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# Seizure free status as a good predictor for quality of life of temporal lobe epilepsy patients after amygdalohippocampectomy



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Muhamad Thohar Arifin<sup>1\*</sup>, Ashari<sup>1</sup>, Surya Pratama Brilliantika<sup>1</sup>, Jacob Bunyamin<sup>1</sup>, Hardian<sup>2</sup>  
Happy Kurnia Brotoarianto<sup>1</sup>, Alifiati Fitrikasari<sup>3</sup>, Zainal Muttaqin<sup>1</sup>

## ABSTRACT

**Background:** The aim of epilepsy surgery is to improve the quality of life of people with epilepsy. Temporal lobe epilepsy (TLE) is the most common form of intractable epilepsy with a risk of low quality of life due to uncontrolled seizures. In this study, we evaluated the quality of life among TLE patients who underwent amygdalohippocampectomy between those who were free from seizure and those who were not.

**Methods:** This was a cross-sectional observational study. The postoperative quality of life was measured by QOLIE-31 questionnaire followed-up at least 12 months since the surgery.

**Results:** Among 31 patients, 21 patients (67.7%) were free from seizures after 12 months of follow-up. We observed significantly higher quality of life of those seizure-free patients either as overall quality of life ( $p=0.001$ ) or among domains such as seizure anxiety ( $p=0.003$ ), emotional well-being ( $p<0.001$ ), fatigue ( $p<0.001$ ), cognition ( $p=0.002$ ), medication effects ( $p=0.01$ ) and social function ( $p<0.001$ ).

**Conclusion:** TLE patients who were seizure-free had better quality of life compared to those who were not after amygdalohippocampectomy.

**Keywords:** quality of life, temporal lobe epilepsy, amygdalohippocampectomy

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<sup>1</sup>Department of Neurosurgery, Faculty of Medicine, Universitas Diponegoro, Semarang City, Central Java Province, Indonesia

<sup>2</sup>Department of Physiology, Faculty of Medicine, Universitas Diponegoro, Semarang City, Central Java Province, Indonesia

<sup>3</sup>Department of Psychiatry, Faculty of Medicine, Universitas Diponegoro, Semarang City, Central Java Province, Indonesia

\*Correspondence to:  
Muhamad Thohar Arifin;  
Department of Neurosurgery,  
Faculty of Medicine, Diponegoro  
University, Jl. Prof Soedarto  
Tembalang Indonesia;  
[thohar@fk.undip.ac.id](mailto:thohar@fk.undip.ac.id)

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## INTRODUCTION

The high burden of epilepsy in Indonesia as the fourth most populous country in the world reached approximately 1.1 million people with epilepsy (PWE) and roughly 360.000 of them will become resistant to medication and become candidates for epilepsy surgery.<sup>1,2</sup> The primary objective of epilepsy surgery is to relieve epileptic seizures PWE and to improve quality of life (QoL). Health-related QoL (QoL) consists of the overall condition of physical, social, psychological, vocational, and economic health status of PWE TLE (TLE) which is the most frequent type of intractable epilepsy is most frequently resulted from hippocampal sclerosis with the ictal onset zone in the hippocampus, amygdala, and parts of temporal neocortex.<sup>7-10</sup> Surgery is said to be successful if the patients show improved QoL after surgery or if their QoL is better than before surgery. This is because the surgery is aimed at reducing or eliminating the frequency of seizures, therefore controllable seizure conditions can affect the QoL.<sup>3-5,14-16</sup> In this study, we evaluated surgical management of epilepsy at the Kariadi General Hospital and compared the aspect of QoL in TLE patients between those who were free from seizures and those who were not following

amygdalohippocampectomy.

## METHODS

This study used an observational design with a cross-sectional approach. This research was conducted at the Kariadi General Hospital of Semarang from February to June 2012. The target population involved all patients with TLE who had undergone amygdalohippocampectomy. The participants of this study were selected using consecutive sampling which was based on the admission of the subjects to the Kariadi General Hospital of Semarang. We included patients diagnosed with TLE following amygdalohippocampectomy who had at least a year of follow-up, aged over 15 years, and had no communication difficulty. The instrument of this study involved two standardized questionnaires that measure QoL of the epilepsy patients, namely QOLIE-31.

## Surgical Evaluation

Prior to surgery, several stages of assessments (semiology assessment, electroencephalography and neuroimaging) were performed to determine the ictal onset zone. After surgery, all patients continued to consume anti-epileptic drugs

according to the therapeutic dose. Seizure-free status was assessed using the Engel's criteria at 6 and 12 months following surgery. Drug dose reduction was performed in the second year after surgery.

