ORIGINAL ARTICLE

Causes of Epilepsy in Elderly Patients Presenting in a Tertiary Care Hospital of Karachi

Anila Umer, Aijaz Ali, Syeda Urooj Riaz, Shazia Jatoi, Ajeet Kumar, Muhammad Ishaq
Jinnah Medical and Dental College, Bihar Muslim Society, Sharafabad, Karachi, Pakistan.

ABSTRACT

Background: Epilepsy is fairly a frequent occurrence in the elderly. It is commonly diagnosed after the episode of two or more unprovoked seizures. Unprovoked seizures in elderly are recurrent rather than younger individuals. This study was designed to estimate the concrete burden of frequent causes of epilepsy.

Methods: A descriptive cross-sectional study with a total of 153 patients diagnosed case of epilepsy were included in this study at Jinnah Medical College Hospital from February 2018-August 2018. Mean was calculated for age, duration of disease of the patients. Causes of epilepsy, gender, and education was calculated and presented as percentages. Electrolyte readings were taken i.e., Sodium, Calcium and Magnesium levels and imaging was planned to rule out stroke, primary neurodegenerative disorders and tumors. Post stratification Chi square test was applied and *p*-value less than or equal to 0.05 was considered significant.

Results: The mean age of the patients was 63.91±5.68 years and mean duration of the disease was 4.61± 1.07 months. The common causes of epilepsy were found to be cerebrovascular disease 56.9%, cryptogenic 54.2%, neurodegenerative disorder 20.3%, traumatic head injury 11.8%, metabolic abnormalities or electrolyte disturbances 10.5% and brain tumor 7.8%.

Conclusion: Elderly patients with first seizure should present to a facility designed in a way that neurologist, cardiologist, rehabilitation and geriatrics work together to identify and treat the condition in a better way.

Keywords: Epilepsy; Seizures; Cerebrovascular Disease; Neurodegenerative Disorder.

Corresponding Author:
Dr. Syeda Urooj Riaz
Jinnah Medical and Dental College,
Bihar Muslim Society, Sharafabad,
Karachi, Pakistan.
Email: urooj_sr@hotmail.com
doi.org/10.36283/PJMD9-4/009

INTRODUCTION

Epilepsy is mainly a frequent severe neurological disorder. Epilepsy is typically diagnosed after the incidence of two or more unprovoked seizures[1]. To diagnose epilepsy, it became increasingly difficult due to increase in number of co morbid conditions, multiple drug usage and its atypical presentations. It became increasingly common after the age of 60 years and can have a momentous impact on functional status[2].

A definitive cause of epilepsy can be recognized in more than 60% of elderly people with epilepsy[3]. The common causes of epilepsy in old age around 60 years was cerebrovascular disease 50%, traumatic head injury 10.2%, cryptogenic 50%, neurodegenerative disorder 11.7%, brain tumor 8.8%, Metabolic abnormalities, including hyponatremia, uremia, and hypocalcaemia 9 to15% and dementia 19% [3]. Various centers have worked on the topic of epilepsy and mostly found certain conditions that contribute to occurrence of seizures. In another study the root cause was cerebrovascular disease in 44%, brain tumor in 12%, pneumonia, urosepsis, and hepatic failure 11%, metabolic or electrolyte disturbances, including hypoglycemia and hyperglycemia, uremia, hyponatremia, hypocalcaemia,

hypothyroidism, and unidentified in 16% [4]. Since, our demographics are different from the world therefore it may has different etiologies of stroke.

The local data regarding the frequency of common causes of epilepsy shows moderate variations from study to study as stated above. Therefore, this study was designed to approximate the real burden of general cause of epilepsy in our targeted population; so this data could be used for planning strategies. Various studies have been done in this regard but in our population, this is the first study, which highlights points about seizure occurrence. However, keeping in mind the elderly population co-morbidities, control of underlying disease and association with metabolic derangements is also considered, as they contribute to occurrence of seizures. Therefore, the aim of the study was to find out the causes of epilepsy in elderly patients presenting in a tertiary care hospital of Karachi.

