

## Original Research Article

# New onset seizures an etiological study

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**Received:** 22 September 2017

**Accepted:** 26 September 2017

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### ABSTRACT

**Background:** Seizures are common disorders found all over the world and are encountered frequently during medical practice in variety of settings. Etiological spectrum of acute symptomatic seizures in developing countries is different from developed countries. So, this study was done to know the various etiologies of new onset seizures in adults in this region.

**Methods:** Consecutive 100 Cases of new onset seizures from the Bhagwan Mahaveer Jain hospital, Bengaluru, were included in the study. The etiology was determined by neuroimaging and appropriate investigations including cerebrospinal fluid examination.

**Results:** Of 100 patients 89% were acute symptomatic seizures. The seizure types were GTCS in 71% and 29% had simple or complex partial seizure (s) with or without secondary generalization. 8 (8%) patients had status epilepticus (SE). 40% Of SE were caused by neuroinfections. Neuroinfection was the leading cause of seizure, which accounted for 34%, followed by Cerebrovascular accidents (29%) and metabolic (9%). Neurocysticercosis is most common cause in neuroinfection (35%), followed by meningitis (29%) and cerebral malaria (17%). 8% of seizures were because of CNS Tuberculosis. 55% of the CVA were due stroke and 34% due to CVT. 14% of seizures were pregnancy related.

**Conclusions:** This study illustrates that the etiological spectrum of seizures in this part of the world is different from that described from developed countries and CNS infections account for a significant number of cases.

**Keywords:** Acute symptomatic seizures, Cerebral venous thrombosis, Infections of central nervous system, Neurocysticercosis

### INTRODUCTION

Seizures are common disorders found all over the world and are encountered frequently during medical practice in variety of settings. Etiological spectrum of acute symptomatic seizures in developing countries is different from developed countries. Presently CNS infections like malaria, meningitis, tuberculosis, HIV, neurocysticercosis account for significant number of cases in developing countries.<sup>1</sup> since these infections vary from region to

region; etiology of seizure may also vary from region to region. Single small enhancing CT lesions (SSECTL) (ring enhancing/disc lesions, 20mm in size) are an important cause of seizures in India. Initially it was thought that SSECTL were because of tuberculosis, focal encephalitis, micro abscesses and cysticercosis but now histopathological studies suggest that in most of the cases SSECTL is because of dying cysticercus larva.<sup>2</sup> so etiology itself changes over time.

Seizures occur in about 40 percent of patients, which is higher when compared to arterial stroke. Focal seizures are more common but they can generalize to a life-threatening status epilepticus.<sup>3</sup> Etiology of seizures can be easily made out in most of the older patients. The causes include subdural haematoma, stroke, CNS infections, degenerative disorders like Alzheimer's disease and malignancy which includes malignant gliomas, and brain metastases.<sup>4</sup> In stroke seizures occur more commonly with hemorrhagic stroke than with ischemic stroke.<sup>5</sup> They also can occur with systemic metabolic conditions like uremia, hyperglycemia, hypoglycemia, hyponatremia and alcohol withdrawal.<sup>4</sup> With the advent of modern technologies like CT scan, MRI and CSF serology for infection like viral, tubercular, neurocysticercosis, the diagnosis of seizure has become more accurate and has completely changed the course of management. So, this study is done to know the various etiologies of new onset seizures in adults in this region.

## METHODS

This prospective study was done in the Bhagawan Mahaveer Jain Hospital, Bengaluru, from June 2010 and ended on May 2012. The institutional ethical committee approved our study protocol. 100 cases of new onset seizures that fulfilled the criteria as mentioned in materials and methods were included in the study. The informed consent was taken from all the patients enrolled in our study. The study criteria include: Age of patients more than or equal to 18 years; Patients presenting with new onset seizures. New onset seizure is defined as the first seizure (or the first cluster of seizures within 24-hour period) ever experienced by the patient and excludes: Patient with seizure like episodes; Hyperventilation, TIA, Narcolepsy, Movement disorder like choreoathetosis, tic disorder, psychogenic seizures. Patients presenting with history of seizures were included in the study. Patient and eyewitness were interviewed regarding history, and clinical examination was done as mentioned in proforma. The investigations included hemoglobin level, total count, differential count, ESR, urine routine, blood urea, serum creatinine, blood glucose levels, liver function test and estimation of serum electrolytes like sodium, potassium, and calcium. Special investigations like lumbar puncture, serological tests, CT scan brain, EEG were done in selected cases. The collected data was analysed using the computer programme Statistical Package for Social Sciences (SPSS 11.0) and Systat 8.0. Microsoft word and Excel have been used to generate graphs tables. Descriptive analysis was used to compute percentage, to calculate Mean and Standard deviation.

## RESULTS

Out of 100 patients 55% were males, 45% were females with male to female ratio of 1.22: 1.0. Majority of males were in 5<sup>th</sup> decade and females were in 3<sup>rd</sup> decade. Patient's age ranged from 17 years to 80 years, with

Mean of 40.51 years, with 74% Of the patients were in the below 50 years.

