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Correlation between seizure characteristics and quality of life in epilepsy patients

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ABSTRACT

Background: Epilepsy is one of the most common neurological disorder and characterized by recurrent seizures caused by abnormal electrical activity in the brain. Epilepsy is both a medical diagnosis and a social label that can negatively impact quality of life (QoL). **Aims and Objective:** This study aimed to evaluate the correlation between characteristics of seizure and QoL among epilepsy patients. **Materials and Methods:** This is a case series study conducted at Bethesda Hospital, Yogyakarta. Subjects answer 8 questions in the SF-8 questionnaire by choosing one from several alternative answers. Sub-scale assessed in this questionnaire including general health perception (GH), physical functioning (PF), physical role functioning (RP), bodily pain (BP), vitality (VT), social role function (SF), mental health (MH), and emotional role functioning (RE). Each answer will be score and processed in a program from Optum™. The final results will be summarized into physical component (PCS) and mental component (MCS). **Results:** Total of the subjects were 27. Subjects were dominated by male, age< 60 years. The highest score is on the bodily pain subscale (mean: 50.00 ± 8.0739), wherease the lowest score is on global health perception (mean: 43.95 ± 7.1970). Overall, subjects in this study have a better mental status than physical status (47.14 ± 10.2093 vs 46.90 ± 7.9418). Type of seizure (PCS p: 0.794; MCS p:0.093), duration of epilepsy(PCS p: 0.832; MCS p: 0.856), history of epileptic status (PCS p: 0.141; MCS p: 0.951), the presence of neurological deficit (PCS p: 0.140; MCS p: 0.283), frequency of seizure before treatment (PCS p: 0.648; MCS p: 0.213), frequency of seizure after treatment (PCS p: 0.249; MCS p: 0.407), and frequency of seizure within the last 1 year were not significant to influence the QoL (PCS p:0.978; MCS p: 0.513). **Conclusion:** There is no significant characteristics of seizure that influence the QoL.

Key words: Epilepsy; Quality of life; SF-8 questionnaire; Seizure

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INTRODUCTION

Epilepsy is a disorder of the central nervous system characterized by periodic loss of consciousness with or without convulsions associated with abnormal electrical activity in the Bram.[1] It is estimated that 50 million individuals worldwide have epilepsy and about 90% of them are from developing countries.[2,3] The incidence of epilepsy is around 50 per 100,000 per year and do affect between 5 and 10 people per 1000 in developed country.[4,5] Asia has 17.0% higher burden than Africa from neuropsychiatric conditions (including epilepsy). In comparison to Africa, Asia has more untreated patients, 55.0% more additional epilepsy cases every year, because of its larger population.[6]

Epilepsy is both a medical diagnosis and a social label because people with epilepsy face many psychosocial challenges (anxiety, social stigma, difficulty in driving, unemployment) that can negatively impact quality of life (QoL).[7] Epilepsy is a multifaceted chroinic disorder which has diverse and complex effects on the well-being of the patients.[8]Previous study showed QoL was significantly worse in patients with epilepsy than in the healthy population in many factors and it had similar QoL with the healthy population when patients with epilepsy are well-

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controlled.[9-11] Improving the QoL is the most important goal of epilepsy Management.[12] The burdens of epilepsy to an affected person include physical hazards from the seizure itself and also social discrimination as a result of negative attitudes towards people with epilepsy.[4] This study aimed to identify the correlation between seizure characteristics and QoL in epilepsy patients.

MATERIALS AND METHODS

Subject

This is a case series study. This study has been done on December 2017 to January 2018 at Neurology Clinic, Bethesda Hospital, Yogyakarta, Indonesia. Inclusion criteria of the subjects i.e.: (i) adult (age >18 years), (ii) an outpatient at Bethesda Hospital, (iii) diagnosed epilepsy ≥ 6 months, and (iv) have a routine epilepsy treatment. Every subjects who refused to be included in this study and have a disability caused by major health problem (stroke, chronic heart failure, chronic kidney disease, chronic pulmonary obstructive disease, cancer, dementia, severe mental disability) will be excluded.

