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Screening Symptoms of Depression and Suicidal Ideation in People With Epilepsy Using the Beck Depression Inventory

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ABSTRACT

Objective: To measure the severity of symptoms of depression and suicidal ideation in people with epilepsy (PWE) before and after epilepsy surgery using the Beck Depression Inventory (BDI). We aimed to determine the factors associated to depression in PWE. **Methods:** PWE, regardless of epilepsy type, seizure type, duration or frequency of seizures, and AEDs were investigated. The sample (n=468) was divided into two groups: pre-operatory (n=346) and pos-operatory (n=122). **Results:** Before epilepsy surgery female gender, unemployment and high seizure frequency were associated factors for the occurrence of symptoms of depression. After epilepsy surgery, the only factor associated to high level of depression symptoms was the lack of seizure remission. Suicidal ideation was associated to seizure frequency before and after epilepsy surgery. **Conclusion:** Our results confirm the generally held view that depression is common in PWE and provide further insight to the association of depression with certain socio-demographic and seizure-related factors before and after epilepsy surgery.

Keywords: epilepsy, seizures, depression, suicidal ideation.

RESUMO

Rastreamento de sintomas de depressão e ideação suicida em pessoas com epilepsia usando o inventário de depressão de Beck

Objetivo: Avaliar a gravidade dos sintomas de depressão e ideação suicida em pessoas com epilepsia (PCE), antes e após o tratamento cirúrgico utilizando o Inventário de Depressão de Beck (BDI). Nosso objetivo foi determinar os fatores associados à depressão em PCE. **Métodos:** PCE, independentemente do tipo de epilepsia, tipo de crises, duração ou frequência das crises, e DAEs, foram investigados. Os pacientes (n=468) foram divididos em dois grupos: pré-operatório (n=346) e de pós-operatório (n=122). **Resultados:** Antes do tratamento cirúrgico, o sexo feminino, o desemprego e a alta frequência de crises foram fatores associados à ocorrência de sintomas de depressão. Após a cirurgia de epilepsia, o único fator associado ao alto nível de sintomas de depressão foi a falta de remissão de crises. Ideação suicida foi associada à frequência de crises antes e após a cirurgia de epilepsia. **Conclusão:** Nossos resultados confirmam a opinião generalizada de que a depressão é comum nas PCE e proporcionam mais evidência para a associação de depressão com alguns fatores sócio demográficos e relacionados às crises antes e após o tratamento cirúrgico das epilepsias.

Unitermos: epilepsia, crises epilépticas, depressão, ideação suicida.

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INTRODUCTION

Epilepsy involves a constellation of problems that goes beyond seizures. It produces medical, psychological, economic and social repercussions that interact in several ways and may be devastating for people with epilepsy (PWE).[1]

Depression is the most recurrent psychiatric comorbidity in PWE and the prevalence is higher in PWE when compared to people with other chronic disorders and general population,[2] with a frequency varying from 30%-70%.[3,4] The etiology of depression is multifactorial and results from complex interaction between endogenous, genetic, therapeutic, and environmental aspects.[5] Sociocultural aspects of epilepsy appears also to affect depression.[6-8] Some of the antiepileptic drugs (AEDs) may cause depression.[9] Other factors, such as seizure frequency, degree of seizure freedom and duration of epilepsy, have been shown to considerably contribute to the prevalence of depression among PWE [10]. Depression significantly affects the quality of life of PWE.[11,12] Unfortunately, most PWE are not regularly screened for depression and consequently, are not treated.[13]

There may be many reasons to explain why depression goes unrecognized in PWE. One of these is the lack of efficient screening measures with well established sensitivity and specificity. According to a previous study,[14] the Beck Depression Inventory (BDI) achieves a quite high level of sensitivity to depression with good specificity and without a high level of false-positive errors. They pointed the BDI to be the instrument that most efficiently measures depression in epilepsy in a short time period (patients take about 10 minutes to fulfill the instrument). Other authors[15] also concluded that the BDI has an important ability to identify major depression in epilepsy and that it is the most appropriate instrument to estimate the frequency and severity of a wide range of depressive symptoms in PWE.

