ORIGINAL ARTICLE

e-ISSN: 2349-0659 p-ISSN: 2350-0964
doi: 10.21276/apjhs.2018.5.1.24

Prevalence and correlates of cognitive adverse outcomes among epileptic patients - Evidence from a cross-sectional study

Subodh Pandey*

Department of Physiology, Gandhi Medical College, Bhopal, Madhya Pradesh, India

ABSTRACT

Background: Epilepsy accounts for 1% of the global burden of disease and affects over 60 million people worldwide imposing a large economic burden on global health-care systems. The objective of the present study was to determine the prevalence of cognitive dysfunctions among epileptic patients.

Material and Methods: It was a cross-sectional study, and 148 patients diagnosed with epilepsy were screened using mini-mental state examination (MMSE).

Results: There were 148 epileptic patients involved in this study. The lowest MMSE score was 16, whereas the mean and median were 26.92 and 28, respectively. Females had higher mean MMSE scores than males (26.57 vs. 27.31). The marital status (divorced/widow/separated), younger age of diagnosis (<10 years), elderly (>60 years), longer duration (>10 years), and higher seizure frequency were associated with lower MMES score.

Conclusion: The low MMSE score was associated with poor prognosis indicators of epilepsy.

Key words: Cognitive adverse effects, epilepsy, India, mini-mental state examination

INTRODUCTION

Epilepsy is one of the most common neurological disorders. Recent estimates suggest that it accounts for 1% of the global burden of disease[1] and affects over 60 million people worldwide.[2] In addition, the caretakers of patients with epilepsy also bear the burden of this neurological condition, and it is estimated that more than 500 million people are indirectly affected by epilepsy.[3] People suffering from epilepsy not only suffer from the disease itself but also with social stigma and psychiatric comorbidities such as anxiety, depression, fear, and psychotic disorders.[4] Numerous studies have provided the evidence that depression and anxiety are more common in epileptic patients than in normal population. A variety of clinical epilepsy factors contribute to cognitive adverse effects (CAE) of epilepsy, including underlying brain pathology, age at seizure onset, seizure type and severity, antiepileptic medications, and other factors.[5-7] An earlier age at onset is associated with a worse prognosis. Severity and chronicity are the major sources of cognitive problems[8] while anatomical location explains the specificity of these symptoms.

In newly diagnosed and untreated epileptic patients, cognitive problems are already present[9] in more than 50% of patients. Psychiatric or behavioral as well as academic problems may antedate the diagnosis of epilepsy even in adults[10] with epilepsy. The possibility exists that factors associated with underlying epileptogenesis leading to the onset of seizures may play a role.[11] It is postulated that cognitive dysfunctions are there even before the onset of a seizure, and epilepsy leads to further progressive deterioration of cognitive functions. Different factors contribute to adverse cognitive effects in epileptic patients including antiepileptic drugs, the underlying brain pathology, and neurological infections. These all contribute to both increased prevalence CAE particularly in patients with severe forms of epilepsy in developing part of the world. Although the magnitude of CAE of epilepsy has been known for a long period of time, there is a scarcity of data from the developing countries, particularly in India. Thus, we conducted this study with the objective to determine the prevalence of cognitive dysfunctions among epileptic patients attending epilepsy clinic, in Hamidia Hospital, Bhopal.

MATERIALS AND METHODS

This was a cross-sectional study; the subjects were patients who came to epilepsy clinic in Hamidia Hospital, Gandhi Medical College, Bhopal. One hundred and forty-eight epileptic patients were included in the study. The inclusion criteria for cases were as follows: (i) Patient clinically diagnosed with epilepsy by experts

Address for correspondence:
Dr. Subodh Pandey, Department of Physiology, Gandhi Medical College, Bhopal, Madhya Pradesh, India.
E-mail: subodhpandey97@gmail.com

Received: 17-12-2017 **Revised:** 03-01-2018 **Accepted:** 24-02-2018

and (ii) patients diagnosed with epilepsy for at least 3 years. Exclusion criteria were as follows: (i) Patient suffering from neurological disorder other than epilepsy.

Data Collection Instruments

Every eligible patient was interviewed using a structured questionnaire. Additional information was obtained using mini-mental state examination (MMSE) as a screening tool.[12] Any score ≥24 points (out of 30) indicates a normal cognition. Below this, scores can indicate severe (≤9 points), moderate (10–18 points), or mild (19–23 points) cognitive impairment (Table 1). This questionnaire was used after semantic validation, in such a way that it was easily comprehensible to the patients of the outpatient clinic for epilepsy at this hospital.[12]

Data Management

Completed questionnaires were checked for the completeness of information by the principal investigator (PI). Once the information was found to be complete, then it was fed into SPSS 18.0 for data analysis. $P = 0.05$ was considered to be a statistically significant association.

