

Clinicoetiological Profile of Seizure Disorder in Elderly Persons - A Study from a Rural Tertiary Centre, West Bengal

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ABSTRACT

BACKGROUND

Epilepsy is a very common serious chronic neurological disorder in the elderly aged 60 years and above. Epidemiologic studies have shown that the incidence of epilepsy is significantly higher in the elderly than in any other age group and aetiology, clinical manifestations and treatment responses are different from epilepsy in younger individuals. We evaluated the causes of seizure disorder in elderly people presenting to the medicine and neurology department and various clinical presentation of seizure disorders in the elderly.

METHODS

This was a cross-sectional, observational study of 200 patients done at our centre for two years and was extensively clinically, biochemically and radiologically evaluated. SPSS Statistics v25, SAS Studio 3.7 and Excel were primarily used for analyzing data. After the collection of all data, they were first arranged in an SPSS datasheet and then analysed by SPSS software.

RESULTS

The male to female ratio was 1.63:1. Females have an equal propensity to develop generalized tonic-clonic seizure (GTCS) (47.4 %) or focal seizure (45.7 %) whereas males have a higher propensity for GTCS (79 %). GTCS was seen in 134 cases, focal seizures in 60 cases and status epilepticus was found in 6 cases. The most common cause of GTCS in our study was stroke followed by metabolic causes. Of metabolic causes, the commonest cause was hyponatremia, most common cause of focal seizure (30 % of all cases) were infective. The overall commonest cause was a stroke. Neuroimaging plays an important role in the workup of patients with epilepsy imaging and abnormality was found in 69 % of cases in our study.

CONCLUSIONS

The present study was a hospital-based cross-sectional study; therefore the results of the study cannot be projected over the general population. The study may be limited by the relatively small sample size and the homogeneity of the ethnicity of the participants.

KEY WORDS

Epilepsy, Elderly, GTCS, Focal Seizure, Stroke.

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BACKGROUND

The elderly population, comprising individuals aged 60 years and above, is the most rapidly growing in the world. Epilepsy in the elderly with specific features, etiological aspects, clinical manifestations and treatment responses are different from epilepsy in younger individuals. It is the most common serious chronic neurological disorder in the elderly after stroke and dementia. The overall age-specific incidence of epilepsy is bimodal, with a peak in the newborn and a more pronounced peak in those aged over 60 years.^{1,2} Epilepsy commonly manifests for the first time in older individuals.³ Epidemiologic studies have shown that the incidence of epilepsy is significantly higher in the elderly than in any other age group.² Obtaining an accurate seizure diagnosis in the elderly is challenging and relies much more upon an accurate clinical history and eye-witnessed accounts (which are often absent) than on diagnostic tests. They have a two- to three-times greater mortality than the general population. Status epilepticus in the elderly, in particular, may carry a probability of mortality of approximately 50 %.⁴ Cerebrovascular disease, CNS infections, brain tumours and traumatic head injury, are the most commonly identified aetiologies in patients with late-onset epilepsy.⁵ However, the underlying cause of epilepsy cannot be identified in up to 50 % of elderly people (termed 'cryptogenic' or 'idiopathic').⁶ Focal seizures with impaired awareness are the most common presentations, although may initially evade diagnosis.⁷ Older patients are more likely to have an extra-temporal epileptic focus and so less commonly report auras or automatisms. Atypical presentations may also include altered mental status, periods of staring, unresponsiveness, brief losses of consciousness, inattention, memory lapses or confusion. Some common clinical scenarios encountered in the elderly may mask or mimic epilepsy like mechanical falls, syncope (especially orthostatic hypotension, but also cardiac arrhythmogenic syncope), confusional states, memory problems, sleep disorders and dizziness. Given the prevalence and economic burden of epilepsy in the elderly, there has been surprisingly little specific research into this.

Objectives

The purpose of the study was to evaluate the various clinical presentations and underlying causes of seizure disorder in the elderly.

METHODS

This was a cross-sectional, observational study conducted in the indoor and outdoor of the Department of Neurology and indoor at Department of General Medicine of Burdwan Medical College and Hospital in Burdwan District (West Bengal) from January 2018 to December 2019.