The BDI was validated to Portuguese language[16] and cut-off scores have been developed to define the presence of significant depression symptoms in PWE.[14,15] A BDI score of 12 was set as the cut-off point for mild depression, 20 for moderate depression and 36 for severe depression.

The items constituting the BDI have been separated into two subscales. The first, Affective subscale, evaluate the mental aspect of depression (sadness, pessimism, past failure, loss of pleasure, guilt feelings, punishment feelings, self-dislike, self-criticalness, suicidal ideation, crying, agitation, loss of interest, indecisiveness and worthless). The second, the somatic subscale, access vegetative and somatic symptoms (loss of energy, sleep problems, irritability, appetite problems, concentration, fatigue and loss of interest in sex).[17]

Some authors have highlighted the fact that some measures of psychopathology have the problem of presenting a "somatic effect" or bias, due to the somatic content of these items. This results in probable overestimation of level of depression, when patients indicate items on a depression scale as a result of somatic pathology resulting straightforwardly from illness.[14] The somatic items of the BDI, however, do not confound the measurement of depression in neurological patients and evaluate straightforwardly symptoms of depression.[14] Such bias is an important consideration in selecting the instrument to be used in screening symptoms of depression in epilepsy, besides the amount of time that can be dedicated to the patient interview.

The BDI has a specific suicide item (question 9) to screen for suicidal ideation. Suicidal ideation is an ordinary medical word for thoughts about suicide, which may be as detailed as a formulated plan but without the suicidal act itself. Suicidal ideation seems to be an important indicator for identifying patients at risk of suicide[18] and suicide attempts.[19,20] Although most people who have suicidal ideation do not commit suicide, it may be an important warning sign for suicide attempts, especially in high-risk populations such as PWE.[21-24] Therefore, the identification of risk factors for suicidal ideation may be critical for preventing PWE from committing or attempting suicide.

We measured the severity of symptoms of depression and suicidal ideation in PWE before and after epilepsy surgery using the BDI. We aimed to determine the factors (socio-demographic and seizure-related factors) associated to depression in PWE. Since some of the variables studied are treatable, they could thereby lessen the risk of depression and suicidal risk in epilepsy.

METHODS

Adult individuals with a diagnosis of epilepsy (n=468), regardless of epilepsy type, seizure type, duration or frequency of seizures, and anti-epileptic drugs (AEDs) were randomly recruited through the outpatient clinic of epilepsy of the University of Campinas (UNICAMP) from 2003 to 2010.

Inclusion criteria included epilepsy diagnosis for over two years and age between 17-80 years old. Exclusion criteria included patients with severe medical disorders, progressive neurological disorders, evident mental retardation or alcohol or drug abuse.

At enrollment, all patients provided informed consent to participate in the study and completed the BDI[16] to capture current depressive symptoms. Suicidal ideation was evaluated through the item 9 of the BDI, which evaluates suicide ideation and attempts.

Socio-demographic and seizure-related factors were collected by interview and from information given in the

patient's medical files. Socio-demographic factors included age, gender, education, employment, and civil status. Seizure-related factors included seizure type, epilepsy syndrome, age at onset, duration of epilepsy, seizure frequency, seizure control (at least six months without a seizure) and number of AEDs.

The patients (n=468) were divided into two groups. The patients who were being evaluated for epilepsy surgery comprised 346 patients (pre-operatory group) and the other group, formed by patients who underwent epilepsy surgery comprised 122 patients (pos-operatory group). Because it is a retrospective study, there is some missing data in both groups, which was corrected in the statistical analysis. Table 1 summarizes the socio-demographic and seizure-related characteristics of the study sample.

Statistical analysis

Descriptive statistics are presented in terms of counts, percentages, and mean±standard deviation values. The *t*-test was used for numeric variables and Fisher test for categorical variables. The Kruskal-Wallis test for independent samples was applied to elucidate the differences in BDI scores according to gender, years of education, employment, civil status, seizure type, epilepsy syndrome, seizure control, and number of AEDs. We used simple linear correlations to evaluate the relationship between BDI scores and age, epilepsy onset, duration of epilepsy and seizure frequency. The level of statistical significance was set at $p<0.05$. We did not perform corrections for multiple comparisons because all comparisons were planned *a priori* or were complementary [25].

