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Clinical and demographic characteristics predicting QOL in patients with epilepsy in the Czech Republic: How this can influence practice

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ABSTRACT

Objective: The aim of our study was to assess the influence of different clinical and demographic variables on quality of life (QOL) in patients with epilepsy in the Czech Republic.

Methods: Outpatients with epilepsy ($n = 268$) who visited two neurology departments between 2005 and 2006 were included. Clinical and demographic characteristics were retrieved from medical records. Quality of life was measured by the Quality of Life in Epilepsy Inventory (QOLIE-31). Using multiple regression analysis, we determined which variables were associated with QOLIE-31 overall and subscale scores.

Results: 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. Seizure frequency was strong predictor for all seven subscales. Employability explained 10% of the variance in the QOLIE overall score and was the strongest predictor for Overall QOL, Emotional Well-being, Energy/Fatigue and Cognitive Function. Gender, type of seizures, age at onset of seizures, and systemic comorbidity had no significant association in this study.

Conclusions: The present study confirms that besides seizure frequency, employability and comorbid psychiatric conditions are strong predictors of QOL in patients with epilepsy. Interventions focusing on psychosocial problems and identification of factors that hamper employment in patients with epilepsy are necessary for improving QOL in these patients.

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Introduction

The impact of epilepsy cannot be understood as simply resulting from the occurrence of seizures. Epilepsy can be associated with social isolation and problems such as education, employment, family life and leisure activities.^{1,2} Previous studies have indicated that epilepsy causes cognitive, behavioral and social problems more frequently than some other chronic diseases.³ The quality of life (QOL) of patients with hypertension, diabetes, and heart disease is similar to that of those who have simple partial seizures.⁴ Patients with continued seizures and impaired consciousness are the worst off. On the other hand, patients who achieve seizure freedom without significant adverse effects exhibit the highest degree of satisfaction⁴ and their QOL

may be as good as individuals without epilepsy.⁵ However, epilepsy appears to have a major impact on emotional well-being in comparison with QOL in patients with other chronic diseases.⁶

To understand the impact of epilepsy and improve care for affected patients, it is necessary to identify factors predicting QOL in epilepsy. Several studies have been performed assessing the relationships between socioeconomic status, demographic characteristics, clinical characteristics and patients' QOL scores.^{7–16} It has been shown that the most important factors affecting QOL in epilepsy are demographic variables, such as age, sex and socioeconomic status, and clinical variables including seizure frequency, duration of disease and effect of antiepileptic drugs (AEDs).^{7,12,16–18} Although some cross-cultural differences can be seen between countries, seizure frequency still remains the most significant predictor in most studies.^{16,17,19–21}

The aim of our study was to assess the influence of some clinical and demographic variables on QOL and identify the main factors predicting QOL in epilepsy outpatients in the Czech Republic.

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Methods

Patients and data collection

The study was performed in two neurology departments in the Czech Republic (the Department of Neurology of the University Hospital Hradec Kralove and the Centre for Epileptology and Epileptosurgery of the Thomayer's Teaching Hospital in Prague). The study was approved by the ethics committees of both hospitals.

Epileptic outpatients who visited the neurology departments between March 2005 and June 2006 were asked to participate in the study. Eligible patients were 16 years or older with a confirmed diagnosis of epilepsy who made regular visits to a neurology department. Patients with intellectual disability or any other reason for being unable to complete the QOLIE-31 were excluded.

Clinical and demographic characteristics which could have had a possible influence on QOL were retrieved from patients' medical records on the same day the patient visited the doctor and completed the QOLIE-31. For all patients, age, sex, duration of epilepsy, frequency and type of epileptic seizures, the number of antiepileptic drugs taken (current AED intake), number of different AEDs used over lifetime (past treatment history of epilepsy), the presence of comorbidities, and employment status were recorded. Epileptic seizures were classified according to the International League Against Epilepsy.²² For the purpose of analysis, the patients were categorized into three groups: (1) patients with partial seizures (simple partial seizures, complex partial seizures, partial seizures with secondary generalization); (2) patients with generalized seizures (absence, atypical absence, myoclonic seizures, clonic, tonic, tonic-clonic, and atonic seizures); and (3) patients with unclassified seizures.