METHODS

It was a descriptive cross-sectional study at Jinnah Medical College Hospital (JMCH), Karachi conducted in medicine and Neurology OPD and ward during 6 months from February 2018-August 2018. The following parameters considered for sample size calculation through non-probability consecutive sampling and least among all is population (8.8%), distribution (4.5%) and n=153 (calculated by Raosoft WHO calculator for sample size). The ethical review board of the college approved the study (reference number: JMC.ERC.1.01.08.29).

The inclusion criteria were patients diagnosed case of epilepsy through electroencephalogram (EEG), as those 60-80 years, multiple co morbid and frailty with disease of 6 months of duration so that we know its established disease and history of grand seizures. The patient with the history of syncope (e.g., vasovagal syncope, dysautonomia, and cardiac arrhythmia), sleep disorders (e.g., cataplexy, night terror, and narcolepsy), movement disorders (e.g., paroxysmal dyskinesia) and psychiatric conditions (e.g., conversion, panic attacks, breath-holding spells, malingering, and secondary gain) were excluded from the study.

The epilepsy patients were enrolled in the study from JMCH. Consent was taken prior to study. History was taken and the researcher evaluated the clinical features conducted examination and a predesigned questionnaire including age, gender, duration of disease and cause of epilepsy was filled. Electrolytes were sent in lab and documented in form. Data analysis procedure was done with the help of SPSS version 17.0. Mean ± SD was calculated for age, duration of disease of the patients. Frequency and percentage of causes, gender, and education was calculated, electrolyte readings were taken i.e., Sodium, Calcium and Magnesium levels and imaging was planned to rule out Cerebrovascular Accident (CVA), primary neurodegenerative disorders and tumors. Cryptogenic was defined if no above stated factor found. Stratification was done with respect to age, gender, duration of disease and educational status to control the confounder in the study. Post stratification Chi square test was applied and *p*-value less than or equal to 0.05 was considered as significant.

RESULTS

A total of 153 patients diagnosed case of epilepsy had the mean age of 63.91±5.68 years and mean duration of disease was 4.61± 1.07 months. Out of 153 patients (Table 1), 72(47.06%) were male and 81(52.92%) were female. Regarding education of the patients, 22(14.37%) were illiterate, 40(26.14%) primary educated, 53(34.64%) matric passed, 30(19.6%) intermediate and only 8(5.22%) patients were graduate.

Table 1: Descriptive statistics of patients.

Gender n(%)	**Males**	**Females**			
	72 (47.06%)	81 (52.92%)			
Education n(%)	**Primary Educated**	**Matric Passed**	**Intermediate**	**Graduate**	**Illiterate**
	40 (26.14%)	53 (34.64%)	30 (19.6%)	8 (5.22%)	22 (14.37%)
Electrolyte n(%)	**Hyponatremia**	**Hyponatremia**	**Hyponatremia**	**Hyponatremia**	
	6 (37.5%)	6 (37.5%)	2 (12.5%)	2 (12.5%)	

 doi.org/10.36283/PJMD9-4/009

Frequency of common causes of epilepsy in elderly patients was observed. The common causes of epilepsy (Figure 1) were cerebrovascular disease 87(56.9%), cryptogenic 83(54.2%), neurodegenerative disorder 31(20.3%), traumatic head injury 18(11.8%), metabolic abnormalities or electrolyte disturbances 16(10.5%) and brain tumor 12(7.8%) shown in certain patients with multiple causes of the illness.

