

Research Article

Clinical profile of seizure disorder in hospitalized patients

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ABSTRACT

Background: Hughling Jackson in 1870 described first “seizures as intermittent derangement of central nervous system and abnormal and excessive discharge of central nervous tissue on muscles” and the same was refined further. Average incidence rate for epilepsy is 0.3 - 0.5% in patients.

Methods: A total of 100 patients admitted with sign and symptoms suggestive of seizure disorder in tertiary care hospital during the period of 1st December 2012 to 31st July 2014. A detailed clinical history, examination and investigation with following patients were included in study; (1) age of the patients above 13 years; (2) patient present with history of seizure the cross sectional observational study was carried out at Dr. V. M. Government Medical College, Solapur, Maharashtra, India.

Results: Generalized tonic clonic were the commonest type seen in 69 patients (69%) and cerebrovascular disease because seen in 25 patients (25%) is the second most common cause.

Conclusions: (1) Ring enhancing lesion were seen in 15% patients, among most common was tuberculoma that is seen in 10 patients and neurocysticercosis was seen in 5 patients; (2) cerebral tumour was seen in 4 patients; (3) EEG was abnormal in 31% cases of seizure and most common EEG abnormality was focal slow waves and (4) CT scan abnormality was seen in 47 cases (47%).

Keywords: Seizure disorder, EEG, CT scan, MRI

INTRODUCTION

Hughling Jackson in 1870 described first “seizures as intermittent derangement of central nervous system and abnormal and excessive discharge of central nervous tissue on muscles” and the same was refined further.¹ The word seizure is derived from Latin word *sacire* "which means to take possession of".² Average incidence rate for epilepsy is 0.3 - 0.5% in different populations throughout the world, and prevalence of epilepsy has been estimated at 5-10 person per 1000 population.² MRI, CT scan and EEG has major role. Present study was undertaken to evaluate clinical profile of patients with seizures (focal and generalised) and to study their CT scan and EEG correlation.

METHODS

1. To study the symptoms and signs in patients with seizure disorder; (2) to find out the etiology of seizure in patients with seizure disorder; (3) to study the correlation between electroencephalography, radiological and etiology of patients with seizure disorder. A total of 100 patients admitted with sign and symptoms suggestive of seizure disorder in Dr. V. M. Government Medical College, Solapur, Maharashtra, India during the period of 1st December 2012 to 31st July 2014. A detailed clinical history, examination and investigation with age of the patient above 13 years, patient present with history of seizure. The cross sectional observational study was carried out at Dr. V. M. Government Medical College,

Solapur, Maharashtra, India with following investigations were studied; CBC (Hb, MCV); BSL; serum electrolyte (Na⁺, K⁺, Ca⁺⁺); renal function test; liver function test; urine routine, microscopy; HIV; ECG; EEG; FUNDUS; CT scan (head)-plain and contrast; MRI; CSF.

RESULTS

As seen from Table 1 generalized seizure seen in 74 patients (74% cases) and focal seizure were seen in 26 patients (26% cases). Over all generalized are common seen in 74 patients (74% cases) followed by focal seizures seen in 26 (26% cases).

Table 1: Various types of seizure in different age groups.

Age group (years)	Focal				Generalized					Total		
	Motor	Sensory	Autonomic	Cognitive	Absence		Tonic	Clonic	Atonic		Mycl-onic	Tonic-clonic
					Typical	Atypical						
13-20	3	1			2						9	15
21-30	4	1		1	1						18	25
31-40	2			1							19	22
41-50	4			4			1				8	17
51-60	1			2			1				6	10
61-70	1	1									3	5
71 and above											6	6
Total	15	3		8	3		2				69	100

Table 2: Etiological diagnosis and their percentage.

Diagnosis	No. of cases	Percentage
Idiopathic	47	47%
Cerebrovascular diseases	25	25%
Ring enhancing lesion	15	15%
Infective	7	7%
Tumour	4	4%
Metabolic	2	2%
Total	100	100

them 14 patients have infarction; followed by 6 patients have cerebral hemorrhage and 5 patients had cortical venous thrombosis. Ring enhancing lesion were seen in 15 patients (15% cases) out which 10 patient have tuberculoma, followed by five patients have neurocysticercosis, followed by one patients cerebral metastasis from hepatic carcinoma.

