Factors affecting the mini-mental state examination (MMSE) score in the epilepsy patients in Aceh, Indonesia

CrossMark

Nova Dian Lestari,[1*] Rizkidawati,[2] Cut Prita Shafira,[3] Suherman,[1] Endang Mutiawati[1]

ABSTRACT

Background: Epilepsy patients in developing countries is quite high. A person can have epilepsy within a certain time limit, but also not a few people who survive with this condition for life. This situation will affect cognitive function. Cognitive function impairment in epilepsy patients can be triggered by various factors related to aetiology, clinical, and others. Therefore, we tried to find the factors that influence the cognitive function in epilepsy patients.

Methods: This study was an observational analytic study with a cross-sectional design. The study was conducted using primary data obtained from direct interviews and MMSE examination and secondary

data obtained from medical records to confirm the diagnosis of epilepsy. Samples were collected based on the diagnosis of neurologist in the patient's medical record at the Regional General Hospital Dr. Zainoel Abidin Banda Aceh from October to December 2019. This study involved thirty-four epilepsy patients.

Result: There were cognitive function decreased in recalling 47,1% and 26,5% in Attention and calculation. The relationship between the frequency of seizure (p = 0.028) and therapy (p = 0.012) on the MMSE.

Conclusion: Politherapy was the dominant factor affecting the MMSE score of epilepsy patients.

[1]Neurology Department, Faculty of Medicine, Universitas Syiah Kuala, The Zainoel Abidin General Hospital, Banda Aceh, Indonesia
[2]Neurology Resident, Universitas Syiah Kuala, Banda Aceh, Indonesia
[3]Medical Student, Universitas Syiah Kuala, Banda Aceh, Indonesia

*Correspondence to:
Nova Dian Lestari; Neurology Department, Faculty of Medicine, Universitas Syiah Kuala, The Zainoel Abidin General Hospital, Banda Aceh, Indonesia
novadianlestari@unsyiah.ac.id

INTRODUCTION

In the current era the number of epilepsy patients in developing countries is quite high. Epilepsy is a chronic neurologic condition that related to stigma, socioeconomic problems, and psychiatric comorbidity.[1]

World Health Organization (WHO) data for 2019 shows that around 50 million people worldwide currently live with epilepsy. Globally, 2.4 million people worldwide are diagnosed with epilepsy per year. In developed countries, annual new cases range from 30 to 50 cases per 100,000 population.[2] Epidemiological data in Indonesia are very limited, there are an estimated 1.3-1.6 million sufferers of epilepsy. This number does not describe the actual number of cases because many families do not want to take their family suffering from epilepsy to the health center or hospital for treatment.[3]

Cognitive impairment can cause decreased quality of life of epilepsy patients. Many factors can cause cognitive impairment in epilepsy patients such as the aetiology of epilepsy, epilepsy-related factors (e.g. duration of illness, age at onset. the nature of the epilepsy syndrome, location of the epileptogenic focus), seizure-related factors (e.g. seizure type, occurrence of status epilepticus, seizure frequency) and therapy (e.g. type of anti-epileptic drug, dosage, drug interactions).[4]

One of most common complications because of epilepsy is cognitive dysfunction, especially in cases of epilepsy that lasts a long time and difficult to control. Some research shows that epilepsy patients experience the cognitive disorder function, especially in cognitive domain functions specific, namely attention, memory, and executive function.[5,6]

Every time a patient experiences a seizure even if it lasts for several minutes will cause damage or death of several brain cells. If it keeps repeating, the brain cells will become weak, resulting in a decrease in intelligence, and can even cause severe mental deterioration and intellectual power. Various studies outside of Aceh that are population-based and hospitals have been conducted that discuss factors that decrease cognitive function of epilepsy patients. The study aims to examine related factors that influence the cognitive function of epilepsy patients in Dr. Zainoel Abidin General Hospital Banda Aceh, Indonesia.

METHODS

This study was an observational analytic study with a cross-sectional design. The study was conducted using primary data obtained from direct interviews and MMSE examination and secondary data obtained from medical records to confirm the

diagnosis of epilepsy. Samples were collected based on the diagnosis of neurologist in the patient's medical record at the Regional General Hospital Dr. Zainoel Abidin Banda Aceh from October to December 2019. This study involved thirty-four epilepsy patients as a study sample.

The sample in this study were all epilepsy patients who come Regional General Hospital dr. Zainoel Abidin Banda Aceh that meets Inclusion criteria: Patients with epilepsy who are or have been treated in RSUDZA from October to December 2019, Age over 18 years, Proficient in Indonesian, Epilepsy patients are not blind. The exclusion criteria are epilepsy patients who are less cooperative, epilepsy patients who cannot read and write. Data

were analysed using Chi-square statistical test, all data considered significant if $p < 0.05$.

RESULT

This research was carried out for 3 months in October, November and December 2019 at the Neurology Poly of RSUD dr. Zainoel Abidin Hospital Banda Aceh. This research was conducted on 34 epilepsy patients in the Neurology Polyclinic of RSUD Dr. Zainoel Abidin Hospital Banda Aceh to find out the factors that influence the MMSE score of epilepsy patients. The factors examined in this study are age, frequency of seizure, duration of epilepsy and therapy received by the patient.

