The impact of anxiety, seizure severity, executive dysfunction, subjectively perceived psychological deficits, and depression on social function in patients with epilepsy

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ABSTRACT

The impact of anxiety, seizure severity, executive dysfunction, subjectively perceived psychological deficits, and depression on social function in patients with epilepsy (PWE) was analyzed. A brief cognitive screening test (EpiTrack) and an estimation of the last 6 months' cumulative seizure severity (Chalfont seizure severity scale) were performed, and questionnaires on subjectively perceived cognitive deficits (c.I.-Skala), anxiety (State-Trait Anxiety Inventory, STAIX1 and STAIX2), depression (Self Rating Depression Scale, SDS), and social function (Soziale Aktivität Selbstbeurteilungsskala, SASS) were completed. Forty PWE (aged 41.8 years, SD 16; 24 female, 16 male) were analyzed. Thirty-eight point 5 percent had a score signifying depression in the SDS; 20% had a pathological result in at least one of the anxiety scores. The ANOVA revealed that only anxiety as a trait symptom (STAIX2) had a significant influence on social function apart from the other factors ($p < 0.004$). Additionally there was a trend for a significant influence of depressive symptoms (SDS) on social functioning ($p = 0.093$). Symptoms of anxiety impair the social function of patients with epilepsy apart from depression, cognitive function, and seizure severity. They should be taken into account in the treatment of patients with epilepsy.

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1. Introduction

Mood and anxiety disorders are common in patients with epilepsy (e.g., prevalence of 22.4% for anxiety disorders, 32.5% for depression in the U.S. population [1], and 19.6% for anxiety disorders in patients with epilepsy in Germany [2]) and have a comparable negative impact on quality of life in patients with epilepsy [3]. The comorbid occurrence of mood and anxiety disorders yields a worse impact [3]. Mood and anxiety disorders may interfere with treatment efficacy. On the one hand, patients with symptoms of anxiety or depression were more likely to miss outpatient appointments, and those with symptoms of both anxiety and depression were more likely to undergo an inpatient admission [4]. On the other hand, pregabalin, an antiepileptic drug licensed for the treatment of generalized anxiety disorder, was more effective in patients with refractory epilepsy and comorbid anxiety disorders than in those without comorbid anxiety disorders [5], and treatment of depression at least with selective serotonin reuptake inhibitors may reduce

seizures [6]. Therefore, the treatment of these psychiatric comorbidities may also reduce seizure frequency. Conversely, a negative impact of an antiepileptic polytherapy on anxiety was found [7]. In the same study, a negative influence of the social aspect of stigma, a lack of paid employment, and ineffective seizure control were found [7]. Because symptoms of anxiety or depression may lead to a deficit in social function, there may be an alternately influential relationship between social function and anxiety, mood disorders, and seizure control. The following study aimed to elucidate the relative influence of cognitive dysfunction, anxiety, mood disorders, and seizure control on social function.

2. Methods

In this prospective study, we screened 40 adults aged 18 to 70 years, who presented to our outpatient department with epilepsy from August 2011 until March 2015 for cognitive deficits, symptoms of depression or anxiety, and deficits in social function. Patients with a mental handicap, aphasia, dementia, or severe psychiatric illness such as acute psychosis were excluded. The study was approved by our institutional ethics board under the registration number A 2011 83. We recorded the patients' age, gender, epilepsy syndrome according to the Proposal of the International League Against Epilepsy (1989) [8], and the number of antiepileptic drugs (AEDs) taken at the time of recruitment for the study. Screening for cognitive deficits was performed with the EpiTrack

Table 1
Results in the Chalfont Seizure Severity Scale and in the psychometric measures.

Scale	Score: mean (SD)	Pathological results
Chalfont Seizure Severity Scale	472.5 (1062.2)	Not applicable
EpiTrack (age-corrected score)	29.5 (5.7)	N = 9 (23.1%)
c.I.-Skala	13.5 (9.3)	N = 11 (28.2%)
Self-rating Depression Scale	47.4 (13)	N = 15 (38.5%)
State-Trait Anxiety Inventory X1	42.8 (10.6)	N = 3 (7.7%)
State-Trait Anxiety Inventory X2	41.4 (9.9)	N = 7 (18%)
Soziale Aktivität Selbstbeurteilungs-Skala	42.2 (7)	N = 8 (20.5%)

[9]. This is a screening test consisting of six subtests (trail-making A and B, interference, digit span backwards, written word fluency, labyrinth). For the age dependent correction of the raw data, we used the original version [9]. To assess subjectively perceived cognitive deficits, we used the c.I.-Skala [10]. Screening for symptoms of depression was performed with the Self Rating Depression Scale (SDS) [11]. We used the State-Trait Anxiety Inventory (STAI) [12] to measure anxiety. The STAI consists of two 20-item self-report measures (STAIX1 and STAIX2) measuring anxiety as a feature of the patients' state (STAIX1) or trait (STAIX2). We regarded scores in both parts as pathological when they were more than two standard deviations above the mean in the corresponding subgroup of the original sample of German patients [13]. In all other measures mentioned so far, scores were regarded as pathological according to the published norms. The cumulative seizure severity of the last six months before the assessment of the psychometric data was estimated using the Chalfont Seizure Severity Scale (CHSSS) [14]. Social function was assessed with a self rating scale developed to assess social activity in patients with depression (Soziale Aktivität Selbstbeurteilungs-Skala (SASS)) [15]. This scale records motivation to social activities, extent and quality of social relationships, the amount of perceived social support, the satisfaction with one's role, and the competence to control social interactions in a single scale. It was developed to assess social function in patients with depression. Therefore, its measures should not be confounded by psychopathological symptoms of depression. Because we wanted to identify as many as possible patients with poor social function, we regarded a score in the SASS as significantly low when it was more