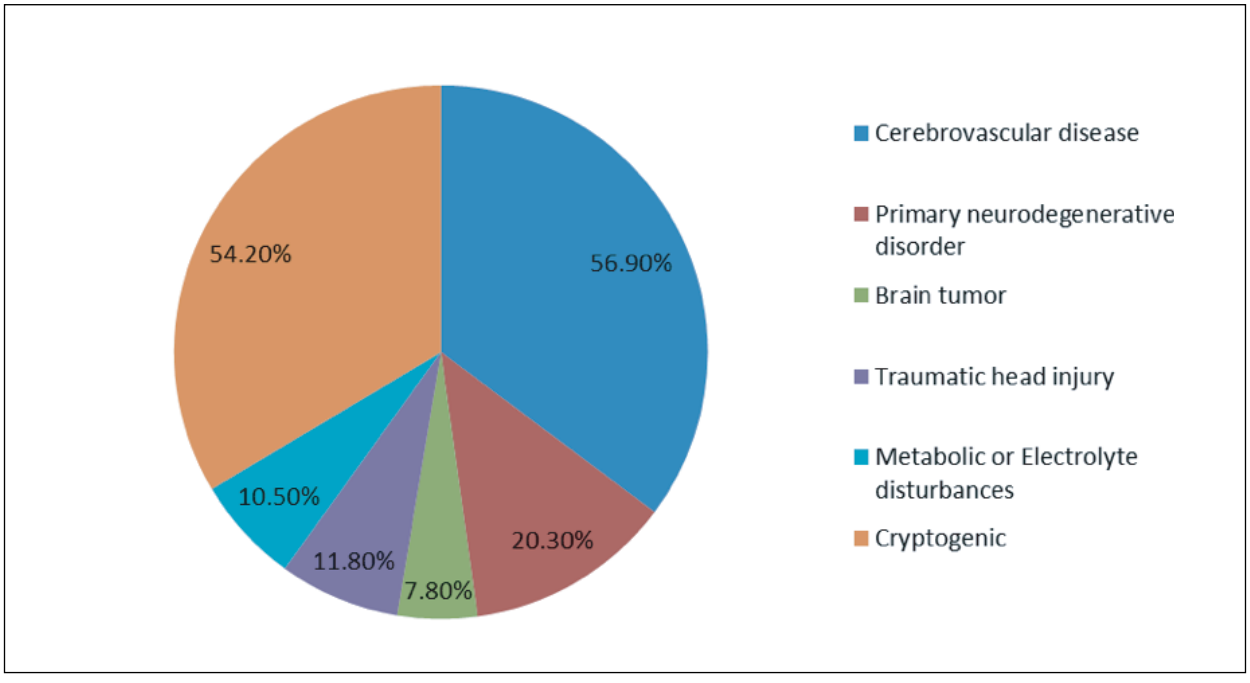

Figure 1: Frequency of common causes of epilepsy in elderly patients.

Stratification analysis with respect to age groups showed that rate of brain tumor and cryptogenic were high in above 70 years of patients age as compare to below and equal to 70 years of patients age. While traumatic head injury and metabolic or electrolyte disturbances (Table 2) was high in below and equal to 70 years of age patients compared to the patients with above 70 years of age. There was no significant difference between male and female in causes of epilepsy.

Table 2: Causes of epilepsy in elderly population with respect to age groups.

Causes	Age Groups		*p*-Value
	60 to 70 Years n=89	>70 Years n=64	
Cerebrovascular disease	53(59.6%)	34(53.1%)	0.42
Primary neurodegenerative disorder	14(15.7%)	17(26.6%)	0.10
Brain tumor	0(0%)	12(18.8%)	0.0005*
Traumatic head injury	15(16.9%)	3(4.7%)	0.021*
Metabolic or Electrolyte disturbances	14(15.7%)	2(3.1%)	0.012*
Cryptogenic	41(46.1%)	42(65.6%)	0.017*

Does not add up to 100% because of multiple causes in patients, significant.*

DISCUSSION

Patients at diverse ages have different etiologies of seizures. Our study patients had the mean age of 63 years. Younger population with recent onset seizure right after trauma is commoner than older[4,5]. Following stroke elderly are likely to develop fits after stroke, this adds to their chance of disability, dependence and morbidity[6]. Older people have co-morbidities, likely include functional and cognitive impairment, plus it is complicated by drug usage and its side effects, these all require combined management, which includes recognition, evaluation, and management[7].

The annual incidence increases according to age from 80 years compared with an overall incidence of 80.8 per 100,000 people[7]. This shows that older age has significant effect on etiology of seizures[8]. Elderly population as they are suffering from co morbidities is taking many drugs that interact with electrolytes and other drug too.

