

# Study of inter-relationship of depression, seizure frequency and quality of life of people with epilepsy in India

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## Abstract

Epilepsy is a chronic neurological disorder that can have profound physical, social and psychological consequences. We aimed to assess the clinical predictors of quality of life of people with epilepsy. We recruited 31 patients suffering from epilepsy in this cross-sectional study. Their clinical profile was recorded. Quality Of Life in Epilepsy (QOLIE-31) was used to assess quality of life of our patients. Depression was screened by Neurological Disorders Depression Inventory in Epilepsy (NDDI-E). Among all the clinical variables, only seizure frequency significantly correlated with seizure worry ( $P=0.002$ ), emotional well-being ( $P=0.026$ ) and social functions ( $P=0.013$ ) subscales of QOLIE-31. NDDI-E score showed a significant negative correlation with all the subscales of QOLIE-31 except medication effects ( $P=0.993$ ). A significant positive correlation was also noted between seizure frequency and NDDI-E score ( $r=0.417$ ,  $P=0.020$ ). Seizure frequency and depression are the most important predictors of quality of life in epilepsy patients. The management of patients with epilepsy should not only be aimed at just preventing seizures but the treating clinicians should also be cognizant about depression which itself can significantly affect the quality of life of patients.

## Introduction

Epilepsy is a chronic neurological disorder that affects individuals of all ages regardless of gender. The impact of living with epilepsy can be enormous than the seizure itself. A World Health Organization (WHO) report estimated that 10% of the global burden of brain and mental disorders is caused by epilepsy, calculated in form of disability-adjusted life years (DALYs).<sup>1</sup>

Epilepsy can have diverse and complex effects on the overall well-being or subjective quality of life (QOL) of its sufferers.<sup>2,3</sup> It can be associated with profound physical, psychological and social consequences and its impact on

a person's quality of life can be greater than that of some other chronic conditions.<sup>4,5</sup>

Several aspects directly related to epilepsy, including disease duration, age of onset, seizure severity and seizure frequency, are considered to affect the QOL of patients with epilepsy. However, one factor that has consistently been shown to be predictive of QOL in epilepsy is seizure frequency.<sup>6</sup> Individuals with uncontrolled epilepsy often feel that they are a burden to others, especially because their condition limits many of their activities.

Also, people with seizures are more likely to have mental illness or psychological stress, to be physically inactive, or to report physical ailments.<sup>7</sup>

Depression and anxiety have been reported to be the most common psychological co-morbidities with epilepsy.<sup>7</sup> Multiple studies have confirmed that mood is one of the strongest predictors of QOL, even when other factors such as seizure severity or frequency are accounted for.<sup>8-10</sup> A review of several studies also indicated that depression has been consistently associated with a poorer QOL in patients with epilepsy regardless of anti-epileptic drug (AED) response.<sup>7</sup>

With this backdrop, we planned this study to assess the impact of seizure frequency and depression on QOL of epilepsy patients in our settings as there is relative paucity of Indian research in this regard.

The main aim of our study was to assess the quality of life of patients of epilepsy and determine its clinical predictors.

We hypothesized that depression and seizure frequency would affect all the domains and thus overall quality of life of epilepsy patients. Our second hypothesis was that seizure frequency and hence seizure control would predict the occurrence of depression in our patients.

## Materials and Methods

This was a cross-sectional study in design. 31 patients with epilepsy who were attending the follow-up at our psychiatry outpatient department were recruited for this study. We included only the patients of epilepsy who had been diagnosed for at least one year. The subjects were not categorized according to type of epilepsy as the previous studies suggest that type of epilepsy is not an important predictor of QOL.<sup>11,12</sup> People with psychotic disorders, stroke, head injury, brain tumors, mental retardation, co-morbid chronic medical disorders like diabetes, hypertension and asthma and patients who have had recent brain surgery were excluded from the study. After taking the written informed consent for participation in the study, the patients were then subjected to

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evaluation by study instruments.

*Socio-demographic performa:* this included patient's age, sex, marital status, occupation, educational status, religion, family type, locality.

*Clinical profile sheet:* this consisted of clinical variables directly related to epilepsy like age of onset of seizures, duration of illness, seizure frequency, history of epilepsy in first-degree relatives and type of anti-epileptic drug (AED) being given. We chose to look at seizure frequency at three levels (0, 1, or >1) rather than as a continuous variable to minimize inaccuracies related to participants' recall of number of seizures.<sup>13</sup>

*Neurological Disorders Depression Inventory in Epilepsy (NDDI-E):*<sup>14</sup> it is a six-item self-administered tool designed to assess patients with epilepsy for depression. Each item is rated on 4-point likert scale with rating as 1-never, 2-rarely, 3-sometimes, 4-always/often. Total score ranges from 6-24. A score of 14 and higher is suggestive of the possibility of a major depressive disorder and serves as a indicator to carry out a more in-depth evaluation.