than one standard deviation below the published mean of the original sample of patients [15]. All data were stored and analyzed using the SPSS statistical package, version 20.0 (SPSS Inc. Chicago, Illinois, USA). The statistics included means and standard deviations for continuous variables and frequencies and relative frequencies for categorical variables. Associations between five independent variables (i.e., EpiTrack, CHSSS, c.I.-Skala, SDS, STAIX2) that should best predict values of the social function score (SASS) were examined using a univariate linear regression analysis. Ascertainment if the linear model is appropriate for describing the relationship was realized. For the model regression coefficients, standard errors of the estimates and result of the F-test of the ANOVA were determined. A significant result of the F-test indicated that the simultaneous test that each regression coefficient is 0 is rejected. All p-values were derived from two-sided statistical tests, and p-values less than 0.05 were assessed as significant. Since there is an ongoing discussion on the influence of antiepileptic polytherapy on cognitive function, mood, and anxiety [7,16], we calculated the Spearman correlation coefficient between the number of AEDs and scores in the psychometric scales and tested it for significance.

3. Results

Forty patients with epilepsy (24 females/16 males) aged 41.8 years (SD 16.1 years) entered the study. They took an average of 1.9 AEDs (SD 0.9) at this time. Fifteen patients had a symptomatic focal epilepsy, 21 patients suffered from cryptogenic focal epilepsy, and only four patients had an idiopathic generalized epilepsy. For the results in the CHSSS and the psychometric scores, see Table 1. For the correlations between the scores, see Table 2. Of note, the scores in the c.I.-Skala and the scales for anxiety and depression were highly significantly correlated with each other. The number of AEDs was significantly correlated with the score in the EpiTrack only. The regression model of five scores (i.e., EpiTrack, CHSSS, c.I.-Skala, SDS, STAIX2) influencing the SASS was highly significant ($p < 0.001$). The equation was (standard error of regression coefficient in brackets): SASS = 61.42 + 0.152 (0.178) EpiTrack + 0.000 (0.001) CHSSS + 0.204 (0.129) c.I.-Skala − 0.184 (0.106) SDS − 0.432 (0.138) STAIX2. In this equation, the significance for the regression coefficients was p = 0.401 (EpiTrack), p = 0.851

Table 2
Correlations between the scales.

Scale 1	Scale 2	Correlation (level of significance)
Chalfont Seizure Severity Scale	EpiTrack (age-corrected score)	−0.081 (n.s.)
Chalfont Seizure Severity Scale	c.I.-Skala	0.13 (n.s.)
Chalfont Seizure Severity Scale	Self-rating Depression Scale	0.17 (n.s.)
Chalfont Seizure Severity Scale	State-Trait Anxiety Inventory X1	−0.04 (n.s.)
Chalfont Seizure Severity Scale	State-Trait Anxiety Inventory X2	0.16 (n.s.)
Chalfont Seizure Severity Scale	Soziale Aktivität Selbstbeurteilungs-Skala	−0.09 (n.s.)
EpiTrack (age-corrected score)	c.I.-Skala	−0.33 (p < 0.04)
EpiTrack (age-corrected score)	Self-rating Depression Scale	−0.24 (n.s.)
EpiTrack (age-corrected score)	State-Trait Anxiety Inventory X1	−0.19 (n.s)
EpiTrack (age-corrected score)	State-Trait Anxiety Inventory X2	−0.08 (n.s.)
EpiTrack (age-corrected score)	Soziale Aktivität Selbstbeurteilungs-Skala	0.07 (n.s.)
c.I.-Skala	Self-rating Depression Scale	0.65 (p < 0.000005)
c.I.-Skala	State-Trait Anxiety Inventory X1	0.51 (p < 0.0007)
c.I.-Skala	State-Trait Anxiety Inventory X2	0.56 (p < 0.0002)
c.I.-Skala	Soziale Aktivität Selbstbeurteilungs-Skala	−0.32 (p < 0.05)
Self-rating Depression Scale	State-Trait Anxiety Inventory X1	0.63 (p < 0.000009)
Self-rating Depression Scale	State-Trait Anxiety Inventory X2	0.69 (p < 0.0000008)
Self-rating Depression Scale	Soziale Aktivität Selbstbeurteilungs-Skala	−0.6 (p < 0.00005)
State-Trait Anxiety Inventory X1	State-Trait Anxiety Inventory X2	0.62 (p < 0.00002)
State-Trait Anxiety Inventory X1	Soziale Aktivität Selbstbeurteilungs-Skala	−0.53 (p < 0.0005)
State-Trait Anxiety Inventory X2	Soziale Aktivität Selbstbeurteilungs-Skala	−0.67 (p, 0.000002)
Number of AEDs	EpiTrack (age-corrected score)	−0.343[*] (p = 0.03)
Number of AEDs	c.I.-Skala	−0.024[*] (n.s.)
Number of AEDs	Self-rating Depression Scale	0.051[*] (n.s.)
Number of AEDs	State-Trait Anxiety Inventory X1	−0.012[*] (n.s.)
Number of AEDs	State-Trait Anxiety Inventory X2	0.001[*] (n.s.)
Number of AEDs	Soziale Aktivität Selbstbeurteilungs-Skala	−0.044[*] (n.s.)

[*] Spearman correlation coefficient.