Sampling

Convince non-probability sampling technique was used to collect the sample for the present study. Duration of study: The total duration of the study was 8 months. The period of data collection was 6 months.

Sample size

- $N = Z^2pq/D^2$
- $N = (1.96)^2(0.1)(0.9)/(0.05)^2$
- $N = 138$.

However, during the process of data collection, we encountered 148 patients fulfilling our inclusion criteria, and thus, all of them were included in this study.

RESULTS

The overall mean and median MMSE score among study participants were 25.14 ± 015.31 and 26, respectively. Table 2 shows the sociodemographic profile of study participants and their mean MMSE score. The means ± SD ages for females and males were 34.12 ± 22.12 and 37.02 ± 11.32, respectively. Females had higher mean MMSE scores than males (26.57 vs. 27.31). Table 3 shows the clinical feature and the results of the MMSE score.

Table 1: Mini-mental status examination score

Category	Maximum score	Description
Orientation to time	5	From broadest to most narrow. Orientation to time has been correlated with future decline
Orientation to place	5	From broadest to most narrow. This is sometimes narrowed down to streets, and sometimes to the floor
Registration	3	Repeating named prompts
Attention and calculation	5	It has been suggested that serial sevens may be more appropriate in a population where English is not the first language
Recall	3	Registration recall
Language	2	Naming a pencil and a watch
Repetition	1	Speaking back a phrase
Complex commands	6	Varies can involve drawing figure shown

DISCUSSION

The prime objective of this study was to determine the prevalence of CAE in epileptic patients using MMSE. In our study, the overall mean and median MMSE scores were 25.14 ± 015.31 and 26, respectively. In comparison, a study conducted among epileptic in Ethiopia reported that the overall mean and median MMSE scores were 26.92 and 28, respectively. We observed that CAE among epileptic patient was significantly associated with following sociodemographic variables: Marital status (divorce/separated/widow, $P = 0.029$) and age of participants (age group >60 years, $P = 0.045$).

A younger age at seizure onset and longer disease duration correlate with reduced memory capacity.[13-15] We observed similar findings in our study; as the frequency of seizures increased, the prevalence of CAE also increases as evidenced by

Table 2: Distribution of sociodemographic characteristics of the study subjects (*n*=146)

Study variable	*n* (%)	Mean MMSE	*P*
Age			
18–≤40	53 (35.8)	26.4	Ref
41–≤60	54 (36.5)	25.2	0.071
≥61	41 (27.7)	23.1	0.045
Mean	38.12±08.11		
Sex			
Male	86 (58.1)	26.3	Ref
Female	62 (41.9)	27.1	0.066
Marital status			
Married	91 (61.5)	25.8	Ref
Single	39 (26.4)	26.2	0.062
Divorced/widow/separated	18 (12.2)	23.2	0.029
Age at seizure onset			
<10	42 (28.4)	21.3	0.039
10–20	66 (44.6)	22.1	0.063
21–45	29 (19.6)	24.6	Ref
>45	11 (7.4)	26.1	0.071
Mean	15.35±11.25		
Duration since epilepsy diagnosis			
<5	22 (14.9)	26.3	Ref
5–10	74 (50.0)	24.1	0.043
11–20	39 (26.4)	20.1	0.029
>20	13 (8.8)	19.8	0.016
Mean	09.65±015.31		
Minimum seizure frequency			
Once a week	6 (4.1)	18.6	0.19
Once a month	28 (18.9)	21.3	0.27
Once in 3 months	34 (23.0)	23.8	0.041
Once in 6 months	37 (25.0)	24.6	0.072
No seizure in the past 6 months	43 (29.1)	26.4	Ref

Ref - reference

Table 3: Distribution of study participants on the basis of type of epilepsy, EEG findings, CT scan, and MRI findings (*n*=146)

Study variable	*n* (%)	Mean MMSE	*P*
Type of epilepsy			
Simple focal	33 (22.3)	26.5	Ref
Focal with secondary gen	31 (20.9)	24.9	0.059
Complex partial	24 (16.2)	24.6	0.029
GTC seizure	36 (24.3)	22.2	0.031
Other	24 (16.2)	23.4	0.071
ECG findings			
No abnormality	34 (23.0)	26.1	Ref
Abnormal, non-epileptiform	58 (39.2)	24.3	0.046
Abnormal, epileptiform	56 (37.8)	21.2	0.031
MRI findings			
No abnormality	39 (26.4)	25.3	Ref
Abnormal	109 (73.6)	23.2	0.038
CT scan findings			
No abnormality	51 (34.5)	26.1	Ref
Abnormal	97 (65.5)	21.8	0.041

Ref: Reference, CT: Computed tomography,
EEG: Electroencephalography, MRI: Magnetic resonance imaging

the lower overall MMSE score among those who have a weekly seizure in comparison to those who had no seizure in the past 6 months. The similar finding is reported by other studies.[13-15] In addition, the duration since the first episode of seizure was also significantly associated with CAEE among epileptic patients. Furthermore, we observed that those with the onset of seizure at a younger age (<10 years) had a significantly lower MMSE score ($P = 0.039$).