Sample Size

90 % of epilepsy is in developing countries. India contributes nearly one-sixth of the global burden. There is a median prevalence of epilepsy of 1.54 %. The prevalence is a bit

higher in the elderly. So assuming this prevalence and considering it to be a hospital-based study, patients were selected using formula $Z^2p(1-p)/d^2$ (Z is standard normal variate, considered as 1.96, $d = p/2$ as prevalence is less than 10 %, $p = \text{prevalence}$). Thus about 200 patients of either sex of age > 60 years who presented with a history of symptoms and/or signs of new-onset seizures were randomly selected. All seizure mimickers were excluded. Information was collected through prepared proforma for each patient.

Complete clinical examination in the form of pulse, blood pressure, neurological examinations including higher mental function, cranial nerve examination, meningeal signs, cerebellar signs and any specific neurological examination as needed were done.

Lab work to assess electrolyte imbalance (calcium, magnesium, sodium, potassium), plasma glucose, liver function test, renal function test, CSF examination (in selected patients) were done.

Neuroimaging in the form of CT brain, magnetic resonance imaging (MRI) with contrast and electroencephalography (EEG) was done in practically all patients, cardiovascular testing such as an electrocardiogram (ECG) or echocardiography in selected patients was done.

Patients' demographic, social, economic and medical details were also collected.

Statistical Analysis

SPSS Statistics v25, SAS Studio 3.7 and Excel were primarily used for analyzing data. After the collection of all data, the data were first arranged in an SPSS datasheet and then analysed by SPSS software. Microsoft Excel was used for graphic analysis and tabulation. Once summary tables were generated using SPSS, the data was visualized using clustered bar charts and pie graphs. SAS Studio was used for data exploration and performing distribution analysis. The student's t-test was used for testing statistical significances. A two-tailed P value was used. A P-value of less than 0.05 was considered statistically significant.

RESULTS

The mean age of distribution of seizure in the elderly was 71.64 with a standard deviation of 4.527 (Table 1). It was found that seizure frequency increases with older age. The present study comprises 200 patients with seizures (124 males and 76 females). The male to female ratio was 1.63:1. (Table 2)

In the present study, out of 200 cases of seizure, generalized tonic-clonic seizures (GTCS) were seen in 134 cases, focal seizures in 60 cases and status epilepticus found in 6 cases. It was found that GTCS was the most common seizure presentation in the elderly. Of 134 cases of GTCS, 80 were primary generalized and 54 were secondarily generalized. Of 60 focal seizures, 40 were complex partial and 20 were simple focal.

Considering the association between sex and seizure, in the present study out of 200 patients with seizures, GTCS seen in males was 79.0 %, and females 47.4 %, but focal seizure seen in males was 21 % and female 45.7 % while

status epilepticus was mostly seen in females (7.9 %). It was found that females have equal propensity to develop GTCS (47.4 %) or focal seizures (45.7%) whereas males have a higher propensity for GTCS (79 %) than focal seizures (21 %).

Considering the association between co-morbidity and seizures, it was found that in the present study, hypertension with 50 cases, was the most common co-morbidity seen with seizure disorder (GTCS - 44 %, Focal - 44 %, Status -12 %). HTN/DM was seen in 30 cases of seizures (GTCS - 86.7 %, Focal - 13.3 %), dyslipidemia was seen in 30 cases (GTCS-100%), hepatitis in 6 cases (GTCS -100 %) and CKD in 4 cases (GTCS - 100 %). No history of DM /HTN / Dyslipidemia was seen in 80 cases.

Considering the association between blood profile and seizures, it was found that in the present study, blood abnormality of dyslipidemia was seen in 30 patients, hyperglycaemia was seen in 20 patients with seizure type GTCS (100 %), hyponatremia was seen in 20 patients with common seizure type primary GTCS (100 %), hypoglycaemia in 6 patients with seizure type GTCS (100 %), 6 patients of meningoencephalitis with hypokalemia presented with status epilepticus (100 %), hyperbilirubinemia was seen in 6 cases, and uraemia in 4 cases. A normal blood profile was present in 110 cases. It was found that deranged blood metabolite (hyperglycaemia, hypoglycaemia, hyponatremia, hypokalemia, dyslipidemia, and uremia) increases the propensity of seizure disorder in the elderly. Considering the association between cardiac profile and seizures, it was found that in the present study out of 50 patients with cardiac disease (arrhythmia-26, LVH- 24), most common seizure type was GTCS (100 %). It was found that GTCS was a common seizure type in patients with cardiac disease and related cardioembolic stroke.

Considering the association between EEG and seizure, in the present study, it was found that EEG abnormality suggestive of seizure disorder was seen in only 84 cases. Of them, the most common seizure type was GTCS in 74 patients (88.1 %), status epilepticus in 6 patients (7.1 %) and CPS in 4 patients. (4.8 %).

