Original Article

Evaluation of Symptoms of Depression and Anxiety in Adolescents with Epilepsy in a Tertiary-Level Medical Center in Serbia

Ksenija Ervin Gebauer-Bukurov[1,2], Zeljka Dragomir Nikolasevic[3], Dragica Stevan Hajder[1,2], Zeljko Dragan Zivanovic[1,2], Vojislava Vojislav Bugarski Ignjatovic[2,3]

[1]Department of Neurology, Faculty of Medicine, University of Novi Sad, [2]Clinic for Neurology, Clinical Center Vojvodina, [3]Department of Psychology, Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia

Abstract

Backgrounds: Even though epilepsy is the most common neurological disorder in adolescence; studies of adolescents with epilepsy are scarce. **Objective:** To evaluate whether adolescents with epilepsy are more likely to develop anxiety and depressive symptoms than their healthy peers and to determine the relationship of depression and anxiety scores to epilepsy-related variables. **Settings and Design:** Cross-sectional observational study. **Methods and Procedures:** Ninety adolescents with epilepsy aged 13-19 years were compared with healthy controls using the Beck Depression Inventory II (BDI II) and the Stait Trait Anxiety Inventory (STAI) for assessment of depressive and anxiety symptoms. Within the study group, epilepsy-related variables were also determined using the stated measures. **Statistical Analysis Used:** The independent sample t-test, One-Way ANOVA, Pearson's correlation coefficient. **Outcomes and Results:** 23.3% of the study group and 8.3% of the control group had mild to moderate depression. The mean BDI II score was significantly higher in the group of adolescents with epilepsy. Comparing the STAI scores, results on both STAI scales were higher in the study group. Regarding the epilepsy-related variables, a high frequency of seizures, symptomatic etiology and polytherapy showed strong associations with high depression and anxiety scores. **Conclusion and Implications:** Symptoms of depression and anxiety are not uncommon among adolescents with epilepsy. BDI II and STAI may be used as screening tools to provide useful information to clinicians when assessing adolescents' mental status.

Keywords: Adolescents, anxiety, depression, epilepsy

Introduction

Epilepsy is the most common neurological disorder in adolescence. Adolescence is a period of highly sensitive psychophysical development, and it involves intense changes in the biological, social, and psychological domains that can be especially challenging for adolescents with epilepsy.[1] In the recent literature, there are not many studies focusing on adolescents with chronic diseases. Adolescents are rarely observed as a separate group and more frequently as part of adult or pediatric populations. A lot of studies focusing on psychopathology in patients with epilepsy have documented that children or adults with epilepsy have an estimated overall risk of psychopathology ranging from 20% to 60%, which is at least three to six times higher than the risk of psychopathology in the general population.[2,3] Depression and anxiety are the most frequent psychiatric comorbidities among epilepsy patients.[4,5] The rate of depression in children and adolescents with chronic epilepsy measured by self-reporting instruments ranged between 23% and 26%.[6,7] The prevalence rates for anxiety disorders in children and adolescents with epilepsy remain unknown. Unfortunately, these conditions are often unrecognized and left untreated. It has also been demonstrated that these conditions in adolescents may present with different symptoms compared to adults, which makes it difficult to isolate those symptoms to a single diagnosis.[8] The diagnosis and adequate treatment of depression and anxiety in these young people are thus often overlooked.[4,9] Unrecognized and untreated, they can negatively affect the quality of life and seizure control, lead to higher rates of detrimental effects of antiepileptic drugs (AEDs), poorer outcome of epilepsy neurosurgery, and an increased risk of suicide attempts.[4,10,11] Therefore, early recognition of depressive and anxiety symptoms could lead to earlier diagnosis and prompt intervention.

The unpredictability of epileptic seizures and a potential common underlying mechanism corroborates the hypothesis that adolescents with epilepsy, especially those with uncontrolled seizures, have significantly higher rates of depressive and anxiety symptoms compared to their healthy peers.