A large number of patients develop subsequent epilepsy; mostly the etiology is stroke, which is more than half of other etiologies. After every stroke the risk increases up to 20-fold in the first year[9]. Cerebrovascular disease accounts for most cases as the most common factor for underlying epilepsy in elderly people[6,10]. Patients loose significant morbidity time after each episode of epilepsy, which affects their cognition and behavior. More than a third of patients turn into status epilepticus later in life[11]. In our study, the most common causes of epilepsy were cerebrovascular disease 56.9%. As the incidence of cerebrovascular disease is raising our research frequencies may also increase in future. In older individuals the propensity to fall causing head injury[12] and 20% of cases of epilepsy in the elderly account for trauma while space occupying lesions form from at least 10% and 30% of seizures, typically gliomas, meningiomas, and brain metastases[13]. In our study, we found 7.8 % of brain tumor causing epilepsy in elderly, which highlighted that tumors and neoplasms contribute less in development of seizures. Seizures commonly have a predominant focality, but elderly patients do not always show neurological signs. Their signs range from memory impairment, personality changes, and mood changes to sensory or motor deficits. Often one condition masks other so it makes the diagnosis and management plan tricky and time taking.

Within the study context, an important study reported that younger patients with seizures are more susceptible to tumor development than older individuals[14], but age is a risk factor for increased mortality in people who do develop seizure activity[14]. Also post trauma after a road traffic accident can also contribute to epilepsy in young. Similarly, elderly who are prone to fall can also be affected. Patients with Alzheimer's disease are up to ten times more prone to develop epilepsy[15], dementia and neurodegenerative disorders[16] and can be attributing to 10-20% of all epilepsies in older individuals[17]. In this study, we found 54.2% cryptogenic, 20.3% neurodegenerative disorder and 10.5% metabolic abnormalities or electrolyte disturbances were the cause of epilepsy.

It is revealed that hyponatremia and hypoglycemia are the most common metabolic disturbances that can cause seizures although other metabolic derangements also contribute but these have common and severe implications. Diuretic use can result in hyponatremia and serum sodium level should be evaluated in patients of seizures[18]. Various drugs used in cardiac failures because hyponatremia as a side effect and our elderly population is more prone to it. Other than hyponatremia, variation in serum calcium levels and serum magnesium levels also contribute to seizure occurrence. Hypoglycemia is an issue of diabetes patients and should be corrected before initiating drugs for seizures[19]. Mostly the diabetics are on insulin, oral hypoglycemic drugs and they are non-compliant to drugs, and food intake the chances of hypoglycemia and other metabolic derangements are higher[20,21].

Stroke as a whole is a state in which the patient loses his control over his own body and when it is accompanied with chances of seizures, the patients' self-esteem and his mood falls. It in turn affects the patient physically mentally and emotionally[21]. This highlights that while treating stroke it is not just a neurologist that will be involved. However, an internist for his other co morbid, a psychiatrist for chances of depression and anxiety, a psychologist for self-esteem, a physiotherapist for disability, and teaching for the caregiver[22].

Epilepsy management in the elderly is more than a controlling fit and clinicians should work on aspects, such as associated co-morbidities, driving eligibility, social stigmas, quality of life, and lots of medication side effects, taboos and discrimination[22]. For better health outcomes, a multidisciplinary team approach to epilepsy management in the elderly may be planned. Neurologists work closely with geriatric medicine and cardiologists. Those with established epilepsy require access and follow-up in specialist services. Thus, in order to prevent a disease such as epilepsy, we may suggest that clinicians should try to find the patients at risk for Cerebrovascular Accident (CVA) and related complication.

As we have major population dependent on care facilities, we may make a plan, how to cater the needs of our population. Since, we were dealing with

elderly, the metabolic derangements stand second in occurrence of epilepsy, as treating the derangement does help in seizure control as well. Secondly, the care givers need to consult a neurologist but a team action is required where a psychiatrist, psychologist, internist and physiotherapist need to work in collaboration.

CONCLUSION

The cerebrovascular diseases are considered the most frequent cause of epilepsy in elderly followed by cryptogenic and neurodegenerative disorders.

ACKNOWLEDGEMENTS

We are thankful to the medicine department of the Jinnah Medical College Hospital.

CONFLICT OF INTEREST

All authors have read and approved the final manuscript and declared no conflict of interest.

ETHICS APPROVAL/DISCLOSURE

The ethical review board of the Jinnah Medical and Dental College approved the study (JMC.ERC.1. 01.08.29).

PATIENT CONSENT

The consent of the patient/guardian was taken prior to the writing of the manuscript.

AUTHORS' CONTRIBUTION

All authors analyzed and interpreted the patient data and equally contributed in writing the manuscript.