Table 1 shows that the age of the most dominant respondent is adult or the age range of 26-65 years, which is 20 respondents (58.8%), while the final adolescents are 14 respondents (41.2%). Probable cognitive impairment was found in 17.6% sample and definite cognitive impairment in 3% sample (Table 2). Chi-Square statistical test results a probability score of 0.097 ($p > 0.05$), indicating the age of the patient does not affect the MMSE score of epilepsy patients (Table 3).

Table 4 shows normal MMSE values are more common in people who rarely experience seizures, whereas impaired MMSE values are more likely to be experienced by people who often have seizures. Chi-Square statistical test results produce a probability score of 0.028 ($p < 0.05$), indicating the frequency of seizures affects the MMSE score of epilepsy patients. Chi-Square statistical test result a probability score of 0.600 ($p > 0.05$), indicating the duration of epilepsy does not affect the MMSE score of epilepsy patients (Table 5).

By comparing the measurement results of MMSE scores to therapy, it was found that the results of MMSE were dominantly normal in epilepsy patients with monotherapy and were disturbed more dominantly in respondents with polytherapy. The Chi-Square statistical test results in a probability score of 0.012 ($p < 0.05$), indicating that therapy affects the MMSE score of epilepsy patients (Table 6). The results of logistic regression analysis, in table 8 can be seen that the variable that most influences the MMSE score of therapeutic respondents with the least probability score compared to other variables ($p = 0.036$) (Table 7).

DISCUSSION

Cognitive function refers to the processes of perception, analysis, and memory that underlie daily life. Decreased cognitive function is influenced by circumstances and conditions. Based on this

Table 1 Baseline characteristics

Characteristics	Frequency (n)	Percentage (%)
Age of Epilepsy Patients		
17-25	14	41.2
26-35	6	17.6
36-45	11	32.4
46-65	3	8.8
Sex		
Male	21	61.8
Female	13	38.2
Frequency of Revival		
Frequent	15	44.1
Often	14	41.2
Seldom	5	14.7
Duration of Epilepsy		
>1 year	23	67.6
1 tahun	7	20.6
< 1 year	4	11.8
Therapy		
Monotherapy	20	58.8
Polytherapy:		
2 drug	9	26.5
3 drug	3	8.8
4 drug	2	5.9

Table 2 Distribution of respondents based on MMSE Score

MMSE Score	Frequency (n)	Percentage (%)
Normal	27	79.4
Probable cognitive impairment	6	17.6
Definite cognitive impairment	1	3.0
Total	**34**	**100**

Table 3 Relationship between Age and MMSE Score of Epilepsy patients

| Age | MMSE Score | | | | p-value |
| | Normal | | Impairment | | |
	N	%	N	%	
Teenanger	9	12.7	5	10.0	
Adult	18	66.7	2	4.6	0.097
Total	27	79.4	7	42.6	

Table 4 Relationship between Frequency of seizure and MMSE Score of Epilepsy patients

| Frequency of seizure | MMSE Score | | | | p-value |
| | Impairment | | Normal | | |
	N	%	N	%	
Often	6	85.7	9	33.3	
Seldom	1	14.3	18	66.7	0.028
Total	7	100	27	100	

Table 5 Relationship between Epilepsy Duration and MMSE Score of Epilepsy patients

| Epilepsy Duration | MMSE Score | | | | p-value |
| | Impairment | | Normal | | |
	N	%	N	%	
>1 year	4	57.1	19	82.7	
<= 1 year	3	42.9	8	72.7	0.600
Total	7	100	27	100	

Tabel 6 Relationship between Therapy and MMSE Score of Epilepsy patients

| Therapy | MMSE Score | | | | p-value |
| | Impairment | | Normal | | |
	N	%	N	%	
Polytherapy	6	85.7	8	57.1	
Monotherapy	1	5.0	19	95	0.012
Total	7	100	27	100	

Tabel 7 Multivariate analysis results of the factors that most influence the MMSE score of epilepsy patients

Variable	p-value	OR
Frequency of seizure	0.053	8.064
Therapy	0.036	5.231

research of the most dominant respondent is adult on the reproductive age, this result is in accordance with research conducted by Raymond et al., Which found that epilepsy patients mostly occurred at productive age (range of age 19-64 years).[9]

Table 4 proved that there was a correlation between the frequency of seizures with the cognitive function of epilepsy patients, in this context, our data corroborate with Arend et al. research.[10] We found that epilepsy duration and MMSE Score was not correlated, The results of this study are consistent with the results of research by Pinzon which states that there is no significant outcome between cognitive function and the duration or duration of epilepsy. Pimpalkute et al. also found no negative effect on duration of quality of life for epileptic patients. This can be explained by the fact that epilepsy patients who have had epilepsy for a long time have been able to adapt to body conditions over time.[7,8,11]