Table 3: Treatment administered in various groups.

Etiology	Total	Anticonvulsant		
		1 Drug	2 drug or more	Surgery
Cerebral infarction	14	9	3	
Cortical venous thrombosis	5	3		
Cerebral hemorrhage	6	4	2	
Tuberculoma	10	7	3	
Neurocysticercosis	5	2	1	
Cerebral tumors	4			4
Metabolic	2	2		
Idiopathic	47	41	6	
Infective	7	5	2	
Total	100	77	19	4

As seen from Table 2 Idiopathic case i.e. unknown cause was seen in 47 (47% Of cases). Followed by cerebrovascular disease 25 patients (25% of cases) from

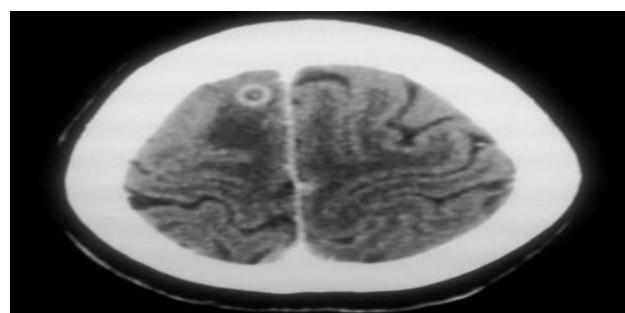


Figure 1: Neurocysticercosis with dot sign.

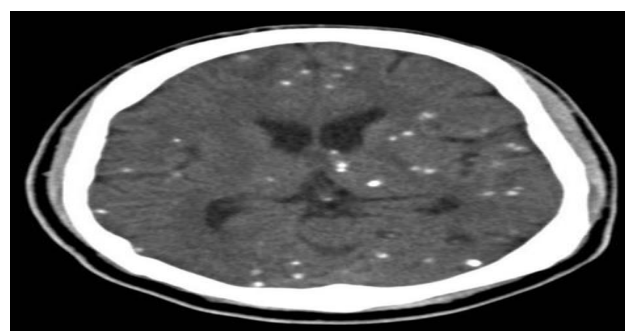


Figure 2: Neurocysticercosis.

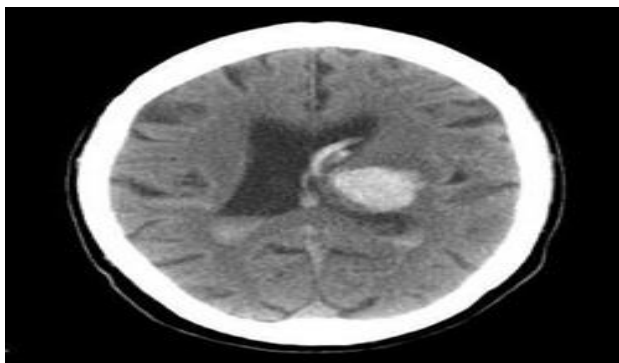


Figure 3: CT of brain – acute intracerebral haemorrhage in center left basal ganglia.

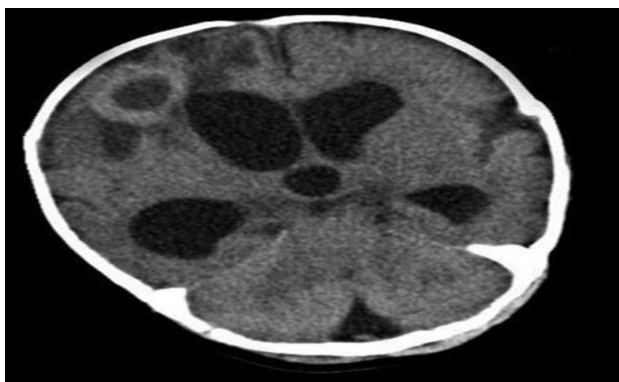


Figure 4: Glioblastoma multiforme.