**Table 1: Etiological spectrum of seizures in different age group.**

	HAUSER <sup>13</sup> et al study (1995) (U.S.A).	Our study
15-35 years	Alcohol related	Neuroinfection (50%)
	Head trauma	CVA (all were CVT) (30%)
35-64 years	Alcohol related	Neuroinfection (37%)
	Tumour	Stroke (20%)
	Head trauma	Idiopathic (18%)
> 65 years	Strokes	Alcohol related (7%)
	Strokes (50%)	CVA
	Metabolic	Metabolic
		Neuroinfection

**Table 2: Distribution of etiologies in patients with seizures.**

Etiologies	Number	%
	(n=100)	
Neuroinfection	34	34.0
Meningitis	10	10.0
Meningoencephalitis	3	3.0
Neurocysticercosis (NCC)	12	12.0
Cerebral malaria	6	6.0
Tuberculoma	3	3.0
Cerebrovascular accidents	29	29.0
Infarct	10	10.0
Haemorrhage	6	6.0
Cerebral venous thrombosis	11	11.0
SAH	1	1.0
Subdural haemorrhage	1	1.0
Idiopathic	9	9.0
Metabolic	9	9.0
Hypoglycaemia	5	5.0
Hyperglycaemia	1	1.0
Hypocalcaemia	1	1.0
Hyponatraemia	2	2.0
Tumor	6	6.0
Meningioma	1	1.0
Glioma	2	2.0
Secondaries	1	1.0
Glioblastoma	2	2.0
Miscellaneous	6	6.0
A-V malformations	2	2.0
Post dialysis	1	1.0
Alcohol withdrawal	3	3.0
Poisoning	4	4.0
OP compound	3	3.0
Chloroquine over dosage	1	1.0
Elcampsia	3	3.0

**Table 3: Association for etiology and type of seizures.**

Etiology	Type of seizures						Total
	GTCS	PSSG	SE	SPS	CPS	PC	
Neuroinfection	25	3	3	2	1	-	34
NCC	6	3	2		1		
Tuberculoma	2			1			
Others	17			1			
CVA	15	10	-	4	-	-	29
CVT	7	3		1			
INFARCT	4	4					
Haemorrhage	3	2					
Tuberculoma	2			1			
Others	17			1			
Idiopathic	8	-	1	-	-	-	9
Metabolic	5	1	1	1	-	1	9
Tumor	1	3	-	1	1	-	6
Miscellaneous	4	-	1	-	1	-	6
Poisoning	3	-	1	-	-	-	4
Eclampsia	2	-	1	-	-	-	3
Total	63	17	8	8	3	1	100

Neuroinfection was the leading cause of seizure which accounted for 34%, followed by Cerebrovascular accidents (29%) and metabolic (9%). In 9% of seizures were idiopathic (cryptogenic). Neurocysticercosis (35%) was the most common cause among neuroinfection, followed by meningitis (29%) and cerebral malaria (17%). 55% of the CVA were due stroke and 34% due to CVT. 55% of metabolic seizures were due to hypoglycaemia. 14% of seizures were pregnancy related. In males, majority of seizures were because of neuroinfection (38.2%), followed by CVA (20%). Most of idiopathic seizures (77%) and all alcohol related seizures occurred in males.

In female's majority of seizures were because of CVA (40%) of which CVT accounted for 24%, followed by neuroinfection 28.9%. 14% of seizures were pregnancy related and all seizures due to poisoning occurred in females. Up to 5th decade Neuroinfection were the most common cause for seizures (40%) followed by CVA (24%). Above 50 years CVA was the most common cause (43%) followed by metabolic seizures (27%). All CVA occurring in 2nd and 3<sup>rd</sup> decade was CVT. GTCS was the most common seizure. The most common causes for GTCS were Neuroinfection (40%), followed by CVA (23%) and Idiopathic (13%). 59% of PSSG is caused by CVA. 38% of SE is caused by neuroinfection. 1 patient had EPC due to Hypocalcaemia. 3% of seizures were CPS. All causes are space occupying lesions.

## DISCUSSION

Seizures are common disorders found all over the world and are encountered frequently during medical practice in

variety of settings. Etiological spectrum of seizures in developing countries is different from developed countries. So, this study on "seizures" was done to know the various etiologies of new onset seizures in adults in this region.

Age and Sex distribution: Etiological spectrum depends on age, sex, geography and medical setting.<sup>6</sup> Out 100 patients 55 were males and 45 were females, with male to female ratio of 1.22: 1.0 Majority of males were in 5<sup>th</sup> decade and females were in 3<sup>rd</sup> decade. In a study from United Kingdom by SANDER et al (1990), 25% were below the age of 15 years, 51% in 3<sup>rd</sup>-4<sup>th</sup> decade, and 24% above 60 years.<sup>7</sup> Another study from south India (Hyderabad) by Narayanan JT and Murthy JMK, 36% were > 60 years, with mean age of 49 years.<sup>8</sup> In the present study, patient's age ranged from 17 years to 80 years, with Mean of 40.51 years. (Patients more than or equal to 15 years, were included in the study). Majority of patients were in the age group of 21-30 years (n = 28, 28%) followed by 41-50 years (n = 19, 19%). 78% Of the patients were in the age group of 21-60 years. 12% Of the patients were in the age group of >60 years. In our study majority of patients were younger unlike western studies were many were in older age group. Mean age was lower (41 years) when compared with study by NARAYANAN JT and MURTHY JMK, probably etiological spectrum varies from region to region.<sup>8</sup> More of CVT patients were seen in our study. No difference in male to female ratio was observed. All studies were slightly male predominate. Idiopathic seizures were most common seizures in western population unlike acute symptomatic in present study. In present study, Neuroinfection is leading cause of seizure which accounted for 34%,