RESULTS

As it is shown in Table 1, when we compared the socio-demographic and seizure-related variables in both groups, we did not find significant difference in age ($p=0.422$), gender ($p=0.750$), education ($p=0.653$), employment ($p=0.694$), civil status ($p=0.519$), epilepsy duration ($p=0.166$), seizure type ($p=0.373$), epilepsy syndrome (p=0.432), number of AEDs ($p=0.102$), and suicide ideation ($p=0.309$).

Table 1. Demographic and clinical characteristics of the PWE enrolled in this study.

Variable	Pre-operatory group (n=346) (Mean±SD) / (%)	Pos-operatory group (n=122) (Mean±SD) / (%)	*p*-value
Age (years)	17-78 (40.25±12.03)	18-60 (39.26±10.69)	0.422
Epilepsy onset (years)	0-63 (12.38±10.39)	0-41 (9.5±8.1)	0.006
Duration of epilepsy (years)	2-66 (27.48±13.44)	5-56 (29.4±12.0)	0.166
Seizure frequency/month	0-30 (5.3±8.1)	0-30 (2.4±6.8)	0.001
Total BDI score	0-50 (10.14±9.8)	0-53 (7.3±9.2)	0.007
Cognitive-Affective BDI	0-38 (6.58±7.2)	0-37 (4.77±6.4)	0.016
Somatic-Performance BDI	0-30 (7.12±6.5)	0-32 (5.0±6.1)	0.002
Gender – Female – Male	198 (57%) 148 (43%)	72 (59%) 50 (41%)	0.750
Years of education	4 years (55%) 9 years (30%) 12 years (9%) M.D. (6%)	4 years (52%) 9 years (34%) 12 years (11%) M.D. (3%)	0.653
Employment	Unemployed (44%) Employed (39%) Retired (11%) M.D. (6%)	Unemployed (42%) Employed (44%) Retired (11%) M.D. (3%)	0.694
Civil Status	Single (47%) Married (45%) M.D (8%)	Single (54%) Married (43%) M.D (3%)	0.519
Seizure type	Partial (17%) Partial with generalization (39%) Unknown etiology (44%)	Partial (31%) Partial with generalization (57%) M.D. (12%)	0.373
Epilepsy syndrome	Temporal (45%) Extra-temporal (6%) Unknown etiology (49%)	Temporal (79%) Extra-temporal (7%) M.D. (14%)	0.432
Seizure control	Yes (26%) No (74%)	Yes (71%) No (29%)	<0.001
Number of AEDs	Polytherapy (66%) Monotherapy (27%) M.D. (7%)	Polytherapy (70%) Monotherapy (18%) M.D. (12%)	0.102
Symptoms of depression	No (69%) Yes (32%)	No (79%) Yes (21%)	0.028
Suicidal ideation	No (88%) Yes (12%)	No (81%) Yes (19%)	0.309

M.D. = missing data.

The variables that were significantly different between the groups were the BDI score (p=0.007), epilepsy onset (p=0.006) and seizures frequency and control (p=0.001). The pos-operatory group had fewer symptoms of depression, earlier epilepsy onset and less seizures.

Although not significant, the pos-operatory group had more suicide ideation (19%) than the PWE in the pre-operatory group (12%). Suicide ideation was highly associated to depression before and after epilepsy surgery (p<0.001 for both groups). Before surgery 43% of PWE with symptoms of depression also had suicide ideation. After surgery this association occurred in 42% of PWE.

Thirty-two percent (n=110) of the PWE in the pre-operatory group and 21% (n=26) of PWE in the pos-operatory group had scores ≥12 on the BDI, suggesting that they had depression.

Twenty-one percent (n=23) of PWE and depression in the pre-operatory group and 69% (n=18) in the pos-operatory group were taken anti-depressants. In both groups there was an association between the use of anti-depressant and BDI scores (p=0.004 in the pre-operatory group and p=0.011 in the pos-operatory group). PWE who were taking anti-depressants had higher scores in the BDI.