Variables

The variables assessed in this study include: age, gender, educational background (no education, elementary school, junior high school, senior high school, or bachelor degree), family history of epilepsy (with or without family history of epilepsy), etiology of epilepsy (cerebrovascuar accident [CVA] or idiopathic), electroencephalography (EEG) test (abnormal or normal), and CT Scan examination (no abnormalities or CVA).

Characteristics of seizure assessed in this study including: type of seizure (simple partial seizure, complex partial seizure, general tonic clonic seizure, or abscence seizure), the presence of neurological deficit (yes or no), history of epileptic status (yes or no), frequency of seizure before treatment (1 times/month, 1-3 times/month, 4-10 times/month, or >10 times/month), frequency of seizure after treatment (never, 1-3 times/month, 4-10 times/month, or >10 times/month), and frequency of seizure within the last 1 year (at least once/month, 4-11 times/month, 1-3 times/month, or never). Subjects' QoL measured by using SF-8 questionnaire.

SF-8 questionnaire used after obtained a permission from Optum™. It consist of 8 question about daily physical and mental status. Subjects asked to answer the questions by choosing one from several alternative answers.Subscale assessed in this questionnaire including general health perception (GH), physical functioning (PF), physical role functioning (RP), bodily pain (BP), vitality (VT), social role function (SF), mental health (MH), and emotional role functioning (RE).Each answer will be scored and processed in a program from Optum™. The final results will be summarized into physical component (PCS) and mental component (MCS). There is no spesific classification to interprete the SF-8 score. A higher score indicates a better QoL.

Statistical analysis

All variables are analyzed using SPSS programme. Univariat analysis is performed to find out subjects' characteristics. All SF-8 subscale score will be assessed for normality. After calculating for normality, variables will be analyzed using independentt-test, Kruskal-Wallis test,or Mann-Whitney U test for determine a significant factor(s) to QoL.The significant was set at $p < 0.05$.

Ethical clearance

This study is approved by Ethics Committee of Duta Wacana Christian University, Yogyakarta, Indonesia. The number of ethical clearance letter is 583/C.16/FK/2018.

RESULTS

Total of the subjects were 27. Table 1 shows subjects' characteristics. Subjects were dominated by male, age < 60 years, senior high school as the last educational background, and do not have a family history of epilepsy. The underlying cause of epilepsy in the most of subjects is CVA and it was confirmed by CT Scan examination. About 88.9% of the subjects have an abnormal result on EEG.

Table 2 shows the detail of characteristics of seizure. Twenty three subjects (85.2%) have a general tonic

Table 1. Subjects Characteristics

Characteristics	n	%
Gender		
Male	14	51.9
Female	13	48.1
Age (mean: 55.67±17.515)		
≥60 years	12	44.4
< 60 years	15	55.6
Educational background		
No education	1	3.7
Elementary school	3	11.1
Junior high school	3	11.1
Senior high school	11	40.7
Bachelor degree	9	33.3
Family history of epilepsy		
Yes	3	11.1
No	24	88.9
Etiology of epilepsy		
Idiopathic	8	29.6
CVA	19	70.4
CT Scan		
CVA	19	70.4
No abnormalities	8	29.6
EEG test		
Abnormal	24	88.9
Normal	3	11.1

CVA: cerebrovascular accident, EEG: electroencephalography

clonic seizure. More than 50% of the subjects have been diagnosed epilepsy in the last 5 years with neurological deficit. There was an improvement in epilepsy symptom based on the frequency of seizure, compared between before and after treatment. Before treatment, most of the subjects had a seizure more than once per month. After treatment, most of the subjects only have a seizure once per month (55.6%).