followed by Cerebrovascular accidents 29% and metabolic 9%. In 9% of patient's cause is idiopathic (cryptogenic). In neuroinfection Neurocysticercosis accounted for 12% of seizures followed by meningitis 10% and cerebral malaria 6%. Stroke accounted for 16% (Infarct-10, Haemorrhage-6), followed by cerebral venous thrombosis 11%. Neuroinfection occurred in 2% of the patients in SANDER et al study, 15% in Hauser et al, 77% in study by Murthy JMK and Ravi Y and 32% in a study by Narayanan JT and Murthy JMK.<sup>11,10,9,1</sup> In our study etiology is comparable to Indian studies. Single small enhancing CT lesions (SSECTL) (ring enhancing/disc lesions, 20 mm in size) are an important cause of seizures in India.<sup>10</sup> SSECTL accounted for 50% of seizures in study by Murthy JMK and Ravi Y.<sup>1</sup> In our study it occurred only in 5% of cases. This may be because of regional variation in incidence of neurocysticercosis.

CVA occurred in 15% of the patients in SANDER et al study, 18% in Hauser et al, 14% in study by Murthy JMK and Ravi Y and 21% in a study by Narayanan JT and Murthy JMK.<sup>7,13,1,8</sup> In our study CVA occurred in 29%. This is because postpartum CVT were seen in 11% of cases, which is higher even when compared in Indian studies. Alcohol related seizures occurred in 9% of the patients in Sander et al study, 11% in Hauser et al, and 3% in our study.<sup>7,9</sup> Alcohol related seizures were less common when compared with western studies. Seizures due to poisoning were more common than alcohol withdrawal in present study. In our study, 59% of neuroinfection were seen in 3<sup>rd</sup> and 4<sup>th</sup> decade, 27.5% of CVA occurred in 3<sup>rd</sup> decade, 17% occurred in 5<sup>th</sup> decade, All CVA occurring in 2<sup>nd</sup> and 3<sup>rd</sup> decade were CVT, 61% of stroke occurred after 50 years, 45% of metabolic seizures occurred in 5<sup>th</sup> decade.

Etiological spectrum of seizures in different age group was significantly different in our study, when compared to Hauser et al study.<sup>9</sup> Seizures due to Neuroinfection were leading cause in age group of 15-35 years and 35-64 years in our study, whereas alcohol related seizure in Hauser et al study.<sup>9</sup> Seizures due to CVA occurred in 30% of patient in age group of 15-35 years because all the Cerebrovascular accidents were because of postpartum cerebral venous thrombosis which occurred in 2<sup>nd</sup> and 3<sup>rd</sup> decade.

In our study, Most of neuroinfection patients presented with GTCS (73%); 51% of CVA patients presented with GTCS followed by PSSG (34%); 56% of metabolic seizures were GTCS; all patients of poisoning presented with GTCS; 89% of idiopathic seizures were GTCS. 1 case of Epilepsia Partialis Continua due to hypocalcemia occurred in our study, which was not reported in a retrospective analysis of 76 patients with Epilepsia Partialis Continua, the diagnoses were-idiopathic: 17, ischemic stroke: 15, meningoencephalitis: 8, Rasmussen's encephalitis (RE): 7, granuloma: 6, diabetic- non-ketotic-hyperosmolar-coma(DNKHC): 6,CNS malignancies

(primary/secondary): 4, birth injury: 4, cerebral venous thrombosis: 3, CNS tuberculosis: 2, and cerebritis, HIV-related, toxemia of pregnancy, and MERRF one each.<sup>12</sup> SE occurred in 3% of patient in % in study by Murthy JMK and Ravi Y and 10 % in a study by Narayanan JT and Murthy JMK.<sup>1,7</sup> In our study etiology 8% had SE. In present study metabolic abnormality presented as GTCS, in 56%, as PSSG, SE, SPS, and EPC 11% each. In study by Murthy JMK and Ravi Y all were (100%) GTCS.<sup>1</sup>

## CONCLUSION

This study illustrates that the etiological spectrum of seizures in this part of the world is different from that described from developed countries and CNS infections account for a significant number of cases. 89% of seizures were acute symptomatic seizures in which underlying etiologies can be made. Our study recommends find the underlying etiology of seizure and treating the etiology helpful for good clinical outcome in seizure patients.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

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**Cite this article as:** Prakash B, Arun BJ, Ashok VB, Nagaraj N. New onset seizures an etiological study. *Int J Adv Med* 2017;4:1532-6.