Patients were divided into five categories according to the frequency of seizures over the previous 2 years: (1) without seizures in the preceding 2 years; (2) without seizures in the preceding year; (3) fewer than 12 seizures in the preceding 12 months; (4) more than 12 seizures in the preceding 12 months (usually more than one seizure per month); (5) newly diagnosed patients (diagnosed a few days or months prior to the study).

Besides the epilepsy, patients also suffered from other diseases or impairments (e.g. asthma, diabetes, hypertension, migraine, depression, hemiparesis, cerebral palsy, head injury). For purposes of analysis patients with comorbid systemic diseases (including neurological, cardiovascular, respiratory, renal and other systemic diseases) and patients with comorbid psychiatric diseases (mainly anxiety, depression, and psychosis) were distinguished.

The quality of life measurement

The QOL was measured using an epilepsy specific questionnaire, the Quality of Life in Epilepsy Inventory (QOLIE-31).²³ The Czech version of the QOLIE-31 has been extensively tested for validity and reliability.²⁴ The QOLIE-31 consists of seven domains including Seizure Worry, Overall Quality of Life, Emotional Well-being, Energy-Fatigue, Cognitive Functioning, Medication Effects, Social Functioning, and overall score. Higher scores in the QOLIE-31 indicate better QOL.

Data analysis

Univariate and multivariate regression analyses were performed to explore the association between possible prognostic variables (independent variables), reduced QOLIE-31 overall and subscale scores (dependent variables). Univariate analysis included all potential predictor variables and QOLIE-31 summary

scores for each domain. For the univariate regression analysis, independent variables including age, sex, duration of epilepsy, age at onset of epilepsy, frequency and type of epileptic seizures, current AED intake, number of different AEDs used in the past, psychiatric comorbidity, systemic comorbidity, and employment status, were used as potential predictors. Determinants that were significantly associated with the outcome in the univariate analysis (p -value < 0.05) were included in a stepwise multivariate analysis. As dependent variables, QOLIE-31 overall and the seven subscores were processed separately, thus eight separate multiple regression analyses for each domain were performed. In a stepwise multiple regression, each variable is entered in sequence and its value assessed. If adding the variable contributes to the model then it is retained, but all other variables in the model are then re-tested to see if they are still contributing to the success of the model. If they no longer contribute significantly they are removed. Thus, this method should ensure that one ends up with the smallest possible set of predictor variables included in the model. The beta value was used as a measure of how strongly each predictor variable influences the criterion variable. Adjusted R^2 was used to assess the rate of variance of the domain score explained by the full model. In addition, variables including age, duration of epilepsy, age at onset, current AED intake, AEDs used in the past, employment status and comorbidity were tested for interaction effects using Pearson correlation coefficients. Data processing and analysis were carried out using SPSS for Windows (version 14.0).

Results

Sociodemographic and clinical characteristics of the study participants

Two hundred and sixty-eight patients completed the questionnaire. Approximately 15% of patients were not able to complete the questionnaire and 10% refused to participate in the study. Table 1 presents the sociodemographic and clinical characteristics of the patient population.

Regression analysis

Univariate

Following univariate regression analysis, age, duration of epilepsy, employability, number of AEDs used in the past, current AED intake, seizure frequency, and psychiatric comorbidity were the variables strongly associated with QOLIE-31 overall score (Table 2) and its seven subscales. The remaining variables including gender, type of seizures, age at onset, and systemic comorbidity had no significant association.

