Figure 1.



**Figure 1. Age Distribution**

In the age group of 12-85 yrs. maximum cases were seen between 21-40 yrs. and 40-60 yrs.

Sex	Cases	
	No	%
Male	106	53
Female	94	47
<b>Total</b>	<b>200</b>	<b>100</b>

**Table 1. Sex Distribution**

Among 200 patients 106 were males and 53 are females. New onset seizures was more common in males.

Type of Seizures	Cases	
	No.	%
Focal	28	14
Focal Generalised	40	20
GTCS	122	61
EPC	10	5
<b>Total</b>	<b>200</b>	<b>100</b>

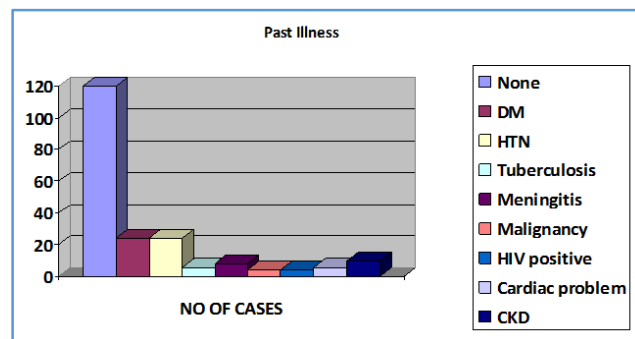
**Table 2. Type of Seizures**

Most common presentation was generalised tonic clonic seizures.

Symptoms	Present		Absent	
	No	%	No	%
Fever	75	37.5	125	62.5
Headache	75	37.5	125	62.5
Vomiting	75	37.5	125	62.5
CSOM	4	2	196	98
Trauma	6	3	194	97
Weakness of Limbs	40	20	160	80

**Table 3. Associated Symptoms**

Patients with acute symptomatic seizures due to infections and CVT had headache, vomiting and fever. Patients with meningitis, brain abscess, encephalitis were presented with fever. Patients who had mass lesions like tumor, neurocysticercosis, tuberculoma or abscess and CVT are presented with headache and vomiting.



**Figure 2. Past Illness**

Among these 200 patients 24 are diabetic, 24 were hypertensive, 6 had tuberculosis, 8 had past history of meningitis, 4 had malignancy of breast and lung. 4 were HIV positive, 6 patients had cardiac problem and 10 had CKD.

Altered Sensorium	Cases	
	No.	%
Absent	30	15
Drowsy	135	65
Stupor/ Coma	40	20
<b>Total</b>	<b>200</b>	<b>100</b>

**Table 4. Altered Sensorium**

Fundus examination was normal in 134 patients and there was papilledema for 40 cases and 16 cases had retinopathy due to diabetes, hypertension related. Blood pressure was high in 68 patients.

Focal Neurological Deficit	Cases	
	No.	%
Absent	134	67
Right Hemiplegia	8	4
Left Hemiplegia	30	15
Monoplegia- Right	10	5
Monoplegia-Left	8	4
Homonymous hemianopia	4	2
Cranial nerve palsy	6	3
<b>Total</b>	<b>200</b>	<b>100</b>

**Table 5. Focal Neurological Deficit**

Among 200 patients with acute symptomatic seizures, 66 patients had focal neurological deficit.

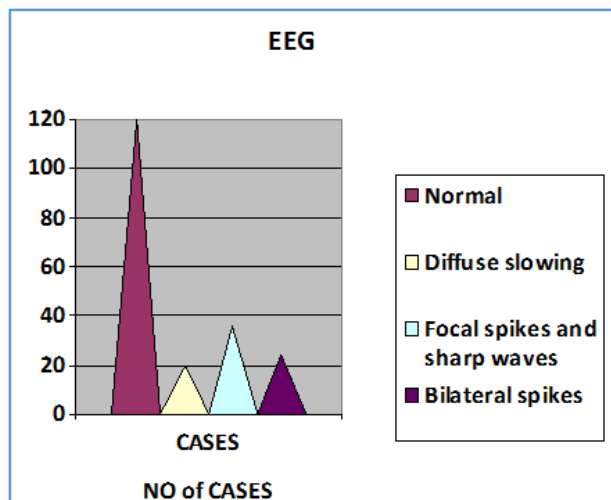


Figure 3. EEG

EEG was normal in 120 cases out of 200. Among 80 abnormal cases, 20 showed diffuse slowing, 36 cases showed focal spikes and sharp waves and 24 showed bilateral spikes and waves.