The purpose of the present study was to evaluate whether adolescents with epilepsy in a single medical center in Serbia are more likely to have anxiety and depressive symptoms

Address for correspondence: Dr. Ksenija Ervin Gebauer-Bukurov, Clinic of Neurology, Dpt for Child Neurology and Epilepsy, Clinical Center Vojvodina, Hajduk Veljkova1, 21000 Novi Sad, Serbia.
E-mail: ksenija.gebauer-bukurov@mf.uns.ac.rs

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than their healthy peers. The correlation between anxiety and depressive symptoms and the epilepsy-related variables were also evaluated.

Methods

The research was designed as a cross-sectional observational study. Study subjects (study group) consisted of a total of 90 adolescents aged 13–19 years with the diagnosis of epilepsy, who were nonconsecutively examined as inpatients or outpatients at the Department of Child Neurology and Epilepsy of the Clinic for Neurology, Clinical Center of Vojvodina in Novi Sad, Serbia, over 1 year. The same sample was used in our previously published study dealing with social competence in adolescents with epilepsy.[12] The Clinical Center of Vojvodina is the only regional tertiary-level medical center for a population of almost two million inhabitants.

Inclusion criteria for the study group were as follows: a diagnosis of epilepsy, normal intelligence, and literacy in the Serbian language.

To take part in the study, an adolescent should have had at least one unprovoked seizure (for specific epilepsy syndrome) or two unprovoked epileptic seizures during the previous 5 years (active epilepsy), in accordance with the new definition of the International League Against Epilepsy (ILAE)[13] and had been taking AEDs for at least 12 months. Exclusion criteria were an additional neurological impairment and intellectual disability. The classification of epileptic seizures and syndromes was based on the clinical signs and electroencephalographic (EEG) findings, according to the ILAE classification.[14]

The patients were categorized by etiology into three groups as follows: idiopathic or genetic, symptomatic or structural, and cryptogenic or unknown. Idiopathic generalized epilepsies include childhood absence epilepsy (CAE), juvenile absence epilepsy (JAE), juvenile myoclonic epilepsy (JME), and other generalized epilepsy (generalized tonic-clonic [GTC] seizure alone). Cryptogenic or unknown etiology refers to the epilepsy of presumed symptomatic nature, in which, there is no identifiable underlying etiology, there are clearly focal seizures or a lateralized EEG finding, and the form of epilepsy is not one of the specific idiopathic syndromes. Symptomatic or structural etiology refers to brain lesion associated with an increased risk of epilepsy confirmed on magnetic resonance imaging (MRI).

Classification of seizure control was based on the type and number of seizures experienced in the previous 12 months:[15]

- Good control: no seizures during the past 12 months
- Partial control: low seizure frequency: 1–20 focal, or 1–4 focal with impaired awareness (replaced the term complex partial), or 1 GTC, or 1–20 absence, or 1–20 myoclonic seizures
- Poor control: high seizure frequency: >20 focal, or >4 focal with impaired awareness, or >1 GTC, or >20 absence, or >20 myoclonic seizures.

Data were collected from medical records and clinical examinations. Detailed histories were obtained from all patients and their parents. Each patient underwent an EEG examination with at least a 16-channel recorder using the 10–20 system, routinely including 5 min. of hyperventilation and photic stimulation, and sleep recording when needed. Computed tomography and/or MRI (in most cases) were performed in all focal seizures, and in all patients in whom a structural lesion was suspected. A detailed analysis of epilepsy and epileptic syndrome was made in all patients. We collected the following clinical information: demographic data, age at onset and duration of epilepsy, seizure type, etiology, seizure frequency, and AED treatment (mono- or polytherapy and new or conventional AEDs).

The control group consisted of 60 healthy randomly selected adolescents, recruited from local public schools, with no history of psychiatric or neurological disorders, matched for age and gender with the study group, and literate in Serbian.

Before conducting the research, the permission of the Ethics Committee of the Clinical Center of Vojvodina was obtained. Both participants and their parents (if participants were younger than 18 years) were familiarized with the research goals and gave an informed consent for participation in the study.

Two self-assessment instruments – the Beck Depression Inventory-II (BDI-II) and the State-Trait Anxiety Inventory (STAI) – were used to screen for depressive and anxiety symptoms in both groups.