The highest score is on the bodily pain subscale (mean: 50.00 ± 8.0739), where as the lowest score is on global health perception (mean: 43.95 ± 7.1970). Overall, subjects in this study have a better mental status than physical status (47.14 ± 10.2093 vs 46.90 ± 7.9418) (Table 3).

Table 4 and 5 show the result of analysis on each variable. Male, age ≥ 60 years, and CVA as the etiology of epilepsy has a worse QoL compared with female, age < 60 years and epilepsy with unknown etiology.Subjects with elementary school as the last educational background have the best PCS score, whereas subjects with bachelor degree have the best MCS score, but it was not significant. Subjects with family history of epilepsy have a worse mental component and it was statistically significant ($p < 0.021$).

Subjects with history of epileptic status (PCS: 47.84 ± 2.935, MCS: 48.18 ± 3.068) and do not have a neurological deficit (PCS: 50.40 ± 6.795, MCS: 50.45 ± 8.010) have a betterQoL score than subjects without history of epileptic status and have a neurological deficit. Subjects with a simple partial seizure have the worst PCS score (41.01 ± 17.684), whereas subject with absence seizure has the best PCS score (50.77). Otherwise, subject with absence seizure has the worst MCS score (32.90), whereas subjects with simple partial seizure have the best MCS score (60.32 ± 1.824). Subjects who suffered from epilepsy for 2-5 years (PCS: 50.93 ± 7.405, MCS: 49.36 ± 5.263) and only have a seizure once per month before treatment (PCS: 49.05 ± 8.924, MCS: 52.41 ± 6.647) have the best QoL. There are no significant seizure characteristics affecting QoL in epilepsy patients.

Table 2. Characteristics of Seizure

Characteristics	n	%
Type of seizure		
Simple partial seizure	2	7.4
Complex partial seizure	1	3.7
General tonic clonic seizure	23	85.2
Absence seizure	1	3.7
History of epileptic status		
Yes	3	11.1
No	24	88.9
Duration of epilepsy		
>10 years	4	14.8
6-10 years	7	25.9
2-5 years	8	29.6
≤ 1 year	8	29.6
Neurological deficit		
Yes	19	70.4
No	8	29.6
Frequency of seizure before treatment		
> 10 times/month	2	7.4
4-10 times/month	8	29.6
1-3 times/month	6	22.2
1 times/month	11	40.7
Frequency of seizure after treatment		
4-10 times/month	1	3.7
1-3 times/month	11	40.7
1 times/month	15	55.6
Frequency of seizure within the last 1 year		
At least once/month	1	3.7
4-11 times/month	3	11.1
1-3 times/month	4	14.8
Never	19	70.4

Table 3. Score of Quality of Life

Sub-Scale	Mean (SD)	Minimum Score	Maximum Score
GH	43.95±7.1970	32.56	59.45
PF	45.67±8.8872	21.46	54.05
RP	46.89±7.7885	28.32	53.98
BP	50.00±8.0739	40.07	60.77
VT	49.82±10.2628	28.14	61.83
SF	46.82±9.1817	23.44	55.25
RE	44.12±7.7381	29.25	52.42
MH	47.52±9.2102	21.40	56.79
PCS	46.90±7.9418	28.51	57.32
MCS	47.14±10.2093	20.15	61.61

SD: Standard Deviation, GH: general health perception, PF: physical functioning, RP: physical role functioning, BP: bodily pain, VT: vitality, SF: social role function, MH: mental health, RE: emotional role functioning, PCS: physical component, MCS: mental component

DISCUSSION

This study showed that male subjects (PCS: 44.67 ± 6.533, MCS: 46.11 ± 9.250), age ≥ 60 years (PCS: 44.26 ± 6.471, MCS: 42.04 ± 10.282), and CVA as the etiology of epilepsy (PCS: 45.42 ± 8.086, MCS: 45.75 ± 10.894) have a worse QoL score on both PCS and MCS. The correlation between age with QoL was not significant. It was a same result with study by Milovanovic, et al.[13], but this finding is contrary to previous studies.Older ages is a potential predictors of worse QoL in adult patients with epilepsy.[14] In a study conducted in Cluj-Napoca, age was negatively correlated with almost all QoL in epilepsy items ($p < 0.05$).[15]