*Quality Of Life in Epilepsy (QOLIE-31):*<sup>15</sup> it consists of seven subscales which are seizure worry (5 items), emotional well-being (5 items), energy/fatigue (4 items), cognitive functioning (6 items), medication effects (3 items), social functioning (5 items), overall QOL (2 items) and overall health (1 item). The responses used Likert rating scales which were later transformed into linear scales that ranged between 0 and 100. Higher the score, better is the quality of life. The scoring and weightage of each item in the QOLIE-31 was obtained from the guidelines in the QOLIE-31 manual.

Data were analyzed using the Statistical Package of Social Sciences (SPSS) version 17.0. Descriptive statistics were expressed as mean [standard deviation (SD)] and frequency (percentage) as appropriate. Correlation coefficient was used to measure the relationship between NDDI-E total score, frequency of seizures and score of QOLIE-31 subscales. The level of significance was set at  $P < 0.05$ .

## Results

The age of patients ranged from 18-65 years with the mean (SD) of 33.74 (11.16) years. Table 1 shows socio-demographic profile of our study sample. Most of the patients were males (74.2%), married (77.4%), unskilled/semi-skilled/skilled workers (70.96%), educated up to middle school (77.4%), of Hindu religion (77.4%), having nuclear family (66.67%) and coming from rural locality (70.96%).

The age of patients showed a significant positive correlation with overall QOL domain ( $r = 0.424$ ,  $P = 0.017$ ).

The mean (SD) age of onset of epilepsy in our patients was 19.66 years (10.96). Mean (SD) duration of illness *i.e.* epilepsy was 14.35 years (11.42). Mean (SD) duration of AED use was 12.18 years (10.18). Out of 31, only 7 patients (22.58%) had history of epilepsy in first-degree relatives; 8 patients reported zero seizures, same number of patients reporting one seizure and 15 patients reported  $> 1$  seizure in last six months.

Table 2 shows distribution of AEDs used by the study subjects. Almost half (48.4%) of them were on two AEDs. Carbamazepine was the most commonly used AED followed by Sodium Valproate. Three patients were using an anti-depressant.

The mean (SD) score of NDDI-E for our sample was 14.45 (4.28). Table 3 shows the mean scores of various QOLIE-31 subscales. The mean (SD) total score for QOLIE-31 was 59.53 (17.59). The highest mean (SD) score was for the medication effects subscale, 88.08 (22.92) and lowest was for seizure worry, 51.82 (32.77).

Seizure frequency as denoted by number of seizures in past six months was found to be significantly correlated with seizure worry ( $P = 0.002$ ), emotional well-being ( $P = 0.026$ ) and social functions ( $P = 0.013$ ) subscales of QOLIE-31 as shown in Table 4.

NDDI-E score showed a significant negative correlation with all the subscales of QOLIE-31 except medication effects ( $P = 0.993$ ) as also shown in Table 4.

A significant positive correlation was also noted between seizure frequency and NDDI-E score ( $r = 0.417$ ,  $P = 0.020$ ).

## Discussion

The focus of this study was to assess the factors affecting the quality of life of patients with epilepsy.

### Clinical variables and quality of life in epilepsy

Duration of illness did not affect any of the domains of quality of life in epilepsy. This is in accordance with the findings of a study by Norsa'adah *et al.*, which also found no significant association between duration of epilepsy and QOL, although they noted lower scores of QOL in those who had longer duration of illness.<sup>11</sup> As opposed to our findings, longer duration of epilepsy has been reported as a predictor for poor QOL in some earlier studies.<sup>12,16</sup>

Age of patients rather affected the overall QOL but age of onset of epilepsy did not. This is supported by similar results from previous studies.<sup>12,16-19</sup>

Duration and type of AEDs use had no significant affection on QOLIE-31 score. Some authors have raised the doubts about the ability to evaluate the impact of AEDs on the quality of life, since this aspect has only a minor impact on calculation of the scores in QOLIE-31.<sup>20</sup>

Seizure frequency was the only clinical variable which had significant impact on some domains of quality of life of epilepsy patients. In general, the literature supports the finding of our study in which people with frequent seizures had significantly poorer quality of life than those with infrequent or no seizures.<sup>3,11,17-22</sup> Baker *et al.* reported that seizures frequency was the most important clinical predictor of psychosocial and emotional maladjustment in patients with epilepsy.<sup>12</sup> Seizure frequency was negatively correlated with subscale scores of seizure worry, emotional well-being and social functions. Probably, people with uncontrolled or poorly controlled epileptic seizures may feel uncomfortable most of the times because of not knowing when the next seizure will occur. Thus to avoid having seizures at inappropriate times, public places or social events, they may take precautions or impose restrictions on themselves by not visiting such places or events. They may be restricted or feel apprehensive themselves while driving, and may be denied employment and career opportunities which can translate into a lower QOL. Frequency of seizures has been related to fear and misunderstanding which results in the social stigma and discrimination surrounding epilepsy. A study by Chomba *et al.* reported that many patients with epilepsy were feared and rejected by families or communities.<sup>23</sup> Cultural