The BDI-II is used to assess the symptoms of depression in individuals aged 13 years and older.[16] It should be used as a screening tool and cannot replace a clinical diagnosis of depression. The BDI-II consists of 21 self-rating items. Each of the items is assessed for its severity from 0 to 3, and the total score is compared to a key to determine the depression severity. A score above 14 is considered depression (mild depression 14–19, moderate depression 20–28, and severe depression 29–63). The BDI-II is being used as a standard reference tool and is one of the most common self-report scales used to assess depression including adolescent populations. In this study, the BDI-II had a good internal consistency, with Cronbach's alpha's of 0.831.

The STAI is a self-report questionnaire consisting of two subscales, each including 20 items evaluating the level of anxiety.[17] The state anxiety subscale includes 20 statements related to how the person feels at the time of assessment, while the trait anxiety subscale comprises 20 items that assess how the person feels most of the time. The responses to each item are scored from 1 to 4. The total score can range from 20 (the lowest possible score) to 80 (the highest possible score). The STAI is widely used in monitoring anxiety state and may also be used to assess anxiety in children and adolescents.[18,19] It has good internal consistency and constructs validity. In this study, the STAI-S and STAI-T had a good internal consistency, with Cronbach's alpha's of 0.919 and 0.817, respectively.

Besides basic sociodemographic variables, such as gender and age, we evaluated the epilepsy-related variables such as onset of epilepsy, duration of epilepsy, etiology, seizure control, and number of AEDs used.

Results were recorded in both Excel and SPSS - Statistic for Windows, Version 20.0 (IBM Armonk, NY: IBM Corp. Released 2011). The groups of adolescents were compared using the independent sample *t*-test and one-way ANOVA for testing differences between the epilepsy-related variables. Where ANOVA showed significant F scores, *post-hoc* analyses were done using the least significant difference test and Bonferroni correction. Correlations between the BDI-II scores and the STAI scores were analyzed using the Pearson's correlation coefficient. $P < 0.05$ was considered statistically significant. With Bonferroni correction, the statistical significance value was set at $P = 0.003$ (Bonferroni correction for 15 comparisons).

Results

A total of 90 adolescents with epilepsy (35 boys and 55 girls) and 60 healthy adolescents (29 boys and 31 girls) aged 13–19 years (mean 16.6 years for the study group and 16.8 years for the control group) were enrolled. There were no significant differences between the groups regarding the age ($P = 0.115$) and gender ($P = 0.21$).

In the study group, the duration of epilepsy ranged from 1 to 16 years (mean 4.21 ± 3.28). Age at the epilepsy onset ranged from 2 to 18 years of age (mean 12.43 ± 3.31). In about one-half of the patients (48.8%), epilepsy started before puberty (under 12 years of age) and in 46 patients (51.1%) epilepsy started in childhood; however, the patients continued taking AEDs during adolescence. According to the clinical findings and EEG and MRI findings, in 39 (43.3%) patients, epilepsy was classified into idiopathic or genetic (CAE, JAE, JME, and other generalized epilepsy – GTC seizures alone); in 26 (28.9%) patients, it was classified into cryptogenic or unknown; and in 25 (27.7%) patients, the etiology was symptomatic or structural. Cortical dysplasia, mesial temporal lobe epilepsy with hippocampal sclerosis, nodular heterotopias, pseudocysts, and gliosis were underlying pathologies in our patients in whom MRI confirmed a symptomatic or structural etiology. A complete seizure control (seizure-free for more than 12 months) was achieved in 49 (54.5%) patients. Twenty-five (27.8%) adolescents with epilepsy achieved a partial control of seizures, and 16 (17.8%) patients had a poor seizure control, and the seizures repeated despite antiepileptic treatment. Sixty-six (73.3%) adolescents from the study group were taking monotherapy, and 24 (26.7%) were taking polytherapy. They were treated with valproate, levetiracetam, lamotrigine, carbamazepine, clonazepam, clobazam, topiramate, and only one patient with phenobarbital.

Patients with epilepsy had a higher prevalence of depressive symptoms compared with the control group. The mean BDI-II score was significantly higher in adolescents with epilepsy. Comparing the STAI scores in study subjects and controls, results on both subscales (STAI-S and STAI-T) were higher in the study group; however, the difference did not reach statistical significance, although the results of STAI-S scores were marginally significant ($P = 0.051$). The results are summarized in Table 1.