The type of epilepsy also was also associated with the patterns of CAE in epileptic patients. GTC seizures and complex partial seizures were more likely to have impaired cognitive functions than the other seizure types. Similar findings were also reported by other researchers.[16,17] Patients with abnormal, electroencephalography (EEG) (both non-epileptiform, $P = 0.046$ and epileptiform, $P = 0.031$) findings were strongly associated with adverse cognitive outcomes as those with normal EEG findings.

Limitations

In general, MMSE remains the most commonly employed tool to screen the cognitive status. Over the years of use, researchers have concluded that following are the shortcoming of MMSE: Low sensitivity in detecting covert cognitive impairment. Therefore, it is important to do a detail neuropsychological test in patients with abnormal MMSE.

REFERENCES

1. World Health Organisation. Atlas: Epilepsy Care in the World. Geneva, Switzerland: WHO; 2005.
2. Ngugi AK, Bottomly C, Kleinschmidt I, Sander JW, Newton CR. Estimation of the burden of active and life-time epilepsy: A meta-analytic approach. Epilepsia 2009;51:883-90.
3. Dodrill CB. Neuropsychological effects of seizures. Epilepsy Behav 2004;5 Suppl 1:S21-4.
4. Jones-Gotman M. Clinical neuropsychology and neocortical epilepsies. Adv Neurol 2000;84:457-62.
5. Aldenkamp AP. Cognitive impairment in epilepsy: State of affairs and clinical relevance. Seizure 2006;15:219-20.
6. Jokeit H, Ebner A. Effects of chronic epilepsy on intellectual functions. Prog Brain Res 2002;135:455-63.
7. Hesdorffer DC, Ludvigsson P, Olafsson E, Gudmundsson G, Kjartansson O, Hauser WA, *et al*. ADHD as a risk factor for incident unprovoked seizures and epilepsy in children. Arch Gen Psychiatry 2004;61:731-6.
8. Iqbal KM, Rambe AS, Sjahrir H. Correlation between anxiety and depression symptoms with seizure severity in epilepsy patients at neurology department Haji Adam Malik hospital Medan, North Sumatra, Indonesia. Bersama Kita Maju 2006;87:2.
9. Mirsky AF, Duncan B, Levav M. Neuropsychological studies in idiopathic generalized epilepsies. In: Jambaquet I, Lasonde M, Dulac O, editors. Neuropsychology of Childhood Epilepsy. New York, USA: Plenum Press; 2001. p. 141-9.
10. Meador KJ. Cognitive effects of epilepsy and of antiepileptic medications. In: Wyllie E, editor. The Treatment of Epilepsy. 4th ed. Baltimore, Maryland, USA: Williams & Wilkins; 2005. p. 1215-26.
11. Thompson PJ, Duncan JS. Cognitive decline in severe intractable epilepsy. Epilepsia 2005;46:1780-7.
12. Tombaugh TN, McIntyre NJ. The mini-mental state examination: A comprehensive review. J Am Geriatr Soc 1992;40:922-35.
13. Kent GP, Schefft BK, Howe SR, Szaflarski JP, Yeh HS, Privitera MD, *et al.* The effects of duration of intractable epilepsy on memory function. Epilepsy Behav 2006;9:469-77.
14. Aldenkamp AP, Bodde N. Behaviour, cognition and epilepsy. Acta Neurol Scand Suppl 2005;182:19-25.
15. Hoppe C, Elger CE, Helmstaedter C. Long term memory impairment in patients with focal epilepsy. Epilepsia 2007;48 Suppl 9:26-9.
16. Dodrill CB. Correlates of generalized tonic-clonic seizures with intellectual, neuropsychological, emotional, and social function in patients with epilepsy. Epilepsia 1986;27:399-411.
17. Rausch R, Victoroff J. Neuropsychological factors related to behavior disorders in epilepsy. In: Devinsky O, Theodore WH, editors. Epilepsy and Behavior. New York, USA: Wiley; 1991. p. 213-21.

How to cite this Article: Pandey S. Correlates of cognitive adverse outcomes among epileptic patients. J. Health Sci., 2018; 5(1):115-117.

Source of Support: Nil, **Conflict of Interest:** None declared.