Chi-Square statistical test proved that frequency of seizure and therapy affect the MMSE score of the correspondent. Research from Raymond et al. states that related pharmacological therapy correlates to cognitive effects, this is related to the use of new generation pharmacological therapies that have effects on cognitive function changes.[9] Administration of antiepileptic drugs (AED) must immediately initiated once a diagnosis of epilepsy has been established. The initiation of AED administration should ideally use 1 type of drug (monotherapy).[12] In this study, it was demonstrated that cognitive impairment was more common in epilepsy patients who received polytherapy. Administration a combination of 2 or more AEDs as well consider if administration of AED monotherapy is still not yet provide good seizure control. Because 30-40% of epilepsy patients are not well controlled with monotherapy, so some patients received combination AED therapy, although AED combination therapy is generally more effective in controlling seizure compared to use of monotherapy, the risk of side effects serious about using combination therapy, of course higher.[13]

Various existing studies support that AED affects cognitive impairment. However, this is contrary to the research conducted by Shiozaki in Japan which states that AED treatment for elderly amnestic patients with temporal spikes was effective in improving cognitive decline and related electroencephalographic abnormalities.[14]

Epilepsy therapy is almost in long-term use. Antiepileptic drugs are useful to balance the process of inhibition and excitation in brain neurons.[15] Sarhan et al. stated that monotherapy is generally capable prevent seizures in 70% of patients, while other studies conducted in India about 83% of patients are free from epilepsy seizures with polytherapy and 59% of epilepsy patients are free from seizures with monotherapy.[12] Epilepsy therapy aims to achieve effective prevention of seizures, minimal side effects and patient satisfaction. Polytherapy

or therapy by combining drugs that have the same work effect has a greater degree of neurotoxic, it becomes the basis of cognitive changes in epilepsy patients with polytherapy.[16]

ETHICAL CLEARANCE

Current study has been approved by Ethical Committee Faculty of Medicine Universitas Syiah Kuala,/Dr. Zainoel Abidin General Hospital, Banda Aceh, Indonesia with registration number 1171012P.

CONFLICT OF INTEREST

The authors declare that there is no competing interest regarding manuscript.

FUNDING

AUTHOR'S CONTRIBUTION

The authors are contribute equally to the content of manuscript from data preparation until data analysis.

REFERENCE

1. Fiest KM, Sauro KM, Wiebe S, Patten SB, Dykeman J, Pringsheim T, et al. Prevalence and incidence of epilepsy A systematic review and meta-analysis of international studies. 2016;
2. World Health Organization. WHO | Epilepsy: a public health imperative [Internet]. Who. 2019. 171 p. Available from: https://www.who.int/mental_health/neurology/epilepsy/report_2019/en/
3. Galtrey CM, Mula M, Cock HR. Stress and epilepsy: fact or fiction, and what can we do about it?. Pract Neurol. 2016;16(4):270-8.
4. Lodhi S, Agrawal N. Neurocognitive problems in epilepsy. Adv Psychiatr Treat. 2012;18(3):232–40.
5. Eddy CM, Rickards HE, Cavanna AE. The cognitive impact of antiepileptic drugs. Ther Adv Neurol Disord. 2011;4(6):385–407.
6. Witt JA, Helmstaedter C. Should cognition be screened in new-onset epilepsies? A study in 247 untreated patients. J Neurol. 2012;259(8):1727–31.
7. Wijono AD. Influenced of related epilepsy factors to age and quality of life. Callosum Neurol. 2018;1(3):106–11.
8. Lukas A, Harsono H, Astuti A. Cognitive impairment in eplipsy. Berk Ilm Kedokt Duta Wacana. 2016;1(2):144.
9. Manado RDK, Sigar RJ, Kembuan MAHN, Mahama CN. Gambaran Fungsi Kognitif pada Pasien Epilepsi di Poliklinik Saraf; 2012.
10. Arend J, Kegler A, Caprara ALF, Almeida C, Gabbi P, Pascotini ET, et al. Depressive, inflammatory, and metabolic factors associated with cognitive impairment in patients with epilepsy. Epilepsy Behav. 2018;86:49–57.
11. Gebre AK, Haylay A. Sociodemographic, clinical variables, and quality of life in patients with epilepsy in Mekelle City, Northern Ethiopia. Behav Neurol. 2018;1-6.
12. Sarhan EM, Walker MC, Selai C. Evidence for Efficacy of Combination of Antiepileptic Drugs in Treatment of Epilepsy. J Neurol Res. 2015;5(6):267–76.
13. Lee JW, Dworetzky B. Rational polytherapy with antiepileptic drugs. Pharmaceuticals. 2010;3(8):2362–79.
14. Shiozaki K, Kajihara S. Anti-epileptic drugs improved serial 7s scores on the Mini-Mental State Examination in elderly with cognitive impairment and epileptiform discharge on electroencephalography. Psychogeriatrics. 2019;19(1):38–45.
15. Husna M, Kurniawan SN. Biomolecular Mechanism of Anti Epileptic Drugs. MNJ. 2018;(3):38–45.
16. Goel D, Mittal M. Mono-Therapy versus Poly-Therapy: Ten Years Indian Experience on Various Seizure Disorders. World J Neurosci. 2015;05(05):350–7.