Pearson correlation coefficient between age and duration of epilepsy was 0.45 ($p < 0.001$), and between current AED intake and AEDs used in the past was 0.67 ($p < 0.001$). Because of the high correlations between these variables, they could not be regressed in the same analysis. Age had a higher association with overall and subscales scores than duration of epilepsy, which led to use of this variable in the multiple regression analysis. Similarly, current AED intake was highly correlated with QOLIE-31 overall score and its seven subscales allowing us to include this variable in the multiple regression.

Multiple regression analysis

Table 3 shows the results of eight multiple regressions examining the contribution of independent variables to QOLIE-31 overall score and each of the seven subscales. Seizure frequency, employability and psychiatric comorbidity were found to be risk factors for QOLIE-31 overall score explaining 33% of the variance in the regression model. Seizure frequency was the strongest

Table 1
Demographic and clinical characteristics of the study participants (n = 268)

	Number of patients	Percentage
Age (mean years ± S.D.; range)	39.9 ± 14.7	17–81
Male	114	42.5
Female	154	57.5
Duration of epilepsy (mean years ± S.D.; range)	18.1 ± 14.9	0–58
Age at onset (mean years ± S.D.; range)	21.6 ± 15.5	0–73
Type of seizures		
Partial seizures	200	74.6
Generalized seizures	56	20.9
Unclassified seizures	12	4.5
Employability		
Employed, student	149	55.6
Unemployed	17	6.3
Disability pension	78	29.1
Old age pensioner	21	7.8
Seizure frequency		
≥2 years without seizures	99	36.9
≥1 year without seizures	47	17.5
<12 seizures per year	59	22.0
≥12 seizures per year	58	21.6
Newly diagnosed	5	1.9
Comorbid conditions		
Systemic comorbidity	59	22.0
Psychiatric comorbidity	38	14.2
No. of AEDs in the past (mean ± S.D.; range)	3.7 ± 2.5	1–12
No. of current AEDs used (mean ± S.D.; range)	1.76 ± 0.95	0–4

predictor, accounting for 20% of the variance followed by employability (10%) and psychiatric comorbidity (3%). Seizure frequency was a strong predictor for all seven subscales. Risk factors for each of the subscales were: Seizure Worry—seizure frequency (accounting for 19% of the variance in the model); Overall Quality of Life—employability, seizure frequency, psychiatric comorbidity, age (accounting for 28% of the variance); Emotional Well-being—employability, psychiatric comorbidity, seizure frequency (accounting for 21% of the variance); Energy/Fatigue—employability, seizure frequency, psychiatric comorbid-

ity (accounting for 21% of the variance); Cognitive Function—employability, seizure frequency, psychiatric comorbidity, age (accounting for 28% of the variance); Medication Effects—seizure frequency, psychiatric comorbidity, employability (accounting for 13% of the variance); and Social Functioning—seizure frequency, employability and current AED intake (accounting for 23% of the variance).

Age was a significant predictor in the univariate analysis, but vanished in multiple regression for most cases. There was a correlation between age and employability (Pearson's $r = 0.55$, $p = 0.001$). When age was controlled for, employability remained a significant predictor for QOLIE-31 overall score, Overall QOL, Emotional Well-being, Energy/Fatigue, Cognitive Functioning, Medication Effects and Social Functioning. Age was also an independent predictor for Overall QOL and Cognitive Functioning in the multiple regression.

Discussion

The aim of the study was to examine the effects of different clinical and demographic characteristics on QOL in patients with epilepsy attending two referral centres in the Czech Republic. Seizure frequency, employability status and psychiatric comorbidity were the main predictors accounting for 33% of the variance in QOLIE-31 overall score. We did not find any association with gender, seizure type, age at onset of epilepsy and systemic comorbidity.

Higher seizure frequency predicted lower QOLIE-31 scores for QOLIE-31 overall score as well as all seven subscales. This finding is in accordance with previous studies where high seizure frequency was a significant predictor of poorer QOL.^{7,8,12,19,25}

Advanced age was a factor influencing QOLIE-31 overall score, Overall QOL, Emotional Well-being, Energy/Fatigue, Cognitive and Social Functioning in the univariate analysis but not in the multivariate analysis except for Overall QOL and Cognitive Functioning.