**Table 1. Socio-demographic profile of the patients.**

Variable	Frequency (%)
Sex	
Male	23 (74.2)
Female	8 (25.8)
Marital status	
Married	24 (77.4)
Unmarried	7 (22.58)
Educational status	
Upto middle school	24 (77.4)
Middle to sr. secondary	5 (16.1)
Grad/post-grad	2 (6.45)
Occupation	
Unemployed	7 (22.58)
Unskilled/semi-skilled/skilled worker	22 (70.96)
Professional	2 (6.45)
Religion	24 (77.4)
Hindu	
Muslim	7 (22.58)
Family type	
Nuclear	20 (66.67)
Nuclear extended	1 (3.22)
Joint	10 (32.26)
Locality	
Rural	22 (70.96)
Urban	9 (29.03)

**Table 2. Anti-epileptic drugs used by patients.**

Drug	Frequency (%)
Carbamazepine	17 (54.83)
Sodium valproate	16 (51.61)
Phenytoin	5 (16.1)
Clonazepam	10 (32.26)
Lorazepam	5 (16.1)
Clobazam	4 (12.9)
One type	4 (12.9)
Two types	15 (48.38)
Three types	12 (38.70)

**Table 3. Mean scores of QOLIE-31 subscales.**

Subscale of QOLIE-31	Mean (SD)
Seizure worry	51.82 (32.77)
Emotional well-being	57.68 (22.74)
Energy/Fatigue	52.10 (13.40)
Cognitive	61.95 (23.94)
Medication effects	88.08 (22.92)
Social functions	64.98 (28.36)
Overall QOL	54.27 (12.67)
Subjective overall health (Item 31-visual analogue scale)	59.35 (14.13)
Total score	59.53 (17.59)

**Table 4. Correlation of seizure frequency with QOLIE-31 subscales and correlation of NDDI-E score with QOLIE-31 subscale score.**

	Seizure worry	Emotional well-being	Energy/fatigue	Cognitive	Medication effects	Social functions	Q-31	Overall QOL
Seizure frequency <sup>o</sup> (r, P)	-0.525 0.002**	-0.399 0.026*	-0.066 0.726	-0.334 0.066	0.190 0.307	-0.440 0.013*	-0.326 0.074	-0.327 0.073
NDDI-E (r, P)	-0.704 0.0001**	0.883 0.0001**	-0.646 0.0001**	0.602 0.0001**	-0.002 0.993	-0.723 0.0001**	-0.705 0.0001**	-0.867 0.0001**

<sup>o</sup>Number of Seizures in Last six Months. r, pearson's correlation; \*P<0.05; \*\*P<0.01.

beliefs influence attitudes and actions of the community towards patients with epilepsy and high rates of psychological problems like anxiety, depression, and low self-esteem have been reported in patients with epilepsy, thus adversely affecting emotional well-being and social functioning of patients.<sup>24-26</sup>

However, there was no significant correlation of frequency of seizures with energy, cognitive and overall QOL domains of QOLIE-31 which is in contradiction to findings from some previous studies.<sup>10,11,15,27</sup>

### Depression and quality of life in epilepsy

It is known that in epileptic patients, psychiatric disturbances are prevalent and depression is the most frequent co-morbidity.<sup>9,28</sup>

Depression showed a strong negative affection of the QOL, and also a significant correlation between the total QOLIE-31 score and subscale scores in the domains of seizure worry, emotional well-being, energy/fatigue, cognitive, social functions and subjective overall health (Item-31).<sup>9,28,29</sup> Strongest correlation between depression and emotional well being dimension seems to be self-explanatory. The more a person with epilepsy feels depressed the more nervous, restless and down-hearted he is. Furthermore, depression appeared to be the stronger predictor of QOL in epilepsy than seizure frequency. In some studies, the presence of depression has been indicated as an essential factor influencing the patient's judgment concerning his QOL. This can partly be explained by the fact that QOL inventories reflect social and psychological domains more than the clinical aspects, and thus being the subjective measures that the individual uses to report on his/her perception of their QOL. Also, there are evidences that psychological factors contribute 30 to 35% or up to 50% to the variation in QOL, as compared to values of about 20% for the clinical variables related to epilepsy.<sup>9,30,31</sup>

Thus our first hypothesis was rejected as depression affects all the domains of QOLIE-31 but seizure frequency is found to affect only three domains.

NDDI-E score was also directly correlated with the frequency of seizures in past six months implying that lack of seizure control

might lead to depression in epilepsy patients. This approves our second hypothesis that occurrence of depression in epilepsy bears an association with seizure frequency. A recent study by Dias *et al.*, also concluded that major depression is associated with uncontrolled seizures, with a prevalence twice that of patients whose seizures are controlled.<sup>13</sup>

### Limitations

Our study had some limitations like small-sample size and a cross-sectional design, thus our findings cannot be generalized. Also, we did not control for use of AEDs while carrying out the study which might have confounded our results to an extent.

### Conclusions

Seizure frequency and depression are the most important predictors of quality of life in epilepsy patients. The management of patients with epilepsy should not only be aimed at just preventing seizures but the treating clinicians should also be cognizant about depression which itself can significantly affect the quality of life of patients. Reintegration of the sufferers into community should also be one of the primary goals of management in epilepsy.

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