77 (77%) patients were treated with single antiepileptic drugs and 19 (19%) treated with 2 or more drug. 4 patient were referred to higher center (Table 3).

Table 4: CT scan finding.

CT scan finding	Etiology	Cases
Normal CT scan		49 (49%)
Abnormal CT scan	Cerebral infraction	14 (27%)
	Cortical venous thrombosis	5 (10%)
	Cerebral hemorrhage	6 (12%)
	Infection	7 (14%)
	Tuberculoma	10 (20%)
	Neurocysticercosis	5 (10%)
	Tumors	4 (8%)

Out of 100 patients, all patients underwent CT scanning, out of 100 patients CT abnormality is seen in 51 cases. Most common abnormality is cerebral infarction (27%) and least common is tumors (4%). Out of 51 patients with abnormal CT scan, 14 patients have cerebral infarction, 6 patients have cerebral hemorrhage and 5 patients have cortical venous thrombosis. Cerebral edema secondary to infection seen in 7 patients. Among ring lesion out of 15 patients, 10 patients have tuberculoma, 3 patients have neurocysticercosis. Among 4 patients of cerebral tumors, 2 patients have glioblastoma multiform 1 patients have

astrocytoma, one patients have cerebral metastasis from hepatic carcinoma (Table 4).



Figure 5: Tuberculoma with hydrocephalous.

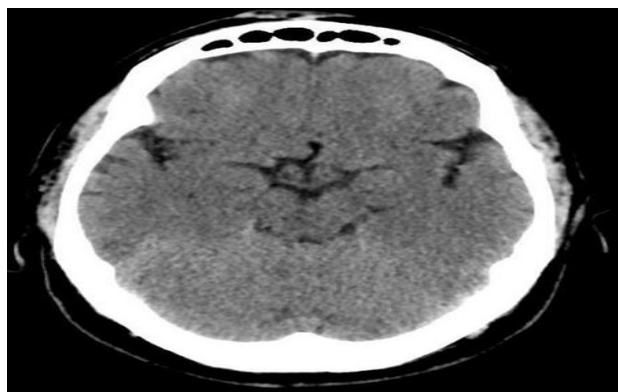


Figure 6: CT head brain shows cerebral oedema.

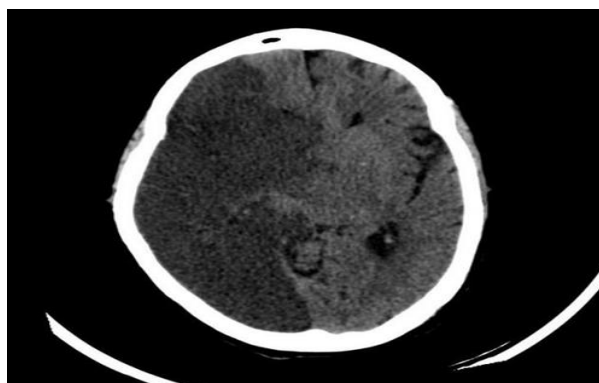


Figure 7: Extensive cerebral infarction on RT MCA territory.

As shown in Table 5 out of 100 patients who underwent EEG, 31 patients have EEG abnormality either focal or generalized. Focal abnormality seen 24 patients and 7 patients have generalized abnormality.

Table 6 shows that ten patients underwent MRI out of which 5 patient have normal, while 2 patients had cerebral infarction, 3 patients has tuberculoma.

Table 5: Electro encephalogram findings.

	Normal	Abnormal EEG				No of EEG done	Total case
		Slow waves		Spikes/sharp Waves			
		Focal	General	Focal	General		
Idiopathic	41	4	2			47	47
CVD	13	3	3	6		25	25
Ring	9	2		4		15	15
Infective	4	1	1	1		7	7
Tumour	0	2	1	1		4	4
Metabolic	2					2	2
Total	69	12	7	12	0	100	100
Total no. of patients -100							
Total EEG done-100							

Table 6: MRI finding.