Despite the difference in the mean scores, regarding percentages, there were no statistically significant differences in subcategories and the majority of both adolescents with epilepsy and controls remained in the nondepression subcategory. About 23% of patients in the study group and 8% of adolescents in the control group had BDI-II >13, suggesting that they had mild-to-moderate depression. Only one patient from the study group and none of the controls had severe depression. The results are shown in Table 2.

Regarding gender, there were no statistically significant differences in the BDI-II scores in both the study group ($P = 0.397$) and in controls ($P = 0.319$) as well as STAI scores between adolescent boys and girls from both groups (study: STAI-S $P = 0.546$; STAI-T $P = 0.640$; and controls: STAI-S $P = 0.394$; STAI-T $P = 0.930$).

There was a strong positive correlation between BDI-II scores and STAI scores in both groups, implying that anxiety and depression were strongly associated.

Among the epilepsy-related factors, the duration of epilepsy and the onset of epilepsy before puberty (onset before 12 years of age) were not related to depression and anxiety scores, as opposed to the STAI-S score, which was marginally significant between the patients with onset of epilepsy before 12 years of

Table 1: Mean Beck Depression Inventory II and State-Trait Anxiety Inventory scores in the two groups of adolescents

Group	Adolescents with epilepsy ($n=90$)	Controls ($n=60$)
BDI and mean±SD	9.99±6.43	5.73±5.33
Statistics	t (148)=1.016, P=0.000	
STAI-S and mean±SD	36.71±10.26	33.28±10.74
Statistics	t (148)=1.967, P=0.051	
STAI-T	39.99 (7.16)	37.70 (7.79)
Statistics	t (148)=1.850, P=0.066	

P<0.001. n=Number of patients, SD=Standard deviation, Mean±SD=Mean with SD, t=Independent samples t-test, BDI=Beck Depression Inventory, STAI=State-Trait Anxiety Inventory

Table 2: Beck Depression Inventory II categories in adolescents with epilepsy and healthy controls

Group	Adolescents with epilepsy, n (%)	Controls, n (%)
No depression (0-13)	69 (76.7)	55 (91.6)
Mild depression (14-19)	14 (15.5)	3 (5)
Moderate depression (20-28)	6 (6.7)	2 (3.3)
Severe depression (>29)	1 (1.1)	0
Statistics	χ^2 (3)=5.94, P=0.115	

n=Number of patients, SD=Standard deviation, Mean±SD=Mean with SD, χ^2=Chi-square test, SD=Standard deviation

age and those with the onset in puberty. In fact, adolescents with the onset of epilepsy before puberty showed lower STAI-S scores, which may mean that they had less anxiety symptoms. However, it seems that the etiology of epilepsy had an effect on anxiety scores only, and less so on depression scores, reaching only a marginal statistical significance. As regards the STAI-S score, we found that there were statistically significant differences between adolescents with idiopathic epilepsy and the two other forms – cryptogenic and symptomatic. In the case of the STAI-T score, we found a statistically significant difference between the idiopathic and symptomatic forms of the disorder. When it comes to the BDI-II score, we found marginally significant differences between the group with idiopathic forms and the group with cryptogenic forms of epilepsy. Regarding the frequency of seizures, depression and anxiety scores were significantly higher in patients with poor control of seizures compared to those who had good and partial control of seizures. Adolescents with poor seizure control showed significant statistical differences in the STAI-S, STAI-T, and BDI-II scores compared with adolescents with partial and good seizure control. There was a strong correlation between the number of AEDs taken and anxiety and depression scores in the study subjects. The depression and anxiety scores obtained on the BDI-II, STAI-S, and STAI-T self-report questionnaires were significantly higher in patients receiving more than one AED compared with the patients who were treated with one drug only. The results are summarized in Table 3.

Discussion

The main objective of the present study was to compare the frequency of depression and anxiety symptoms among adolescents with epilepsy and their healthy peers using self-report instruments. Another aim was to examine the relationship between epilepsy-related variables and anxiety and depression among adolescents with epilepsy.

