Epilepsy and Associated Factors Among Adults Hospitalized for Attempted Suicide

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ABSTRACT

Background: Suicidal behaviors are known to be increased in people with epilepsy compared to the general population. However, few studies have explored the frequency of epilepsy in a large sample of suicide attempters, and scarce data exist about differences and similarities between epileptic attempters (EA) and nonepileptic attempters (NEA). The aim of this study was to explore the frequency of epilepsy as well as psychopathological and somatic factors among suicide attempters.

Methods: In this multicenter cross-sectional study, 1,229 adults hospitalized for attempted suicide were included during the period between July 2001 and December 2015. They were assessed with the Mini-International Neuropsychiatric Interview for *DSM-IV* Axis I mental disorders. Data concerning sociodemographic and somatic diseases, including epilepsy, were collected.

Results: Sixty-five patients (5.3%) had epilepsy. EA had significantly fewer mean ± SD years of education compared with NEA (11.2 ± 3.2 vs 12.1 ± 2.9; $P = .011$) as well as increased rates of head trauma (29.2% for EA vs 16.2% for NEA; $P = .007$), antiepileptic use (35.4% for EA vs 23.8% for NEA; $P = .036$), and lifetime substance abuse and/or dependance (49.2% for EA vs 36.1% for NEA; $P = .034$). Multivariate analyses showed that years of education, head trauma, and panic disorder with agoraphobia predicted belonging to the EA group.

Conclusions: These results suggest that epilepsy is overrepresented among suicide attempters. Few psychopathological differences as well as differences in somatic comorbidities except head trauma were observed between EA and NEA in this sample. These results contribute to draw a clinical profile of people with epilepsy in the population of suicide attempters.

J Clin Psychiatry 2022;83(3):21m14207

To cite: Akrout Brizard B, Courtet P, Jaussent I, et al. Epilepsy and associated factors among adults hospitalized for attempted suicide. *J Clin Psychiatry.* 2022;83(3):21m14207.

To share: https://doi.org/10.4088/JCP.21m14207

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Suicide is a major public health problem, especially in industrialized countries.[1] Around 1 million people worldwide die by suicide annually, making it one of the leading causes of death.[2] To avoid such an outcome, the identification of vulnerable populations as well as risk factors for suicidal behavior is a priority. Epilepsy has been statistically and clinically associated with suicidality.[3–5] Indeed, several studies have reported increased rates of completed suicide,[3,6,7] suicide attempts, and suicidal ideation[8] in people with epilepsy compared with the general population. In addition, compared with patients recently hospitalized for other chronic diseases, those with epilepsy show a 3 times higher risk of hospital readmission for suicide attempt.[9]

While suicidality has been widely explored in people with epilepsy, few studies have reported data on epilepsy among adult suicide attempters. Lawson and Mitchell[10] reported 4.7% of epileptic subjects in a sample of 639 suicide attempters.[10] Mackay[11] observed that 3.5% of 3,733 self-poisoners had epilepsy. Hawton et al[12] and Mendez et al[13] reported epilepsy in 3.2% of their samples of people having attempted suicide (n = 1,291 and n = 711, respectively). These works converge on an excess of patients with epilepsy among suicide attempters compared with the prevalence of epilepsy in the general population (0.8%).[14] According to Hawton et al,[12] this excess may be explained by the risk of depression recognized in epileptic subjects; thus, the relationship between these two phenomena could be indirect.[15] Other explanatory hypotheses include the impact of chronic illness and the effect of anticonvulsant drugs.[16] Schommer et al[17] stated that, although the causes of suicidal behavior in this specific group remain poorly understood, there is evidence that people with epilepsy are susceptible to presenting many risk factors of suicidal behaviors. For example, studies exploring differences between attempters with and without epilepsy reported a significantly increased rate of unemployment, history of psychiatric treatment, and alcohol consumption in those with epilepsy.[12] Mackay[11] found less alcohol excess but increased personality disturbances such as psychopathy in epileptic attempters, and Mendez et al[13] reported that suicide attempts in epileptic subjects were associated with borderline personality disorder and psychosis. Unfortunately, these studies did not explore somatic comorbidities.