MRI	No. of cases
Normal	5
Infarction	2
Tuberculoma	3
Total	10

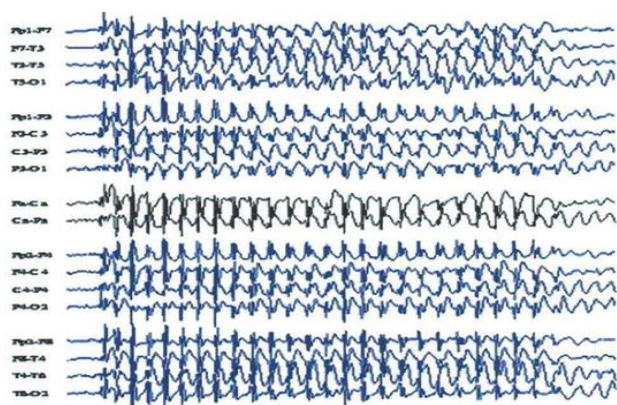


Figure 8: Generalized seizure activity.

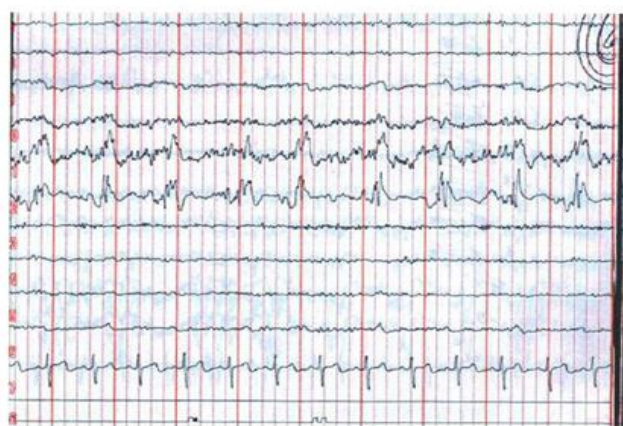


Figure 9: Focal seizure activity.

DISCUSSION

In present study, seizure are classified as focal seizure and generalized seizure (Table 7).

Table 7: Type of seiziures.

Type of seiziure	No. of cases
Focal seiziure	26 cases (26%)
Focal seiziure with motor symptoms	15 cases (15%)
Focal seiziure with sensory symptoms	3 Cases (3%)
Focal seiziure with cognitive symptoms	8 Cases (8%)
Generalized seiziure	74 cases (74%)
Tonic-clonic	69 cases (69%)
Tonic	2 cases (2%)
Absence	3 cases (3%)

According to population based studies on seizures at Tourou, in northern Benin by Adoukonou T.³ In this study 1031 subjects, 632 were men of which 71% have generalized tonic clonic seizure. In the study of Hamdy NA, in this study of 341 patients 74% patients have generalized tonic clonic seizure.⁴ In present study out 100 cases 74 cases have generalized seizure, present study co – relates with Hamdy NA study.

Etiology

Idiopathic seizure

Generally seizure for which no etiology can be found are termed idiopathic seizures. In the national general practice study of epilepsy 60% of all patients had no identifiable cause of epilepsy.⁵

According to study done by Kurland and Hauser in Rochester and Minnesota incidence of idiopathic seizures are decreasing over a period of time from 1935-1949 interval to 1965-1979 time interval.⁶ In 1935-1949

incidence of idiopathic seizure was 34.0 and in 1965-1979 interval incidence was 27.4%.⁶ In idiopathic cases generalized were more common than focal seizure. In present study 47% patient had seizure where no definitive etiology was found. All most of all idiopathic seizures were generalized. In Shridhran R study, 61% patients had no identifiable cause of epilepsy.⁷ Present study correlates with Shridhran R.

Seizures in cerebrovascular diseases

Cerebrovascular diseases and stroke become an increasingly common cause of epilepsy in later year of life. It has been estimated that cerebrovascular disease may account for 15% of all new case of epilepsy.⁵ In the study done by Berger S, Moulin AT, it was found that in stroke seizures occur in 4 - 43% of cases, with greatest frequency after cortical infarct and large haemorrhagic infarcts. Sander JW, Hart YM, Shorvon SD found cerebrovascular disease to be the most common etiological factor i.e. 30-70% cases.⁵

Incidence of seizure due to cerebrovascular disease (CVD).