The mean BDI score from the pre-operatory group was 10.13 (SD=9.79). There was no significant difference between the two subscales (p=0.686): Affective subscale (M=6.57±7.25), Somatic subscale (M=7.12±6.56). The mean BDI score from the pos-operatory group was 7.36 (SD=9.18). There was also no significant difference between the two subscales (p=0.777): Affective subscale (M=4.77±6.37), Somatic subscale (M=5.0±6.08).

BDI score, suicidal ideation and socio-demographic factors

The BDI score of the pre-operatory group was not correlated to the patients' age (p=0.253), education level (p=0.434), and marital status (p=0.658). It was associated gender (p=0.013) and employment (p=0.012). Women had significant higher scores in the BDI than men in the total BDI score (p=0.013) and the Affective BDI subscale (p=0.006), but not in the Somatic subscale (p=0.182). Unemployed patients had higher scores in the total BDI (p=0.012) in both subscales; Affective (p=0.008) and Somatic (p=0.04).

The BDI score of the pos-operatory group was not correlated to any of the socio-demographic variables, as follows: age (p=0.582), gender (p=0.751), education level (p=0.210), employment (p=0.245) and civil status (p=0.392).

The suicidal ideation (evaluated by the item 9 from the BDI) was not associated to any of the socio-demographic variables in both groups as follows (pre-operatory group p-value/pos-operatory group p-value): age (p=0.622/p=0.856), gender (p=0.143/p=0.273), education level (p=0.127/p=0.289), employment (p=0.5/0.092), and civil status (p=0.541/p=1.0).

BDI score, suicidal ideation and seizure-related factors

The BDI score of the pre-operatory group was not correlated to epilepsy onset (p=0.987), epilepsy duration (p=0.196), seizures type (p=0.213), epilepsy syndrome (p=0.408), and number of AEDs (p=0.149). Seizures frequency was correlated to BDI total score (p=0.002) and both subscales; Affective subscale (p=0.008) and Somatic subscale (p=0.002). Seizures control for six months or more was correlated to BDI total score (p<0.001) in both subscales; Affective subscale (p<0.001) and Somatic subscale (p<0.001).

The BDI score of the pos-operatory group was not correlated to epilepsy onset (p=0.169), epilepsy duration (p=0.754), seizures frequency (p=0.315), seizures type (p=0.283), epilepsy syndrome (p=0.673), and number of AEDs (p=0.462). The only seizure-related variable that was correlated to BDI total score and both subscales was the control of seizures for over six months (p=0.001).

When we associated the suicidal ideation in both groups (p-value pre-operatory/p-value pos-operatory) we did not find significant difference in the following variables: epilepsy onset (p=0.736/p=0.845), epilepsy duration (p=0.345/p=0.850), epilepsy syndrome (p=0.535/p=0.304), seizures type (p=0.842/p=0.214), and number of AEDs (p=1.0/p=0.728). The suicidal ideation was associated to the seizures frequency (p=0.024/p=0.006) and control (p=0.012/p=0.011) before and after epilepsy surgery.

DISCUSSION

The present study investigated the association of socio-demographic and seizure-related variables with symptoms of depression in PWE. Our results confirm the view that depression is frequently associated to epilepsy (32% in the pre-operatory group and 21% in the pos-operatory group). It additionally showed that before epilepsy surgery female gender, unemployment and high seizure frequency are associated factors for the occurrence of depression symptoms. After epilepsy surgery, the only factor associated high level of depression symptoms was the lack of seizure remission. Suicidal ideation was associated to seizures frequency and seizure control before and after epilepsy surgery.

We evaluated the symptoms of depression in PWE using the evaluation of BDI total score and its Affective and Somatic subscales. While the Affective aspect is associated to the "mental aspect" of depression, the Somatic aspect is associated with disease severity. Our findings suggest

that controlling for disease severity, the Somatic Aspect may improve. Our study did not show any difference in the BDI subscales when comparing them to any of the socio-demographic and seizure-related variables, except for the female gender. Women with epilepsy appeared to have more severe symptoms of depression in the BDI total score and in the Affective aspect, but not in the Somatic aspect, but this association occurred only in the group with more frequent seizures (pre-operatory group), and not in the pos-operatory group which had better seizure control.