In this study, data collection on the QoL of this patient was conducted by directly administering the questionnaires to the respondents to collect their responses. Data from the questionnaires were analyzed and compared with the patient's seizure-free status from the medical records. The selected patients were those who had undergone over 1 year of follow-up and were willing to voluntarily research subjects by signing informed consent.

### Data Analysis

Hypothesis testing comparing the QoL between seizure-free epilepsy patients and those who are not seizure-free after surgery was conducted using unpaired t-test if the data is normally distributed. Testing distribution normality of the data was performed using the Saphiro-Wilk test, and comparison of the QoL between seizure-free epilepsy patients and those who were not seizure-free after surgery was performed using the unpaired t-test and Mann-Whitney test. A computerized statistic (IBM SPSS 24) was used to perform all analyses.

### Research Ethics

This study has been approved by the Institutional Review Board of Kariadi General Hospital/Faculty of Medicine Diponegoro University. All patients had consented for participation in this study.

### RESULT

We observed a total of 31 epilepsy patients, in which 21 patients were seizure-free (Engel Class 1), and 10 patients were not (Engel Class 2, 3, and 4). The characteristics of the research subjects are presented in [Table 1](#).

Of total of 31 patients, 21 (67.7%) were male. Regarding age at diagnosis and surgery, 58.1% were diagnosed when they were under 10 years old while 58.1% underwent surgery aged less than 25 years old. Only 3.3% had low education level (elementary school to junior high school graduates), while 76.7% were highly educated (diploma, bachelor or equivalent). Regarding seizure-free status, after 12 months of follow-up, 67.7% were seizure-free and 32.3% were not.

### Comparison of the QoL of patients with postoperative TLE

The results of the comparison of the QoL among patients after TLE surgery who were seizure-free and those who were not seizure-free are presented

in [Table 2](#).

We observed differences in the QoL between patients with postoperative TLE who were free from seizures and who were not in each domain. In general, QoL scores were higher for the seizure-free patients than the non-seizure-free patients. We found that the score of seizure anxiety in the seizure-free cohort was significantly higher compared to the non-seizure free cohort ( $p=0.007$ ). Meanwhile, for the emotional well-being score, the seizure-free cohort had significantly higher score than the non-seizure group ( $p<0.001$ ). The score for energy/fatigue in the seizure-free cohort was also significantly higher ( $p<0.001$ ). As for the medication effect score, higher score was also observed in the seizure-free cohort ( $p=0.01$ ). We also observed a higher social function quality in the seizure-free cohort ( $p<0.001$ ) and higher cognitive function score ( $p=0.002$ ) as well. The overall QoL score of the seizure-free cohort was significantly higher than that of those who were not ( $p=0.001$ ).

### DISCUSSION

Improved quality of life was seen in all outcomes of the postoperative seizure group. Seizure-free patients showed a better quality of life than patients who have continuous seizures and became a crucial component to measure efficacy of the surgery. From 31 subjects of the patients with postoperative TLE, 21 (67.7%) patients were seizure-free and 10 (32.3%) patients were non-seizures-free following the surgery. With regard to the QoL, the results of the study indicated that the QoL of seizure-free TLE patients was significantly higher than non-seizure-free in all QOLIE-31 domains.<sup>17-19</sup> This study was consistent with Ahmad *et al.* showing the differences in several QOLIE-31 domains in which group 1 (Engel Class 1 and 2) had significantly better QoL than group 2 (Engel Class 3 and 4).<sup>18</sup> Another study conducted by Tanriverdi *et al.* showed that seizure-free patients were presented with better scores than non-seizure-free patients in all QOLIE-10 questionnaire domains at 6 months, 2 and 12 years of postoperative follow-up, although there was no difference in three domains, i.e., "memory problems, limitation in social life, and physical side effects" after 12 years of follow-up.<sup>17</sup> Another study reported that good QoL depends on the postoperative state, which suggests that patients who had postoperative seizures (although seizure frequency decreased) could have a poorer QoL compared to the baseline of preoperative status. The possible explanation is that some patients who had epilepsy surgery have too high, sometimes even unrealistic expectations about the changes after surgery.<sup>17,18,20-23</sup>

**Table 1. Demographic characteristics and factors associated with epilepsy on the research subjects**

Characteristics	Mean ± SD (min-max)	n (%)
Age	28.48 ± 7.256 (20-43)	-
Sex		
- Male	-	21 (67.7%)
- Female	-	10 (32.3%)
Age at diagnosis		
- < 10 years old	-	18 (58.1%)
- > 10 years old	-	13 (41.9%)
Age at TLE surgery		
- < 25 years old	-	18 (58.1%)
- > 25 years old	-	13 (41.9%)
Educational status		
- Low	-	1 (3.3%)
- Medium	-	6 (20.0%)
- High	-	23 (76.7%)
12 months follow-up result		
- Seizure free	-	21 (67.7%)
- Not seizure free	-	10 (32.3%)