Present study correlates with Sander JWAS et al 1990.⁵ In present study 25 cases were presented with seizures due to cerebrovascular episode 14 patients have cerebral infarction, In the year 1991, Asconap and Penry had given special attention to cerebrovascular disease as causes of late onset of epilepsy. Early seizures occur during the evolution of stroke or within 2 weeks. Late seizures, occur months or years after the stroke and are due to structural brain abnormalities with the development of epileptic foci.

Dhanuka AK, Kalita J in their study of seizure after stroke found early seizure in 77% cases and late seizure in 23% cases.⁸ Here present study correlates with Dhanuka AK and Kalita J where 70% patients have focal seizure and 30 presented with generalized seizure in our study almost all patients with cerebrovascular disease with focal seizure.

Table 8: Incidence of seizure due to cerebrovascular disease (CVD).

Study	Incidence of seizure
Sander JWAS et al ⁵	30-70%
Hauser WA et al ⁶	11%
Shorvon SD et al ⁵	15%

Seizure due to intracranial space occupying lesion

It includes ring enhancing lesion and cerebral tumour. In our study 15 patients were of ring enhancing lesion and 4 patients were of cerebral tumor.

Ring enhancing lesion and cerebral cysticercosis are the

commonest helminthic infestation affecting the nervous system is cysticercosis. According to Rajshekhar studies in 2003 neurocysticercosis is the most common cause of seizure is cysticercosis due to ring enhancing lesion in India. Sethi PP, Kiyawat DP et al also showed that neurocysticercosis is the most common of seizure among ring enhancing lesion.⁹

According to Deb K pal et al, *Taenia solium* is endemic in Latin America, India and China. Seizures are the common presentation in 70% - 90% of patients. Seizures may occur when cyst is degenerating or after the forming calcified lesion.¹⁰

In present study 5 patients have seizure are due to neurocysticercosis. Present study correlates with Kalita J et al.⁸

Table 9: Incidence of neurocysticercosis.

Study	Incidence of neurocysticercosis
Wadia et al ⁹	19%
Ramesh Baheti ¹⁹	3.8%
Kalita J et al ⁸	5%
Basu PK et al ¹⁷	4%

Tuberculomas

Tuberculoma are structural lesion, compared of characteristic granulomatous tissue, either single or multiple, with variation in size of few mm to occupying a large portion hemisphere. Commonest site in the cerebral cortex parietal or parieto-occipital. Usually they occur in the second or third decade and are rare after the age of 40 yrs. Pathologically they represents a granuloma. During the initial phase of disease, odema and necrosis appear as low attenuating area on CT scan, and once granuloma has begin to organize, high attenuating, contrast, enhancement and calcification is seen. Tuberculoma are rare in developed countries, but are quite common in developing countries. India has highest incidence of tuberculoma, also shows a regional variation. In Madras and Andhra Pradesh, the incidence is as high as 19.4% Rammurthi.¹¹ While in North India it is only 41% (Tandon et al).²⁰ In India it constitute 20-30% of all intracranial space occupying lesion.

In a series of studies of focal seizure by computerized tomography by Washimkar SN, Holey MP, Fusey SM of 120 cases more than 13 years of age, CT scan was positive in 88% cases. Out of 88 cases tuberculoma was diagnosed in 58 cases (65.90%) and neurocysticercosis in 3.4% cases.¹²

Kalitha J et al in their study of 40 cases of late onset epilepsy found tuberculoma in 7 cases (17.5%).⁸ In this study 15 patients were diagnosed with ring enhancing lesion i.e. intracerebral ring enhancing lesion (i.e. either tuberculoma or cysticercosis). This constitute about 15%

cases of these 10 patients had radiologically characteristic features of tuberculoma, while 5 patients CT scan shows neurocysticercosis.

Intracranial tumours and epilepsy

Intracranial tumours includes gliomas, meningiomas, metastases etc. Usually in 40% of brain tumors, seizures are presenting complaint. Glioblastoma and astrocytoma are most frequent intracranial tumors constitute about 10% of total central nervous system tumors.