REFERENCES

1. Lees A. Retrospective study of seizure-related injuries in older people: a 10-year observation. Epilepsy Behav. 2010;19(3):441-444.
2. Brodie MJ, Elder AT, Kwan P. Epilepsy in later life. Lancet Neurol. 2009;8(11):1019-1030.
3. Pugh MJ, Knoefel JE, Mortensen EM, Amuan ME, Berlowitz DR, Van Cott AC. New-onset epilepsy risk factors in older veterans. J Am Geriatr Soc. 2009;57 (2):237-242.
4. Hiyoshi T, Yagi K. Epilepsy in the elderly. Epilepsia. 2004;41(9):31-35.
5. Hauser WA. Seizure disorders: the changes with age. Epilepsia. 1992;33(4):S6-S14.
6. Tanaka T, Yamagami H, Ihara M, Motoyama R, Fukuma K, Miyagi T, *et al.* Seizure outcomes and predictors of recurrent post-stroke seizure: a retrospective observational cohort study. PLoS One. 2015;10(8):1-12.
7. Bagshaw J, Crawford P, Chappell B. Care in people 60 years of age and over with chronic or recently diagnosed epilepsy: a note review in United Kingdom general practice. Seizure. 2009;18(1):57-60.
8. Kim PS, Reicin AS. Discontinuation of vioxx. Lancet. 2005;365(9453):1-2.
9. Stefanidou M, Das RR, Beiser AS, Sundar B, Kelly-Hayes M, Kase CS, *et al.* Incidence of seizures following initial ischemic stroke in a community-based cohort: The Framingham Heart Study. Seizure. 2017; 47:105-110.
10. Elder CJ, Mendiratta A. Seizures and epilepsy in the elderly: Diagnostic and treatment considerations. Curr Geriatr Rep. 2020;9(1):10-17.
11. Samrén EB, Van Duijn CM, Lieve Christiaens GC, Hofman A, Lindhout D. Antiepileptic drug regimens and major congenital abnormalities in the offspring. Ann Neurol. 1999;46(5):739-746.
12. Bruns Jr J, Hauser WA. The epidemiology of traumatic brain injury: a review. Epilepsia. 2003;44:2-10.
13. Serrano-Castro PJ, Mauri-Llerda JA, Hernández-Ramos FJ, Sánchez-Alvarez JC, Parejo-Carbonell B, Quiroga-Subirana P, *et al.* Adult prevalence of epilepsy in Spain: EPIBERIA, a population-based study. Sci World J. 2015;2015:1-8.
14. Çetin ÖE, İşler C, Uzan M, Özkara Ç. Epilepsy-related brain tumors. Seizure. 2017;44:93-97.
15. Mendez MF, Lim GT. Seizures in elderly patients with dementia. Drugs Aging. 2003;20(11):791-803.
16. Liu S, Yu W, Lü Y. The causes of new-onset epilepsy and seizures in the elderly. Neuropsychiatr Dis Treat. 2016;12:1425-1434
17. Hommet C, Mondon K, Camus V, De Toffol B, Constans T. Epilepsy and dementia in the elderly. Dement Geriatr Cogn Disord. 2008;25(4):293-300.
18. Verellen RM, Cavazos JE. Pathophysiological considerations of seizures, epilepsy and status epilepticus in the elderly. Aging Dis. 2011;2:278-285.
19. Petkar S, Cooper P, Fitzpatrick AP. How to avoid a misdiagnosis in patients presenting with transient loss of consciousness. Postgrad Med J. 2006;82 (972):630-641.
20. Oka E, Ohtsuka Y, Yoshinaga H, Murakami N, Kobayashi K, Ogino T. Prevalence of childhood epilepsy and distribution of epileptic syndromes: a population-based survey in Okayama, Japan. Epilepsia. 2006;47(3):626-630.
21. Jawaid W, Nisa Q, Umer SR, Barry SJ, Qureshi A, Shahbaz NN. Etiology and types of seizures in patients presenting to a tertiary care hospital in Karachi: A cross-sectional study. Cureus. 2020;12(7)1-18.
22. Heo J, Lee HS, Hwang JS, Noh OK, Kim L, Park JE. Prevalence of endocrine disorders in childhood brain tumor survivors in South Korea. In Vivo. 2019;33(6):2287-2291.