



Health-related quality of life among people with epilepsy with mild seizure-related head injuries

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ABSTRACT

Seizure-related head injury (SRHI) is an under-recognized condition frequently experienced by people with epilepsy (PWE). The purpose of this study is to investigate the potential impact of SRHI on health-related quality of life (HRQOL) among PWE receiving care in a tertiary epilepsy center. Consecutive adult PWE receiving care at the Baylor Comprehensive Epilepsy Center (BCEC) were recruited for the study. After their informed consent was obtained, patients were administered the QOLIE-31 to measure HRQOL and the NDDI-E to screen for depression. Simple linear regression was used to identify clinical variables associated with HRQOL and that included SRHI obtained systematically at each clinic visit. Data were also compared between the SRHI and non-SRHI groups. Participants included 172 subjects. Recurrent mild SRHI occurred in 50 (29%) subjects. Factors with a negative effect on HRQOL included depression (slope = -19.99 [95% CI $-25.16, -14.81$]; $p < .0001$), recurrent SRHI (-17.02 [$-22.35, -11.69$]; $p < .0001$), past SRHI (-13.46 [$-18.43, -8.48$]; $p < .0001$), and seizure frequency (-0.17 [$-0.26, -0.07$]; $p = 0.001$) on univariate analysis. With stepwise multiple regression, depression and recurrent SRHI significantly impacted HRQOL with slopes (95% CI; p -value) of (-17.53 [$-22.34, -12.73$]; $p < .0001$) and (-14.03 [$-18.78, -9.28$]; $p < .0001$), respectively. Patient-derived HRQOL is negatively associated with depression and recurrent SRHI, independently. There has been a justifiable increased awareness of the potential effects of head injuries among healthy individuals. Our data suggest that head injuries can certainly be detrimental among PWE, and greater efforts should be made to recognize and formulate prevention strategies for SRHI.

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1. Introduction

Over the past decade, there has been great emphasis placed upon epilepsy-related comorbid conditions and how they impact people with epilepsy (PWE) [1]. Comorbid health conditions are common among PWE and impact everyday living and health-related quality of life (HRQOL). Most of the epilepsy comorbidity literature deals with effects of individual comorbid conditions in epilepsy, but, in fact, PWE often have more than one coexisting condition that could potentially have even greater impact upon quality of life. Therefore, investigating subgroups of PWE who have specific combinations of important comorbidities is very worthwhile. For example, one of the better-known conditions that has justifiably received much attention over the past two decades is depression. Depression is a highly prevalent comorbid condition among PWE [2], is often under-recognized [3], and impacts HRQOL [3–5].

Mild head injury is increasingly being recognized as a major public health concern, and though most patients recover fully, many (7% to 33%) experience persistent problems [6,7]. Recurrent injury, even when classified as mild, is associated with definitive decrements in cognitive performance [8–10] which, in turn, lead to diminished HRQOL [11]. Head injury itself is not a homogeneous entity, as different post-injury effects of even mild head injury exist and include somatic, cognitive, and behavioral effects. Seizure-related head injury is a common condition among PWE. Compared with the general population, PWE are at increased risk for experiencing injury [12], and mild seizure-related head injuries (SRHIs) are the most common form of injury encountered [12–15]. Little is known about the potential effects that SRHI, even mild SRHI, has on overall functioning and HRQOL in PWE. Although there is an abundance of literature on the effects of mild head injury in people without epilepsy, little is known about the potential consequences of mild head injury among PWE.

Health-related quality of life is a multidimensional concept often incorporating physical, emotional, and social components associated with an illness. Over the recent decades, understanding HRQOL in PWE has been an important topic of study among clinicians and

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researchers. Individuals with epilepsy are often at a disadvantage as the disease negatively impacts a number of domains of life functioning, including physical functioning, employment, marriage, and overall health [16]. Subjective health is an important issue in the everyday lives of PWE and may involve factors independent of seizures. For instance, most recent studies revealed the strong association between affective disorder and HRQOL [3,4].

Whether SRHI adversely impacts HRQOL is not known. If it does, it is unclear whether its adverse effects in depressed patients with epilepsy are independent of effects of depression. To what extent SRHI may further lower HRQOL in depressed patients with epilepsy is also unknown. If it is a substantial additive effect, then clinicians dealing with patients with epilepsy need to be on heightened alert toward screening for adverse quality of life, assessing both depression and, independently, SRHI. Because mild head injury causes healthy individuals without epilepsy to experience decrements in HRQOL and general well-being [17], we were interested in studying this potential relationship in PWE. To date, there is no study that specifically assesses whether injury plays a role in HRQOL in PWE.

The aim of our study, therefore, was to identify whether single and multiple historical SRHIs are associated with adverse HRQOL in PWE and what specific domains of HRQOL are affected. Furthermore, we aimed to assess whether SRHI adds additional burdens on HRQOL among PWE with depression. We also aimed to examine the potential association of other demographic and clinical factors for impacting subjective HRQOL.