Regarding the association between MRI brain and seizure, in the present study out of 200 patients with seizure, MRI brain abnormality was seen in 138 patients (69 %) out of whom 78 patients presented with GTCS and 60 patients presented with focal seizure. Normal MRI brain finding was seen in 62 cases (31 %). Cortical infarct was seen in 48 patients, ICH was seen in 16 patients, NCC in 18 patients, calcified granuloma in 12 patients, tuberculoma in 10 patients, neoplastic (glioma-8, meningioma-8, metastasis- 4) was seen in 20 patients and trauma (SAH-6, SDH -8) was seen in 14 patients. (Table 3)

Imaging abnormalities were observed in 55.71 % of GTCS whereas, in focal seizures, imaging abnormality was found in 100 % of cases. So, it was found that focal seizure mostly presents with abnormal MRI brain findings.

In the present study out of 12 patients with CSF abnormality, 6 samples were tubercular with the most common seizure type CPS (100 %), and 6 samples were viral with seizure type status epilepticus (100 %).

Coming to aetiology, in the present study, out of 200 patients, there were a total of 64 (32 %) cerebrovascular accident (CVA) patients. Most common aetiology was Ischemic - 48 patients with most common seizure type GTCS

(100 %)- primary-28.1 %, secondary- 71.9%. Intracerebral Haemorrhage (ICH) was seen in 16 patients with common seizure type GTCS (100 %).

Total infective causes were 46 (23 %). Among infective causes, NCC was seen in 18 patients with seizure type CPS (100 %), calcified granuloma was seen in 12 patients with common seizure type CPS (100 %), tuberculoma in 10 patients with common seizure type CPS (100 %), viral meningoencephalitis in 6 patients with common seizure type status epilepticus (100 %).

Neoplastic as described on MRI finding was seen in 20 (10 %) patients with common seizure type focal seizure (100 %), Traumatic (SAH-6, SDH- 8) was seen in 14(7 %) patients with common seizure type GTCS (100 %). Metabolic (hyponatremia-20, hypoglycemia-6, hepatic-6, uremic-4) was seen in 36 cases (18 %) and idiopathic (without any known aetiology) was seen in 20 patients with common seizure type GTCS (100 %). (Table 4)

So, it was found that vascular stroke (32 %), infective (23 %), metabolic encephalopathy (18 %), neoplastic (10 %) and traumatic (7 %) were the most common aetiologies of seizure disorder in our hospital. Among CNS infections, a maximum number of seizures were due to NCC (39.13 %) and among metabolic causes, the maximum number of seizures were attributed to hyponatremia (55.55 %).

The most common cause of GTCS (70 % of all cases) was stroke (45.71) followed by metabolic (25.71 %) idiopathic (14.28 %) and traumatic (10 %)

The most common cause of focal seizure (30 % of all cases) was infective (66.66 %) followed by neoplastic (33.33 %). Overall, stroke (32 %) was the leading cause of seizure in the present study.

N	Minimum	Maximum	Mean	Std. Deviation
200	63	80	71.64	4.527

Table 1. Age Distribution

		Frequency	Percent
Sex	Female	76	38.0
	Male	124	62.0
	Total	200	100.0
Domicile	Rural	136	68.0
	Urban	64	32.0
Religion	Hindu	72	36.0
	Muslim	128	64.0
Education	Primary	72	36.0
	Secondary	88	44.0
	Higher secondary	28	14.0
	Graduate	12	6.0
Occupation	Unemployed	30	15.0
	Farmer	80	40.0
	Labourer	52	26.0
	Service	28	14.0
	Others	10	5.0
Income per month (INR)	<5000	44	22.0
	5001-10000	104	52.0
	>10000	52	26.0

Table 2. Socio-Demographic Data

MRI Brain	Frequency	Percentage
Calcified Granuloma	12	6.0
Cortical Infarct	48	24.0
High-Grade Glioma	8	4.0
ICH	16	8.0
Meningioma	8	4.0
Multiple Metastasis	4	2.0
NCC	18	9.0
SAH	6	3.0
SDH	8	4.0
Tuberculoma	10	5.0
Normal	62	31.0
Total	200	100.0