Several studies have indicated female gender as a significant predictor for lower QOL,^{7,10,12} while other studies have not found this association.^{11,16} In this study, gender was not associated with QOLIE scores. These contrasts may indicate some cross-cultural differences between countries. Female gender could be a significant predictor for lower QOL in countries where availability

Table 2
Univariate association between QOLIE-31 overall score and patient characteristics

Variable	QOLIE-31 overall score ^a	Unstandardized coefficient <i>B</i>	Standardized coefficient β	<i>p</i> value
Age	–	–0.345	–0.273	<0.001
Duration of epilepsy	–	–0.181	–0.145	0.021
Employability		–7.447	–0.432	<0.001
Active worker, student	73.7 (15.3)			
Unemployed	66.8 (15.0)			
Disability pension	51.9 (16.8)			
Old age pensioner	66.0 (15.0)			
AEDs in the past	–	–2.900	–0.396	<0.001
Current AED intake	–	–6.290	–0.329	<0.001
Seizure frequency		–6.686	–0.397	<0.001
≥2 years without seizures	76.5 (13.1)			
≥1 year without seizures	68.3 (15.7)			
<12 seizures per year	58.8 (19.7)			
≥12 seizures per year	55.8 (17.1)			
Newly diagnosed	64.8 (18.4)			
Psychiatric comorbidity		–13.838	–0.266	<0.001
Yes	54.7 (18.3)			
No	68.5 (17.5)			

^a Average (S.D.) QOLIE-31 overall scores.

Table 3
Multiple (stepwise) regression analysis

Domain/predicting variable	Unstandardized coefficient <i>B</i>	Standardized coefficient β	<i>p</i>	Adjusted <i>R</i> ²
QOLIE-31 overall score				
Seizure frequency	−5.456	−0.366	<0.001	0.201
Employability	−4.991	−0.290	<0.001	0.301
Psychiatric comorbidity	−9.958	−0.192	<0.001	0.334 ^a
Seizure Worry				
Seizure frequency	−10.163	−0.442	<0.001	0.192 ^a
Overall Quality of Life				
Employability	−3.912	−0.203	0.003	0.166
Seizure frequency	−4.627	−0.274	<0.001	0.219
Psychiatric comorbidity	−13.545	−0.228	<0.001	0.269
Age	−0.227	−0.160	0.013	0.283 ^a
Emotional Well-being				
Employability	−5.043	−0.263	<0.001	0.129
Psychiatric comorbidity	−14.668	−0.252	<0.001	0.186
Seizure frequency	−2.963	−0.177	0.002	0.212 ^a
Energy/Fatigue				
Employability	−4.706	−0.253	<0.001	0.127
Seizure frequency	−4.344	−0.268	<0.001	0.189
Psychiatric comorbidity	−9.377	−0.166	0.004	0.212 ^a
Cognitive Function				
Employability	−3.552	−0.175	0.010	0.153
Seizure frequency	−5.997	−0.336	<0.001	0.238
Psychiatric comorbidity	−10.867	−0.174	0.001	0.266
Age	−0.250	−0.167	0.009	0.282 ^a
Medication Effects				
Seizure frequency	−5.665	−0.246	<0.001	0.077
Psychiatric comorbidity	−15.011	−0.185	0.002	0.116
Employability	−3.267	−0.123	0.049	0.126 ^a
Social Functioning				
Seizure frequency	−4.252	−0.217	0.001	0.141
Employability	−5.646	−0.252	<0.001	0.212
Current AED intake	−4.605	−0.183	0.004	0.234 ^a

^a Rate of variance of the domain score explained by the full model.

of health and social care for women is inconsistent. However, lower QOL in women with epilepsy has also been reported in developed countries, probably reflecting some biological and psychosocial factors influencing QOL in women.¹⁰