In this study, adolescents with epilepsy showed increased rates of self-reported depression and anxiety compared to healthy controls, although scores on the anxiety scales did not reach statistical significance. In addition, these results corroborate that epilepsy has a significant psychological impact on adolescents. During the period of adolescence, young people with epilepsy face additional challenges that their condition involves. Adolescents with epilepsy are more likely to express certain depressive or anxiety traits, especially in situations that could potentially be experienced as stressful and frustrating, and bearing in mind all the limitations that epilepsy as a disease

Table 3: The relationship between epilepsy-related variables and Beck Depression Inventory II and State-Trait Anxiety Inventory scores

Variable (*n*)	BDI	STAI-S	STAI-T
Duration of epilepsy (years)			
<1 (16)	10.19 (4.98)	37.06 (12.23)	39.75 (8.07)
1-2 (18)	11.89 (6.27)	35.50 (8.69)	40.44 (5.65)
3-5 (33)	9.42 (6.83)	38.67 (11.27)	39.73 (7.31)
>5 (23)	9.17 (6.94)	34.61 (8.33)	40.17 (7.78)
Statistics	F (3.86)=0.729, P=0.537	F (3.86)=0.805, P=0.494	F (3.86)=0.048, P=0.986
Onset of epilepsy			
Before 12 years of age (44)	9.29 (5.99)	34.61 (9.34)	39.68 (6.81)
After 12 years of age (46)	10.65 (6.83)	38.72 (10.80)	40.28 (7.55)
Statistics	t (88)=−1.000, P=0.320	t (88)=−1.925, P=0.058	t (88)=−0.396, P=0.693
Etiology			
Idiopathic (39)	8.15 (5.49)	32.64 (6.96)	37.56 (6.58)
Cryptogenic (26)	11.58 (7.84)	38.61 (11.18)	40.69 (7.67)
Symptomatic (25)	11.20 (5.65)	41.08 (11.54)	43.04 (6.38)
Statistics	F (2.87)=2.944, P=0.058	F (2.87)=6.491, P=0.002*	F (2.87)=5.046, P=0.008**
Seizure control			
Good (49)	7.84 (5.45)	34.14 (9.56)	38.10 (7.06)
Partial (25)	9.88 (4.95)	35.88 (8.40)	39.76 (5.43)
Poor (16)	16.75 (6.89)	45.88 (10.37)	46.13 (6.79)
Statistics	F (2.87)=15.296, P=0.000**	F (2.87)=9.523, P=0.000**	F (2.87)=8.930, P=0.000**
AED			
Monotherapy (66)	8.50 (5.47)	34.24 (9.19)	38.06 (6.34)
Polytherapy (24)	14.08 (7.20)	43.50 (10.18)	45.29 (6.70)
Statistics	t (88)=-3.924, P=0.000***	t (88)=-4.107, P=0.000***	t (88)= -4.711, P=0.000***

*P<0.05, **P<0.01, ***P<0.001. Due to the small study sample and many hypothesis tested, the Bonferroni correction was introduced to avoid making Type I error. The Bonferroni correction was used for tests since multiple comparisons were tested in such a way that the alpha value (P-value) was adjusted by the number of comparisons being performed. With Bonferroni correction, significance value was set at P=0.003 (Bonferroni correction for 15 comparisons). n=Number of patients, SD=Standard deviation, Mean±SD=Mean T scores with SD, F=One-way ANOVA, t=Independent samples t-test, BDI=Beck Depression Inventory, STAI=State-Trait Anxiety Inventory, AED=Antiepileptic drug

entails, it can be assumed that such situations are not few. Since adult psychopathology may originate from psychological suffering in childhood and adolescence, it is important to recognize such symptoms as early as possible. Therefore, the continuous or periodic assessment of depression and anxiety in adolescents with epilepsy is required during follow-up visits, to promptly recognize early symptoms indicative of the development of clinically more pronounced forms of depression or anxiety.