CT Scan Findings	% of Underlying Cause						
	Infection	Metabolic	CVT	Stroke	Tumour	Calcified Granuloma	Others
Normal	10	100	12	10	-	-	30
Abnormal	90	-	88	90	100	100	70

Table 6. Underlying Causes and CT Scan Findings

Underlying Cause	Cases	
	No.	%
Infection	56	28
Metabolic	76	38
Stroke	24	12
CVT	10	5
Calcified granuloma	18	9
Tumor	6	3
Others	10	5

Table 7. Underlying Causes

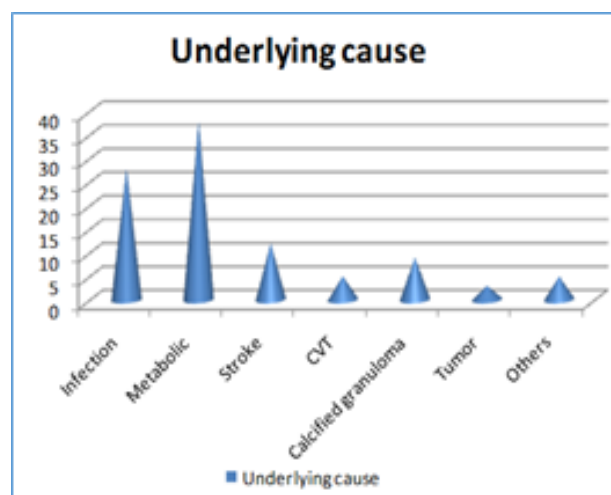


Figure 4. Underlying cause

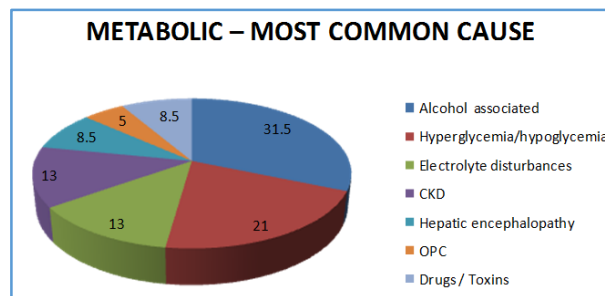


Figure 5. Metabolic- Most Common Causes

Among metabolic causes 24 patients presented with alcohol withdrawal/ intoxication induced seizures, hyperglycaemia associated seizures in 12 patients, hypoglycaemia were 4 patients. Electrolyte disturbances in 10 patients, that includes hyponatremia, hypocalcaemia.

Uraemia induced seizures in 10 patients, hepatic encephalopathy in 6 patients, drug induced seizures includes 6 patients, organophosphates poisoning in 4 patients.

Diagnosis	Frequency	Percent
Bacterial meningitis	10	18
Tubercular meningitis	22	39.5
Neurocysticercosis	4	7
Encephalitis	10	18
Brain abscess	4	7
Brain abscess with CVT	2	3.5
Osteomyelitis, Epidural abscess, cerebritis	4	7
<b>Total</b>	<b>56</b>	<b>100</b>

Table 8. Infection - Second Most Common Cause

Age Group	% Underlying cause						
	Infection	Metabolic	Stroke	CVT	Tumor	Calcified Granuloma	Others
Upto 20 years	68.3	12.7	4.6	1.4	3		10
21-30 years	35.2	22.8	3.4	29.6	-	3	6
31-40	30	48.4	6.6	9.8	-	-	5.2
41-50	31.3	41.7	7	8	7.7	2	2.3
51-60	28.1	49.9	12.3	4	1	2.7	2
>60	2	55.5	24.5	-	10	5	3

Table 9. Underlying Cause and Age

Infections were most common cause among patients below 20 years of age. Adults aged 20-30 years, infection was most common followed by CVT and metabolic. In patients with 30-40 age group, most common cause was metabolic followed by infection. Patients aged 41-60, most common aetiology was metabolic abnormalities and next common was stroke and infections. Patients >60 years metabolic causes were leading followed by stroke and tumours.

## DISCUSSION

### Demography

Acute symptomatic seizure is an important cause of morbidity in our part of the country. It is important to find out the underlying cause and its treatment for prevention of recurrent seizure.