Psychiatric comorbidity remained a significant predictor for QOLIE-31 overall score as well as all subdomains except Seizure Worry and Social Functioning. Anxiety and depression were found to be very important factors affecting the QOL in patients with epilepsy^{11,13,16,26–28} and some studies have reported that psychiatric status has a greater impact on QOL than seizure-related variables.^{9,11,14,29}

Employability was a strong predictor for all domains except Seizure Worry. Employability explained 10% of the variance in the QOLIE-31 overall score and was the strongest predictor for Overall QOL, Emotional Well-being, Energy/Fatigue and Cognitive Function accounting for 13–17% of the variance in these domain scores. Employment is closely related to socioeconomic status and can reflect economic potential and self-sufficiency of patients. Almost 30% of patients in our study were on disability pension and 6% were unemployed. These factors can intensify social isolation, anxiety, depression and negative self-perception in patients with epilepsy. Studies have found that higher socioeconomic status in patients with epilepsy exhibits better QOL.^{7,10–12,25} Recently, factors affecting the regular employment in patients with epilepsy have been summarized, demonstrating that stigma, seizure severity, and psychosocial variables play an important role in predicting employment and that a specific employment training programme would be appropriate for patients with epilepsy.³⁰ Improvement of self-efficacy and coping skills of these people could help them to

achieve better employment positions and higher QOL. However, personal motivation and positive work attitudes have also been reported as important predictors of employment status in patients with epilepsy.³¹

The percentage of patients (30%) receiving disability pension in our study was much higher in comparison with statistical reports on the general population in the Czech Republic (on the 31 January 2005) where the disability pension was paid to 5% of the population.³² The reason for the high rate of patients on disability pension observed here needs to be explored. Furthermore, these patients had the lowest QOLIE-31 scores in our study. The rate of unemployment in our cohort of patients (6%) was a bit lower than the republic average published in 2005 (8%) but it was comparable with data on the general population living in Hradec Králové and Prague. The unemployment figure for December 2005 for Hradec Králové and Prague was 4–7% and 3.5%, respectively.³³

There are several possible limitations of our study. Patients were recruited from two referral centers with secondary and tertiary care units in epilepsy in the Czech Republic. Patients with severe or refractory seizures may have been overrepresented and the results cannot easily be generalized to all people with epilepsy in the Czech Republic. Moreover, information on psychiatric comorbidity (e.g. depression or psychosis) was obtained from medical records without more detailed examination of patients. This accounted for quite low frequency of psychiatric diseases in our study population (14.2%) in comparison with other studies.^{29,34,35} Hospital records may not be a reliable source of data and direct assessment of patients could be the more appropriate method.

Epilepsy is a chronic disease with various consequences and a complex impact on patient's QOL. Besides seizure frequency, occupational status and employability are important predictors of patients' QOL as well as presence of depression or other psychiatric diseases. The management of epilepsy should place more importance on the psychosocial problems of patients, look for the causes of lower QOL and initiate appropriate interventions for improving patients' feeling, self-perception and social functioning.

Special programmes should be established, targeted at the public understanding of epilepsy. Several studies from other countries have indicated the need to improve public knowledge about epilepsy^{36,37} and it has been shown that epilepsy education programmes are associated with a significant increase in epilepsy knowledge as well as positive attitudes towards epilepsy.³⁸ Employment training programmes focusing on increasing the self-efficacy and coping skills of people with epilepsy would be helpful to allow these individuals to achieve better employment positions in society. Special care should be provided to people with comorbid psychiatric conditions. These and other such interventions would help people with epilepsy to reduce the burden of their disorder. Further studies are required to explore the perspectives and problems of patients with epilepsy on the labour market and to address factors that hamper employment of these individuals. It is clear that the social consequences of epilepsy are often more difficult to overcome than the seizures themselves and are closely related to patients' mental condition and total well-being.

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