Glioblastoma is having 25% incidence and astrocytoma is having 11.9% incidence in seizure patients when viewed with MRI, glioblastoma often appear as ring enhancing lesion. However this is not specific. Definite diagnosis of suspected glioblastoma on CT or MRI requires a stereotactic biopsy or a craniotomy with tumor resection. Sander JW, Hart YM found cerebral tumours responsible for 10-15% of cases of seizure.⁵ Dam et al found incidence of brain tumor in seizure to be 42%.²¹

In the adult, tumors are found in 6 to 20% of seizure population.² In present study 4 patients (4%) presented with seizure out of which 3 were having cerebral tumor. 2 patients were having glioblastoma multiforme and 1 astrocytoma one remaining patients have cerebral metastasis from primary hepatic carcinoma. Our study nearly correlates with Sander JW, Hart YM. Various other studies showing incidence of tumors in epilepsy are Steehan et al 6-40%, Rammussen et al 10-20%, Ligant et al 30%.

Central nervous system infection and epilepsy

A wide range of viral, bacterial, opportunistic and parasitic infection can be associated with seizures. Infection account for 3% for cases of seizures in the study of Rochester, Minnesota. Godbole VY et al in their study of first seizure in adult life found acute *Falciparum malaria* in 10.9% of their cases.¹³

In present study out of 7 patients 3 were of pyogenic meningitis, 1 of cerebral malaria, 2 patients had TB meningitis and 1 of viral encephalitis presumed of viral etiology.

Metabolic disorder and seizure

Acute symptomatic seizures, this term was suggested by Hauser, Anderson, Lowenstein and MC Roberts in 1982.¹³ Such seizure are often associated with acute encephalopathy and most are tonic clonic type.

In a study by concluded by Ruskin and Fishman in 1978, seizures occurred in as many as third of patients with renal failure. Study done by Zu Chan in 698 patients with uremia, majority had generalized seizures, had myoclonic seizure and 2 had secondary generalized seizures.³

EEG

The EEG may demonstrating the presence of focal waves abnormalities, suggest the presence of structural lesion as the cause for a patient with epilepsy, as for example focal delta activity increased the chance detection of cerebral tumor on CT scan.^{14,15} In present study out of 100 patient all underwent EEG, out of that 69 patients have normal EEG and 31 have abnormal EEG.

Among abnormal EEG in 31 patients focal spike waves seen in 22 patient's i.e.70% and generalized spike waves are seen in 9 patients i.e. 30%.

Homes et al observed most common EEG finding to be focal slowing.¹⁶ In cases of cerebrovascular accidents correlation between unilateral clinical sign and focal EEG changes was seen in 60% cases while Denmark in 1977-1981 found it to be. In case of partial seizure unilateral clinical abnormalities correlates with focal EEG changes seen in 60%. In present study the clinical abnormality co-relates with EEG changes in 31% cases.

CT scan

Study done on adult onset epilepsy by Basu PK, out of 50 patients of generalized seizure 74% were having abnormal CT scan.¹⁷ Gastaut in his conclusion on CT scan in epilepsy have conclusion that it is best method for detecting cerebral lesion responsible for determining their nature and exact location.¹⁸ In present study the CT head abnormality was found in 51 patients (51%). In focal seizure out of 22 patients 19 have abnormal CT scan findings.

CONCLUSION

As per present study observations, generalized tonic clonic was commonest type seen in 69 patients (69%). Idiopathic etiology is the commonest cause is seen in 47% of the patients and most of these patients have generalized seizures. Cerebrovascular disease was seen in 25 patients (25%) is the second most common cause. Ring enhancing lesion were seen in 15% patients, among most common was tuberculoma that is seen in 10 patients and neurocysticercosis was seen in 5 patients. Cerebral tumour was seen in 4 patients. Among them 3 were having primary CNS tumour i.e. glioblastoma multiforme and one is having astrocytoma. One was having cerebral metastasis from hepatocellular carcinoma. EEG was abnormal in 31% cases of seizure and most common EEG abnormality was focal slow waves. CT scan abnormality was seen in 47 cases (47%).

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Conflict of interest: None declared

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

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