Among our 200 patients, 106 cases were males and 94 cases of females in our study. The mean age is 38.5 and there is patients from 12 to 85 years of age. Study by Sander et al<sup>[4]</sup> the proportions of males and females were similar. Usha Kant Misra et al<sup>[5]</sup> study the median age of the patients was 37 years from 16-78 years.

According to Jaishree T Narayanan et al<sup>[6]</sup> the mean age of patients with acute symptomatic seizures was 49.07 + 20.29 years (Six months to 80 years) as they had included paediatric patients in their study. In our study, less than 20 years were 18%, 21-40 years of age were 34.5 %, 41-60 years 31 % and more than 60 years were 16.5 %. Younger adults are major category in our study group. Study by Sander et al 25% (21-28%) were younger than 15 years and 24% (21-28%) were 60 years or older. Twenty-four (36%) were aged 60 years and above in Jaishree T Narayanan et al study.

### Mode of Presentation

In our study 61% of patients the type of seizure is GTCS and 20% focal with secondary generalization and 14% presented with focal seizure and 5% with epilepsia partialis continua. Study by Usha Kant Mishra et al, generalized tonic-clonic seizure was the seizure type in 36 (55%) patients and in the remaining 30 (45%) patients, the seizure type was focal with or without secondary generalization. According to Sridharan et al<sup>[7]</sup> in the new cases of epilepsy 50% have seizures of focal origin and 50% of generalized origin before the age of 40 years. After 40 years, the proportion of partial epilepsy rises to 75% by the age of 75. Study by Clifford Scholda<sup>[8]</sup> total of 56% of the patients had focal motor seizures, and in 44%, the seizures were generalized.

### Aetiology

Most common cause of seizure in our study is metabolic followed by infection and vascular insult to brain. Out of 200 cases 38% of cases are due to metabolic and toxic, 28% due to infection, 12% due to stroke, 3% due to tumor, 5% due to CVT and 9% are due to single calcified lesions. 5% are classified as others include arachnoid cyst, AVM, Alzheimer's disease.

In our study, 38% are due to metabolic and toxic causes. Jaishree T Narayanan et al study showed metabolic disorders in 32% of cases of seizures. Study by Jaishree T Narayanan out of 21 cases, 15 were due to hyponatremia, 4 were due to hyperglycaemia, 2 were due to hypoglycaemia. In our study, 6 cases of seizures were related to toxins, out of that, 2 were due to organophosphorus poisoning, another 2 cases cypermethrin poisoning and 2 cases were tricyclic antidepressant over dosage. Study by Jaishree T Narayanan there was 6 cases of alcohol related seizures

In our study 28% are due to infection and calcified granuloma single or multiple 9%. Study by Jaishree T Narayanan showed central nervous system (CNS) infections in 32% patients. Study by Ravindra Kumar Garg et al infective pathologies were the most common aetiology.

In our study out of 56 cases of infections, 22 (39.5%) cases are due to tubercular meningitis, 10 (18%) are due to bacterial meningitis, 10 (18%) cases are due to encephalitis, 4 (7%) cases are due to neurocysticercosis, 4 (7%) case due to osteomyelitis, epidural abscess, 4 (7%) case are due to brain abscess. The distribution of the pathology according to Jaishree T Narayanan et al in patients with CNS infections was meningoencephalitis in 43% and parenchymal granuloma in 57% of patients out of that 75% due to degenerative phase solitary cystic granuloma and 25% due to tuberculoma. Study by J. M. K. Murthy et al<sup>[3,9]</sup> Neurocysticercosis, SCTL and small single cerebral calcific CT lesion (SSCCCTL) together accounted for 40% of aetiological factors and neuro-tuberculosis for 10%.

In our study neuro-tuberculosis accounts for 39.5% of infections and according to Jaishree T Narayanan et al it was 25% and J. M. K. Murthy et al 10%. Study by Ravindra Kumar Garg et al tuberculosis was the commonest infective pathology.

In our study 7% of infections are due to neurocysticercosis and 18 cases due to small cerebral calcific CT lesions. According to Jaishree T Narayanan et al parenchymal granuloma in 57% patients with CNS infections, out of that 75% due to degenerative phase solitary cystic granuloma. Study by J. M. K. Murthy et al neurocysticercosis accounted for 40% of aetiological factors.

Study by Ravindra Kumar Garg et al second most common infection was neurocysticercosis following tuberculosis.