**Table 2. QoL outcomes of patients with postoperative TLE who are seizure-free and who are not**

QOLIE-31 Domain	Seizure-free Mean ± SD (min-max)	Non-seizure-free Mean ± SD (min-max)	p
Seizure anxiety	29.3 ± 0.69 (28.2-30.5)	28.4 ± 0.79 (27.4-29.5)	0.007 <sup>*</sup>
Emotional well-being	21.2 ± 1.08 (18.9-22.6)	18.9 ± 1.28 (17.0-21.1)	<0.001 <sup>*</sup>
Energy/Fatigue	27.9 ± 0.78 (26.4-29.5)	26.3 ± 0.74 (24.9-27.2)	<0.001 <sup>*</sup>
Medication effect	32.5 ± 0.25 (31.9-32.9)	32.3 ± 0.28 (31.9-32.7)	0.015 <sup>*</sup>
Social function	30.7 ± 1.72 (27.6-32.8)	27.5 ± 1.37 (25.4-30.2)	<0.001 <sup>*</sup>
Overall life quality	16.6 ± 0.45 (15.5-17.6)	15.7 ± 0.63 (14.6-16.6)	0.001 <sup>§</sup>
Cognitive function	32.2 ± 1.75 (29.2-35.5)	28.5 ± 3.18 (23.7-31.9)	0.002 <sup>§</sup>

\* Unpaired t-test

§Mann-Whitney test

We observed that patients tended to report difficulty in memorizing or acquiring new skills after TLE surgery. The possible explanation was because the removed ictal onset zone was the amygdala and hippocampus which were responsible for memory formation and consolidation. Oddo *et al.* found that verbal memory impairment was common after left-sided TLE surgery patients while visual memory impairment was common in right-sided TLE surgery. We also observed memory impairment as a delay in recall in both verbal memory and visual memory. This finding is in line with the lesions of the mesial-temporal region which is responsible for recall process.<sup>24,25</sup>

This study revealed that seizure anxiety in the non-seizure-free patients was higher than in the seizure-free. The uncontrolled condition of postoperative seizures caused concern among patients that they would have seizures during their daily activities, unlike seizure-free patients who could perform their activities well without worrying about seizures. This finding is in agreement with Ahmad *et al.* who also found a significant difference in the seizure worry domain between the seizure-free and non-seizure-free cohorts after surgery.<sup>18</sup> Moreover, emotional well-being, overall QoL, and energy/fatigue among the seizure-free patients were higher than among the non-seizure-free patients. Non-seizure-free patients were prone to experience uncontrollable seizures leading to anxiety, reduced passion, decreased enthusiasm, and fatigue in daily activities. Therefore, they had poor overall QoL, unlike seizure-free patients who did not feel anxious about seizures.

We also found that the social function of postoperative seizure-free patients was better than non-seizure-free patients, particularly due to the effect of seizures which restricted non-seizure-free patients to optimally fulfill their social functions. Uncontrolled seizures may lead to difficulty in finding job, driving restriction, and limited social interaction due to embarrassment and fear of having seizures in the presence of others.<sup>11,12,17,18,21</sup> However, another study also reported that there was improvement in psychosocial function after surgery regardless the presence of seizure control.<sup>17</sup> Long term epilepsy medication also affected QoL as demonstrated by the postoperative non-seizure-free patients being frustrated, losing hope of recovery and tired of taking the drugs. This finding was in line with the research by Tanriverdi *et al.* which suggested that the less intake of anti-epileptic drugs, the better results in the seizure status.<sup>17</sup> The result of this study contradicted to Ahmad *et al.* who found that the effect of medication was worse in patients with good seizure status (Engel Class 1 and 2) (31%) than in those with poor seizure status (Engel Class 3 and 4) (14%), but the difference was not statistically significant.<sup>18</sup>

## CONCLUSION

We found that the overall QoL in the seizure-free cohort following amygdalohippocampectomy was higher compared to the non-seizure-free cohort. There was an influence of the seizure-free condition of the patients with TLE on their QoL including reduced seizure anxiety, improved social interaction, and emotional well-being. Therefore, it is important for the epilepsy surgeon to assess the preoperative QoL of patients, set a matched

expectation of surgical results, and perform periodical QoL follow-up for TLE patients.

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## DISCLOSURE OF CONFLICTS OF INTEREST

The authors report no relevant conflict of interest, related to this study. They confirm reading the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

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