The correlation between gender etiology of epilepsy with QoL in this study were not significant. It is similar to previous studiesstated patient's sex did not influenced patients' QoL($p < 0.05$).[13,15]

Subjects with elementary school as the last educational background have the best PCS score (49.92 ± 6.405), whereas subjects with bachelor degree have the best

Table 4. Analysis on Subjects' Characteristics

Characteristics	PCS		MCS	
	Mean (SD)	p	Mean (SD)	p
Gender				
Male	44.67±6.533	0.133	46.11±9.250	0.595
Female	49.29±8.854		48.26±11.425	
Age				
≥ 60 years	44.26±6.471	0.126	42.04±10.282	0.017
< 60 years	49.00±8.575		51.23±8.383	
Educational background				
No education	42.13	0.917	46.19	0.751
Elementary school	49.92±6.405		38.78±16.346	
Junior high school	48.00±9.956		45.38±11.177	
Senior high school	46.09±7.653		48.66±6.604	
Bachelor degree	47.04±9.438		48.77±12.349	
Family history of epilepsy				
Yes	47.75±2.708	0.848	34.58±15.349	0.021
No	46.79±8.399		48.71±8.612	
Etiology of epilepsy				
Idiopathic	50.40±6.795	0.140	50.45±8.010	0.283
CVA	45.42±8.086		45.75±10.894	
EEG test				
Abnormal	46.64±8.363	0.649	47.36±10.349	0.760
Normal	48.92±2.942		45.40±10.866	

SD: Standard Deviation, PCS: physical component, MCS: mental component, CVA: Cerebrovascular Accident, EEG: electroencephalography

Table 5. Analysis on Seizure Characteristics

Characteristics	PCS		MCS	
	Mean (SD)	p	Mean (SD)	p
Type of seizure				
General tonic clonic seizure	47.08±7.475	0.794	46.38±9.801	0.093
Absence seizure	50.77		32.90	
Complex partial seizure	50.47		52.59	
Simple partial seizure	41.01±17.684		60.32±1.824	
History of epileptic status				
Yes	47.84±2.935	0.832	48.18±3.068	0.856
No	46.78±8.391		47.01±10.809	
Duration of epilepsy				
>10 years	46.39±9.208	0.141	48.32±3.163	0.951
6-10 years	47.94±5.808		44.90±11.321	
2-5 years	50.93±7.405		49.36±5.263	
≤ 1 year	42.20±8.311		46.31±15.266	
Neurological deficit				
Yes	45.42±8.086	0.140	45.755±10.894	0.283
No	50.40±6.795		50.45±8.010	
Frequency of seizure before treatment				
> 10 times/month	45.67±6.788	0.648	49.51±4.355	0.213
4-10 times/month	45.55±7.194		42.02±11.458	
1-3 times/month	45.14±8.339		43.55±8.339	
1 times/month	49.05±8.924		52.41±6.647	
Frequency of seizure after treatment				
4-10 times/month	50.77	0.249	32.90	0.407
1-3 times/month	44.342±7.296		47.08±7.281	
1 times/month	48.51±8.372		48.14±11.837	
Frequency of seizure within the last 1 year				
At least once/month	45.53	0.978	50.71	0.513
4-11 times/month	45.21±11.863		38.92±11.863	
1-3 times/month	48.07±2.651		42.34±15.412	
Never	46.99±8.905		49.27±8.569	