Table 3. MRI Brain Abnormalities

Aetiology		Seizure					Status	Total	P
		CPS	Focal Simple	GTCS Primary	GTCS Secondary				
Idiopathic	Count	0	0	20	0	0	0	20	.001
	%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100%	
Infective	Count	40	0	0	0	6	46		
	%	87%	0.0%	0.0%	0.0%	13%	100%		
Metabolic	Count	0	0	36	0	0	36		
	%	0.0%	0.0%	100%	0.0%	0.0%	100%		
Stroke	Count	0	0	18	46	0	64		
	%	0.0%	0.0%	28.1%	71.9%	0.0%	100%		
Traumatic	Count	0	0	6	8	0	14		
	%	0.0%	0.0%	42.9%	57.1%	0.0%	100%		
Neoplastic	Count	0	20	0	0	0	20		
	%	0.0%	100%	0.0%	0.0%	0.0%	100%		
Total	Count	40	20	80	54	6	200		
	%	20%	10%	40%	27%	3%	100%		

Table 4. Association of Aetiology and Types of Seizures

DISCUSSION

Seizures are common disorders found all over the world and are encountered frequently during medical practice in a variety of settings. Presently, cerebrovascular accidents account for a significant number of cases of seizures in the elderly.

The present study was therefore conducted on 200 subjects attending OPDS and IPD in the Neurology and General Medicine ward of Burdwan Medical College and Hospital in Burdwan District (W.B). These subjects were meticulously studied for various parameters including the socio-demographic profile, type of seizure, precipitating factors, clinical presentation, electroencephalography, radiological and other relevant investigations.

The maximum number of patients in our study was from rural areas because our population is rural dominated.

In the present study, patient's ages ranged between 63 years and 80 years, with a mean age of 71.64 ± 4.5 yrs. The mean age at the time of entering the hospital was 69.9 ± 4.9 years (range, 65-80 years) in a study by Sanjeev Thomas et al.⁸ and mean age of 66.25 ± 5.95 years seen in a study by Binod Sarmah et al.⁹ which is comparable to our study.

It was found that females have an equal propensity to develop GTCS (47.4 %) or focal seizure (45.7 %) whereas males have a higher propensity for GTCS (79 %) than focal seizure (21 %). Incidence of seizures was higher in males in the present study, with a male to female ratio of 1.63:1 which is comparable to other studies.

In the present study, out of 200 cases of seizures, GTCS was seen in 134 cases, focal seizures in 60 cases and status epilepticus was found in 6 cases. It was found that GTCS was the most common seizure in the elderly.

The most common cause of GTCS (70 % of all cases) was stroke (45.71 %) followed by metabolic (25.71 %) idiopathic (14.28 %) and traumatic (10 %).

The most common cause of focal seizure (30 % of all cases) was infective (66.66 %) followed by neoplastic (33.33 %). Around 6 (3.0 %) patients were presented in status epilepticus similar to observations made by Jaishree T. Narayan¹⁰ in their study (9 %). Similar results were found by Binod sarmah et al.⁹ who in their study of 154 patients found 51.9 % patients with partial seizures and 48.1% with GTCS. Among lifestyle risk factors predisposing to the onset of seizure disorder in the elderly, hypertension (40.0 %) was the most common co-morbidity present in our study followed

by diabetes mellitus (15 %), which is fairly similar to other studies.

It was found that GTCS was a common seizure type in patients with cardiac disease (50 cases). Cardioembolic infarction, hemorrhagic stroke, and cortical lesions are most commonly associated with seizures, called post-stroke seizures (PSS).¹¹

Neuroimaging plays an important role in the workup of patients with epilepsy. CT/MRI was done in all 200 patients. It revealed abnormalities in 55.71 % (78 out of 140) cases of GTCS and 100 % (60 out of 60) cases of focal seizures. In total, the neuroimaging abnormality was found in 69 % of cases in our study. CT scans were abnormal in 68 % of cases in a study by Holt-Seitz A, Wirrell EC, and Sundaram MB.¹² A study by Binod Sarmah et al.⁹ found MRI abnormality in 59.7 % of cases which is comparable to our study.

It was found that EEG abnormality suggestive of seizure disorder was seen in only 84 cases and in 88.1 % of these cases the EEG abnormality was seen in GTCS patients, which was comparable to study by Van Cott AC et al. Epilepsia (2002) in which EEG abnormality was found in 40 % cases.¹³

In the present study, stroke was the leading cause of seizures which accounted for 32 % of cases, followed by CNS infection in 23 %, metabolic causes in 18 %, CNS tumours in 10 % and traumatic in 7% and no cause was found in 10 % of cases.