In our study 12% of cases the cause of seizure is stroke and 5 % due to CVT. Out of these 13(55%) cases are due to haemorrhagic stroke, 11 (45%) are related to infarction. By Jaishree T Narayanan cerebrovascular diseases (ischemic, venous and haemorrhagic) in 21% cases and by JMK Murthy vascular in 14% (Ischemic 6%, Haemorrhagic 5%, CVT 3%) of cases. Mean age of patient presenting with seizure due to stroke was 51+/- 18 years. Studies from developed countries acute symptomatic seizure due to vascular causes were common.

Study by Sander et al vascular disease in 15% (12-18%). Study by J. M. K. Murthy et al cerebrovascular diseases were the risk factors in 48% of patients with remote symptomatic seizures and cerebrovascular diseases were the aetiological factors in 64% of patients aged >40 years. According to Sridharan et al cerebrovascular disease is the most commonly identified cause among adults, 37% of symptomatic seizures.

There are 10 cases of CVT and 2 cases of CVT with brain abscess secondary to CSOM in our study. CVT is a common cause of seizure in the postpartum period in our hospital. Jaishree T Narayanan et al study 3% of cases were due to CVT. Study by Dr J. M. Murthy 3% of cases were due to CVT. Cortical venous thrombosis is an important cause of acute symptomatic seizures among young patients with cerebrovascular diseases more among females and in males CVT more common among alcoholics.

Seizure associated with fever, headache or vomiting should be investigated to find out the underlying cause. In our study patients with infections and CVT had headache, vomiting and fever. Among these 75 patients had fever at the time of seizures. Patients with meningitis, brain abscess, encephalitis were presented with fever. Headache and vomiting were present for 75 patients. Most of these

patients had mass lesions like tumor, neurocysticercosis, tuberculoma, abscess or CVT.

Immediate non-contrast CT is useful for emergency patients presenting with seizure to guide appropriate acute management, especially where there is an abnormal neurologic examination, predisposing history, or focal seizure onset. MRI has been shown to be highly sensitive and specific in identifying the underlying pathology in focal epilepsy.

In our study among 200 patients, 80 patients showed abnormal EEG, 10% showed diffuse slowing, 18% cases showed focal spikes and sharp waves and 12% showed bilateral spike and wave pattern. The frequency of various ictal discharges was variable in different studies. In the series by Granner and Lee<sup>[10]</sup> ictal discharges were generalized in 69%, diffuse with focal predominance in 18%, and focal in 11%.

Seizures may herald or complicate acute neurological and medical disorders. The aetiological spectrum in the present study was distinctly different when compared to the data from developed countries and it well correlate with other studies from developing countries and other studies from south India. New-onset acute symptomatic seizures are different from unprovoked seizures in that they generally do not recur and usually do not need long-term AED therapy.

When considering the results of this study the limitations of the study must be recognized. This is a highly selected population and the findings may not be generalizable. In developing countries CNS infections like tuberculous meningitis, bacterial meningitis and NCC are endemic and are frequent risk factors for new-onset acute symptomatic seizures.

There is a need to study a large population of patients with these pathologies for the risk of recurrence of seizures as it may have therapeutic implications, possible AED prophylaxis.

Alcohol related seizures are more seen now a days. The increased incidence of alcohol withdrawal seizures in and around our hospital, needs further studies, but the number of CNS infections related seizures are in decreasing in nature probably due to effective use of antibiotics and appropriate treatment of other febrile illnesses.

## CONCLUSION

Acute symptomatic seizure can develop at any age and it is most common in patients 20-40 years of age. Most common cause of acute symptomatic seizures is metabolic, of which alcohol related causes (intoxication & withdrawal) are most common in our patients, especially in young adults. Second

common cause is CNS infection and followed by CVT, stroke and brain tumours (both primary and secondaries). Infections are more common in younger patients and cerebrovascular accidents are more common in older patients. CVT is an important cause of seizure in females during peripartum period. In males, CVT is secondary to hypercoagulable conditions, infections and alcoholism. Tuberculoma brain and neurocysticercosis are the most common CNS infections causing seizures, followed by brain abscess and encephalitis. The metabolic causes of seizures other than alcohol related, are hyperglycaemia/hypoglycaemia, uraemia, hepatic failure, hyponatremia, toxins and drugs.

Alcohol withdrawal is a major risk factor seen commonly in our patients and is a major cause for acute symptomatic seizures even though CNS infections appear to be a major cause, as described in previous studies.

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