SD: Standard Deviation, PCS: physical component, MCS: mental component

MCS score (48.77 ± 12.349). There was no statistically significant between educational background with QoL (PCS p: 0.917; MCS p: 0.751). This finding is similar to study by Milovanovic, et al.[13]showed sociodemographic factors (including education) did not significantly predict quality of life in epilepsy (QOLIE)-31 score. In contrast,

Onwuekwe, et al.[16] stated psychological wellbeing had a positive correlation with education level. Education appeared to be most strongly associated with QoL at the high school and college levels. Lower educational attainment level was observed to have an independent, negative association with QOLIE ($p < 0.05$).[17]

Subjects with family history of epilepsy have a worse mental component. It was the only statistically significant variable related to QoL ($p < 0.021$). However, Melikyan, et al.[14] mention family status did not significantly affect health-related qulity of life (HRQOL).

Type of seizure (PCS p: 0.794; MCS p:0.093), duration of epilepsy(PCS p: 0.832; MCS p: 0.856), history of epileptic status (PCS p: 0.141; MCS p: 0.951), the presence of neurological deficit (PCS p: 0.140; MCS p: 0.283), frequency of seizure before treatment (PCS p: 0.648; MCS p: 0.213), frequency of seizure after treatment (PCS p: 0.249; MCS p: 0.407), and frequency of seizure within the last 1 year were not significant to influence the QoL (PCS p:0.978; MCS p: 0.513). This result was paralel to study by Tlusta, et al[18] stated type of seizures had no significant association, but was contradiction to many previous studies.

Correlation analysis revealed that QOLIE-89 total score was negatively correlated with seizure severity, type of seizure, and seizure frequency ($r = –0.424$, $–0.145$, and $– 0.274$ respectively, $p <0.01$).[19]Partial seizures associated with poorer QoL.[20] The analysis of variance showed that the partial epilepsy subgroup had significantly lower averages for all the QoL subfields except for the social relationship dimension. On regression analysis, having a generalized type of seizure was all related to higher scores on the HRQOL.[21]

Predictors of QoL included epilepsy duration ($p <0.05$).[22] Epilepsy duration positively correlated with overall QoL only among older adults.[23] Study in multicentre in Italian showed that duration of epilepsy was still a significant negative predictor of the overall Epi-QoL score in both pairwise model.[24]

Study in Iran stated there was a significant correlation between QoL and frequency of seizures per year.[25] Cross sectional study in India revealed QOLIE and seizure frequency was found to be statistically significant ($p<0.01$).[26] Frequency of seizures was the most significant parameter related to QOL ($R = 0.46$ with total score). Duration of disease also correlated with QOL score ($R = 0.24$ with total score). Significant but rather weak association (link) between frequency of seizures and almost all of subscales of QoL was noticed.[27]Seizure frequency, employability and psychiatric comorbidity were found to be risk factors for QOLIE-31 overall score, accounting for 33% of the variance in the regression model. The greater seizure frequency were the main factors influencing the quality of life in epileptic patients as evaluated by QOLIE-31.[28] Stepwise regression analysis showed that seizure frequency of at least once in three months was a predictive for QoL.[29]

CONCLUSION

Family history of epilepsy is the only significant factor contributing to QoL. Type of seizure, duration of epilepsy, history of epileptic status, the presence of neurological deficit, frequency of seizure before treatment, frequency of seizure after treatment, and frequency of seizure within the last 1 year are not significant to influence the QoL. Further research with a large number of subjects and multicenter is crutial to determine the factors that really affect the QoL.

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Authors Contribution:
RP- Concept and design of the study, manuscript preparation, statistically analyzed and interpreted, critical revision of the manuscript; **RDLRS -** Preparing first draft of manuscript, critical revision of manuscript and review of the study; **J** - Reviewed the literatur, preparing first draft of manuscript, statistically analyzed and interpreted; **ADW-**Reviewed the literature,preparingfirst draf of manuscript, collected data, and review of the Study, statistically analyzed and interpreted; **FB** - Reviewed the literatur, preparing first draft of manuscript, collected data.

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