Our findings are consistent with the increased rates of depression reported in patients with epilepsy of all ages. In this study, 23.3% of adolescents with epilepsy and 8.3% of healthy adolescents had BDI-II scores >13, indicating that they had mild-to-moderate depression. The rate of depression in children and adolescents with chronic epilepsy, mostly measured by self-reporting instruments, is also higher than in healthy controls. Depression symptoms were reported to have an estimated prevalence of 23%–26% based on self-reporting instruments,[6,7] which is also consistent with our results. Alwash *et al.* reported depression in 33% of children and adolescents with epilepsy, as opposed to 16% of controls.[20] In the Turkish study, Oguz *et al.* also noted more symptoms of anxiety and depression among adolescents with epilepsy, compared to healthy controls or younger children.[18] Similarly, Thome-Souza *et al.* found more symptoms of depression in adolescents with epilepsy compared to younger children.[21]

In this study, the BDI-II scores were significantly higher in adolescents with epilepsy than in healthy adolescents. Comparison of STAI scores between adolescents with epilepsy and controls showed that the results on both subscales were higher in the study group, although the difference did not reach a statistical significance. Kwong *et al.* found higher depression scores in adolescents with epilepsy compared with adolescents with asthma. Their study also demonstrated that scores on the anxiety scale were higher in adolescents with epilepsy, although the difference between the epilepsy and asthma groups was not statistically significant.[1] Consistent with our results, Baki *et al.* used the BDI-II and STAI questionnaires and found higher depression scores in children and adolescents with seizures aged 7–19 years; however, the mean STAI scores did not differ between patients and controls.[9] Oguz *et al*. using the STAI in 35 children and adolescents with epilepsy, and 35 healthy children found that the mean trait anxiety score was significantly higher in the study group.[18] Similarly, Ettinger *et al*., Alwash *et al*., and Shatla *et al*. showed that children and adolescents with epilepsy had more anxiety symptoms compared with healthy controls.[7,20,22]

As regards gender differences, we did not find an association between gender and depression or anxiety. A potential explanation may be the fact that our sample did not include many adolescents with clinically significant depressive traits, thus the expected association was not observed. Some authors reported that female gender was an independent predictor of depression in children and adolescents with epilepsy, and that female gender was associated with a higher mean depression score.[1,23] Despite the previous findings of a higher prevalence of depression in girls, some other studies reported that gender had no effect on depression.[9,24] On the contrary, Bilgic *et al.* found that adolescent boys had more emotional problems and suggested that in epilepsy, male gender may be a risk factor for emotional symptoms.[25]

Our study showed a high correlation between depression and anxiety scores, which may reflect the common comorbidity of anxiety and depression among adolescents. In the epilepsy literature, especially in the past, there was a tendency to group depression and anxiety disorders in one category under the label of "mood" or "affective" disorder.[6] Anxiety and depression are separate psychiatric conditions; however, the coexistence of anxiety and depression has been widely reported in people with or without epilepsy.[26,27] Consistent with our results, Kwong *et al.* also found the association between anxiety and depression in adolescents with epilepsy.[1] Smith *et al*. also found a strong correlation between STAI and child depression inventory scores among adolescents.[28] Alternatively, the BDI-II and STAI may not be sufficiently specific instruments to distinguish the two symptoms in this group of adolescents.

Although a number of studies have identified individual predictors of the development of psychopathology, however, the role of epilepsy-related factors still remains controversial.[4,21-23] Among the epilepsy-related factors, in our study, seizure frequency, symptomatic etiology, and polytherapy were associated with increased depression and anxiety scores. A higher frequency of seizures, symptomatic etiology, and use of polytherapy suggests a more difficult control of the disorder and probably contribute to increased worry due to the fear of repeated seizures, living in uncertainty, as well as additional reactive depressive symptoms that may develop as a result of the limited or impaired lifestyle. In agreement with our findings are the results of Turky *et al*., who in their prospective study with adolescents with epilepsy showed that seizure frequency was strongly associated with emotional problems and depression.[23] Oguz *et al*. and Alwash *et al*. also demonstrated that a higher seizure frequency is associated with increased anxiety and depression.[18,20] However, in contrast to our findings, a number of other authors found no association between seizure frequency and depression.[9,21] In addition, Ettinger *et al*. and Baki *et al*. did not find a significant correlation between the number of seizures and anxiety.[7,9]