The prevalence of female gender in depression has extensively been reported, with odds ratios in major epidemiological surveys falling between 1.6:1 and 3.2:1.[26,27] This preponderance seems to emerge in early adolescence and continues through adulthood.[28,29] However, there is no particular definite elucidation to explain why depression is more common in women.[30-32] Besides the previous knowledge of higher prevalence of depression in women, the effect of gender on depression in PWE has been highly controversial, most likely due to different methodological approaches. Some studies concluded that men are overrepresented in depressed PWE.[33-35] Others reported opposite results with gender having either no effect[36] or with a preponderance of female PWE and depression.[37] Our results agree with this latter study, showing a significant association between female gender and depression in epilepsy.

Many studies have shown that PWE are twice as likely as people without epilepsy to be unemployed.[38,39] The unemployment rate of PWE is two to four times greater than that of the general population.[38]

Employment, despite its economic value, indicates social acceptance and leads to sense of worth. Many previous studies have reported a relationship between unemployment and ill health,[40] poor quality of life[41,40] and depression.[40,42,43]

Our study found a relationship between unemployment in PWE and symptoms of depression. Unemployment may be a predictor for depression in epilepsy or the other way around. Considering the high prevalence of epilepsy and depression, this situation creates a huge social problem. One study[44] indicated many reasons for job loss in epilepsy, such as depressed mood, general lack of activity, cognitive disturbances, physical disabilities, poor self-esteem, social isolation, employer discrimination, stigmatization, fear of having a seizure in the workplace, pessimistic attributional style and changes in biological rhythms that negatively influence their ability to work. Because PWE frequently are socially isolated and epilepsy is still professed as some sort of mental disease, patients have serious problems in continuing education or maintaining employment.[45] It is uncertain whether such phenomena are separate from or secondary to depression. This may be a bidirectional effect: depression may lead to low income and unemployment, and unemployment may lead to depression[46]

In addition, uncontrolled seizures may be a risk factor for depression and suicide behavior.[47] Seizure control has consistently been found to be a predictor of depression[48,49] as indicated by our findings. High seizure frequency was the only aspect that was related to suicide ideation before and after epilepsy surgery. It makes the frequency an important predictor for depression and suicide, what calls attention for appropriate treatments and the routine of screening for depression in patients with refractory epilepsy.

Although before surgery the female gender and unemployment were associated to more severe symptoms of depression together with the high seizures frequency and seizures control, after epilepsy seizure when the greater expectative was to have fewer seizures, the seizures control was the only factor that was associated to symptoms of depression. As already observed in our previous studies (Barioni Salgado et al., 2008), it seems that after surgery patients expectations to be free of seizures is so high that failure of postoperative seizure control disrupts all their plans of future and leads to depression and suicide ideation.

Neurologists do not routinely screen PWE for depression,[50] Consequently, depression is under recognized and untreated in PWE,[13] In our study 32% of the pre-operatory group and 21% of the pos-operatory group had symptoms of depression. From this group only 32% of the pre-operatory group and 69% of the pos-operatory group was taking antidepressants. In the same line of previous studies,[51,52] our data showed that PWE using antidepressants were significantly more likely to have more symptoms of depression. It may be due to the fact that the ones who were receiving antidepressants were the ones with the most severe depression, but treatment was either ineffective or they were too early in treatment that could not show its benefit.

One limitation of our study was that being retrospective. Another limitation is the fact that we could not take into account the onset of depression, the recurrence of depression symptoms and other variables associated with depression and/or suicidal thoughts, such as, recent lost of an important person, past history of depression, family history of depression, physical and/or sexual abuse. Our findings add to the understanding of depression in PWE and highlight the need to investigate this further with prospective studies.

In conclusion, our results confirm the general view that depression is common in PWE and provide further insight to the association of depression with high seizure frequency and other socio-demographic factors.

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