2. Methods

Data were collected prospectively from consecutive adults receiving care at the Baylor Comprehensive Epilepsy Center (BCEC) in Houston, Texas from June 2009 to April 2011. The study was approved by the Baylor College of Medicine Institutional Review Board.

Inclusion criteria included adult patients 18 years or older receiving care for their epilepsy at BCEC and taking at least one antiepileptic drug (AED). All patients gave informed consent prior to inclusion in the study. Patients with cognitive handicap precluding them from giving consent were not included in the study. Patients with a history of exclusive provoked seizures or confirmed nonepileptic seizures were excluded from the study.

Clinical variables measured included age, gender, insurance status, epilepsy classification, seizure type(s), seizure frequency, epilepsy duration, and history of past or recurrent SRHI. Information on seizure-related injury is collected at each clinic visit, as part of an ongoing study performed at BCEC, longitudinally assessing for injury among PWE, with systematic determination of the nature, circumstances, consequences, and severity of the injuries encountered [15]. Only those with mild recurrent head injuries were included in the study. Injury severity classification was based on a prior scale [18], where mild SRHI was defined as consciousness impairment or amnesia lasting less than 30 min with no fracture; moderate as consciousness impairment or amnesia lasting 30 min to 24 h or skull fracture; and severe as consciousness impairment or amnesia lasting more than 24 h, intracranial hematoma, or brain contusion [18,19]. For the purposes of the study, seizure-related injury was defined as any dysfunction or pain in a body part resulting from an accidental occurrence directly related to a seizure. Injuries thought to be secondary to drug toxicity or nonseizure-related circumstances were not included in the study. Recurrent seizure-related head injuries were defined as more than one SRHI with a new injury occurring between follow-up visits during longitudinal assessment.

After giving informed consent, patients were asked to complete the Quality of Life in Epilepsy Questionnaire (QOLIE-31). The QOLIE-31 is a well-known self-administered measure of HRQOL for PWE and has seven subscales, including Seizure Worry, Overall Quality of Life, Emotional Well-Being, Energy, Cognitive Functioning, Medication Effects,

and Social Function. During development of the QOLIE-31, internal consistency reliability coefficients (Cronbach's alpha) ranged from $\alpha = 0.77$ to $\alpha = 0.85$. Test-retest data demonstrated good reliability (range $r = 0.64$ – 0.85). The QOLIE-31 is sensitive to differences in seizure frequency and severity categories [20]. Because depression symptomatology strongly predicts poor HRQOL in PWE [3,4,21], all patients were administered the Neurological Disorders Depression Inventory for Epilepsy (NDDI-E) questionnaire (Fig. 1) [22]. The NDDI-E is a 6-item questionnaire that allows for rapid identification of major depression in epilepsy. Neurological Disorders Depression Inventory for Epilepsy scores above 15 are considered positive for depression, with specificity of 90%, sensitivity of 81%, and positive predictive value of 0.62 for a diagnosis of major depression based Mini International Neuropsychiatric Interview (MINI). Patient-reported medication adverse effects did not influence screening results on the NDDI-E.

2.1. Statistical analysis

Data were compared between the SRHI and non-SRHI groups. Continuous normally distributed variables are expressed as means plus/minus standard deviations (sd). Variables that are skewed were expressed as medians and interquartile ranges. We assessed differences in rates for categorical variables among patient groups by using Fisher's exact test or the chi-square test. We evaluated differences in outcome variables among groups using the Wilcoxon rank-sum test.

Simple linear regression was used to identify univariate predictors of the outcome variables. We then used all significant ($p < .05$) univariate predictors in the stepwise multiple linear regression models. Variables were allowed to enter in the stepwise model if $p < .25$ and stay in the model if $p < .05$. All calculations were performed utilizing SAS 9.2 (SAS Institute, Cary, N.C.) for Windows and results were considered statistically significant when $p < 0.05$.

3. Results

One hundred and seventy-two subjects were consented and participated in the study. Mean time to enrollment in the study and completion of the study questionnaires from head injury among those with recurrent SRHI was 2.4 months (median: 2 months). Demographic, epilepsy-related, and other clinical characteristics are shown in Table 1. Overall mean age was 37.8 (15.5), mean monthly seizure frequency was 8.8 (26.8), and mean duration of epilepsy was 17.9 years (13.1). Forty-eight (28%) subjects screened positive for depression on the NDDI-E, 85 (49%) had a history of past SRHI, and 50 (29%) experienced recurrent SRHI over the two-year study period. A total of 56 head injury cases were encountered during the study period, and all head injuries were classified as mild. Twenty (17%) subjects had both recurrent SRHI and depression.

	Always or often	Sometimes	Rarely	Never
Everything is a struggle	4	3	2	1
Nothing I do is right	4	3	2	1
Feel guilty	4	3	2	1
I'd be better off dead	4	3	2	1
Frustrated	4	3	2	1
Difficulty finding pleasure	4	3	2	1

Fig. 1. Neurological Disorders Depression Inventory for Epilepsy (NDDI-E).

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