Similar to our results, Sabbagh *et al.* found a significant relationship between polytherapy and behavior problems in school-aged children with epilepsy.[29] Oguz *et al*. found that polytherapy was a significant predictor for the development of depression and anxiety in children and adolescents with epilepsy, which is in accordance with the findings of Hermann *et al*. who also described behavior problems in patients on polytherapy.[18,30] Conversely, Thome-Souza *et al*. suggested opposite results; they found no significant difference in the

rates of depression between children on monotherapy and those on polytherapy.[21]

As regards the other epilepsy-related factors, duration of epilepsy, onset of epilepsy before puberty, and etiology were not associated with depression in our study group. In agreement with our findings, Oguz *et al*. and Thome-Souza *et al*. also did not suggest that early-onset seizures were a risk factor for depression.[18,21] In contrast, a study conducted by Bromfield *et al*. suggested that depression and anxiety problems may be more common in children with a later onset of epilepsy.[31]

Given the fact that no patients, in our study, had been previously diagnosed with mood disorder, our results demonstrated increased rates of self-reported symptoms of anxiety and depression among adolescents with epilepsy and suggested that such symptoms may be underrecognized in adolescents with epilepsy. There may be many reasons why depression and anxiety remain unrecognized in adolescents with epilepsy. One of the reasons can be the lack of efficient screening instruments. However, the BDI-II and STAI have shown a high level of sensitivity and are probably the most efficient measure of depression and anxiety over a short time, which is very important for overloaded clinicians. The other reasons may be that adolescents may not express depression and anxiety as directly as adults. They may present with other signs, such as disruptive behavior or irritability, physical symptoms which may not be readily identified as signs of depression or anxiety.[32]

Psychological factors, such as unpredictability of seizures, fear of death, feeling of poor control over seizures, feeling of difference from their peers, or stigmatization, are potential factors associated with anxiety and depression in adolescents with epilepsy. To avoid the embarrassment of having seizures in public, adolescents may increasingly withdraw from social activities.[33] This can result in social isolation, which increases the possibility of developing anxiety in various forms, or even depression. It is well known that untreated deficits in social skills are associated with poor academic performance, leading to social adjustment problems and serious psychopathology. Since psychopathology in adulthood may originate from childhood or adolescence, it is very important to detect such symptoms at an early age.

There are a few limitations to our study. These include the relatively small sample size, single-institution recruitment, and specific patient population studied. Although we found significant differences between the groups of epilepsy and nonepilepsy subjects, the relatively small sample size requires caution when interpreting the results. However, it still appears that depressive and anxiety symptoms are relatively common in adolescents with epilepsy. In addition, our study group was heterogeneous with regard to different epilepsy-related variables, which might have influenced our results. Another limitation was the cross-sectional design of the study, and longitudinal studies may be necessary to correlate clinical symptoms over time. We would thus be able to get deeper insights into these symptoms. Furthermore, we did not consider a family history of depression and anxiety, which might have contributed to more severe symptoms in our adolescents. Last but not the least, our evaluation depended on self-reported questionnaires and lacked parent or teacher assessment. Nevertheless, these questionnaires may be a good screening tool, they are not time-consuming, and frequently self-reporting is more reliable in adolescents since they are usually more self-conscious and not ready to reveal their feelings to strangers. Correspondingly, the authors of a recently published paper state that parents' reports are not objective but reflect parents' reactions and emotions. Increasing evidence suggests inherent biases in proxy reports and highlights the need to assess children and adolescents directly.[34]

Despite the limitations of this study, we confirmed that the diagnosis of epilepsy affects negatively the overall mental state of adolescents. Our results suggest that adolescents with symptomatic epilepsy and poor seizure control, who are on polytherapy, have an average interquartile and attend regular school has the greatest chance of developing depressive and anxiety symptoms. Therefore, these adolescents should receive special attention by neurologists and mental health specialists, and a multidisciplinary approach is, therefore, crucial for an appropriate management of these patients.

Conclusion

The BDI-II and STAI remain useful screening tools for depression and anxiety symptoms in adolescents with epilepsy in clinical settings, aimed to identify adolescents who would possibly need further comprehensive psychological or psychiatric assessment. Adolescents may not express depression and anxiety as directly as adults; hence, we can conclude that more research is needed to enlighten the specific phenomenology of depression and anxiety in this young population.

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Conflicts of interest

There are no conflicts of interest.

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