Stroke was the leading cause of seizures in the elderly which occurred in 44.8 % of cases in the study by Binod Sarmah et al.⁹ 32 % of cases in the study by Lühndorf K et al.¹⁴ 33 % of cases in the study by Granger N et al.¹⁵ 53.9 % of cases in the study by Loiseau J et al.¹⁶ Among this, ischemic stroke (75.0 %) was the most common cause of seizures followed by hemorrhagic stroke (25.0 %). In the present study, CNS infection occurred in 23 % of cases which were comparable to a study by Binod Sarmah et al.⁹ in which CNS infections occurred in 11.7 % of cases, and in 9 % of cases in the study by A. L. Viteau et al.¹⁷ neurocysticercosis, small single cerebral calcific CT lesion (SSCCCTL) together accounted for 40 % of etiological factors in a study by J. M. K Murthy and Ravi Yangala¹⁸ and by prof.SV khadilkar -The scenario in India, JAPI Jan 2012 Vol 60).¹⁹

It was found that deranged blood metabolite (hyperglycaemia, hypoglycaemia, hyponatremia, hypokalemia, dyslipidemia, and uraemia) increases the propensity of seizure disorder in the elderly.

The metabolic cause was responsible for seizures in 11 % of cases in Granger N et al.¹⁵ studies, 7.8 % in the study by Binod Sarmah et al.¹⁰ 18 % in the study by A. L. Viteau et al.¹⁷ In the present study it accounted for 18 % of cases.

The idiopathic cause was found in 16.3 % of patients in Binod Sarmah et al.⁹ study, 22 % in Granger N et al.¹⁵ study and 25 % in Lühndorf K et al.¹⁴ study. In the present study, 10 % of cases were found to be idiopathic, which is comparable to other studies. Head injury, mostly from falls, causes up to 20 % of epilepsy in the elderly.²⁰ In the present study, head trauma was found to be responsible for seizures in 7 % of cases, which is comparable to other studies. Tumours occurred in 7.5 % of cases in the study by Granger N et al.¹⁵ and in 14 % in a study by Lühndorf K et al.¹⁴ 6.5 % of cases in the study by Binod Sarmah et al.⁹ In the present study, tumours were found to be responsible for seizures in 10 % of

cases. The findings of the present study are well in conformity with above mentioned studies.

CONCLUSIONS

New-onset seizures are more common in elderly males when compared to elderly females, with a male to female ratio of 1.63:1. It was found that females have equal propensity to develop GTCS (47.4 %) or focal seizure (45.7 %) whereas the males have a higher propensity for GTCS (79 %) than focal seizure (21 %). In the present study, patient's ages ranged from 63 years to 80 years, with a mean age of 71.64 ± 4.5 yrs.

It was found that GTCS was the most common seizure type in the elderly. The most common cause of GTCS (70 % of all cases) in our study was stroke (45.71 %) followed by metabolic (25.71 %) idiopathic (14.28 %) and traumatic (10 %). The most common cause of focal seizure (30 % of all cases) was infective (66.66 %) followed by neoplastic (33.33 %). It was found that lifestyle risk factors predispose onset of seizure disorder in the elderly with hypertension (40 %), DM (15 %) and dyslipidemia (15 %) being the common risk factors. Imaging abnormalities were observed in 55.71 % (39 out of 70) cases of GTCS, 100 % (30 out of 30) cases of focal seizures. Neuroimaging abnormality was found in 69 % of cases in our study. It was found that focal seizures mostly present with abnormal MRI brain findings.

Stroke was the leading cause of seizure which accounted for 32 % of cases, followed by CNS infection in 23 %, metabolic causes in 18 %, CNS tumours in 10 % and traumatic in 7 % and no cause was found in 10 % of cases. Of infective causes, NCC was the commonest cause (39.13 %) and of metabolic causes, it was hyponatremia (55.55 %). It was found that EEG abnormality suggestive of seizure disorder was seen in only 84 cases and in 88.1 % of these cases, the event was GTCS.

Hence special emphasis should be made on the prevention of stroke so that the incidence of subsequent seizures can be reduced.

Limitation of Article

The present study was a hospital-based cross-sectional study therefore the results of the study cannot be projected over the general population. The study may be limited by the relatively small sample size and the homogeneity of the ethnicity of the participants. Further study involving larger numbers of participants from several other ethnic groups may be necessary for the generalization of this finding. Epidemiological studies required community-based studies for unbiased estimates.

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