Clinical Points

- A high frequency of epilepsy (5.3%) was observed in a sample of 1,229 adult suicide attempters in a cross-sectional study.
- Epileptic suicide attempters reported lower levels of formal education and higher rates of head trauma, antiepileptic use, and lifetime substance disorder compared with nonepileptic attempters. These clinical elements deserve deeper investigation to prevent completed suicide in this vulnerable population.

Despite the importance of these results dating from the 1970s and 1980s, more recent data are necessary, especially considering that the etiology of suicidal behaviors is known to be multifactorial and that the influence of risk and protective factors may change over time, as do the rates of comorbidity.[18,19] Moreover, identifying characteristics of people with epilepsy in the population of suicide attempters may help improve clinical screening[20] and prevent completed suicide in this specific and vulnerable group.

The objectives of this study were to explore the frequency of epilepsy in a large sample of adults hospitalized for suicide attempt and to compare psychopathological and somatic characteristics between epileptic and nonepileptic attempters (EA and NEA, respectively).

METHODS

Subjects

For the present study, we used data from a larger multicentric study investigating molecular genetics of suicidal behavior (see Courtet et al,[21] Courtet et al,[1] and Jollant et al[22]). In this study, patients were recruited at hospital admission for suicide attempt in 3 French university hospitals (in Montpellier, Créteil, and Nancy) during the period between July 2001 and December 2015. Inclusion criteria were being aged above 18 years, having all 4 biological grandparents originating from Western Europe (for genetic purposes), and having a history of at least one suicide attempt. A suicide attempt was defined, per Mann et al,[23] as an auto-aggressive gesture carried out with a certain intention to die and sufficiently serious to require medical evaluation. Participants were excluded if they were affiliated with a French social security scheme, protected by law (guardianship or curatorship), or under judicial or administrative deprivation of liberty and in case of pregnancy and breastfeeding.

The study was approved by the local ethics committee (CPP Sud Mediterranée IV, CHU Montpellier, France), and written consent was obtained from all participants.

Instruments and Variables

The French version of the Mini-International Neuropsychiatric Interview (MINI 5.0.0)[24] was used to evaluate Axis I lifetime psychiatric disorders according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*),[25] and the *International Classification of Diseases, Tenth Revision* (*ICD-10*).[26] This structured interview that can be administered in approximately 15 minutes was designed to generate positive diagnosis through questions phrased to allow yes/no answers and is routinely used in the 3 university hospitals.

Information on epilepsy was collected through clinical interview. In this, questions about the presence (yes/no) and type (primary, secondary, or unknown) of epilepsy and age at diagnosis were included. Information concerning the presence of other somatic diseases was also collected in the medical history (eg, migraine, head trauma, and other somatic diseases such as neurologic diseases other than epilepsy; diabetes; thyroid disorders; other endocrinopathies; genetic disease; cancer).

Sociodemographic data and medication prescriptions at inclusion were also collected. Data on medication were analyzed according to World Health Organization Anatomic Therapeutic Chemical classification[27] in 5 categories: antiepileptic drugs (AED), antipsychotics, benzodiazepines, mood stabilizers, and antidepressants.

Statistical Analysis

Statistical analysis was carried out using the IBM SPSS 27 software package.[28] Descriptive analysis was performed (percentage, mean, standard deviation, median, and interquartile range values). Binary logistic regressions were performed for comparison between the 2 groups (EA and NEA). Later, those variables significant at 10% in comparison analyses were included as covariates in a model exploring predictors of epilepsy status. The significance level was set at 5%.

RESULTS

The sample was composed of 1,229 adults with a mean ± SD age of 41.47 ± 13.4 years. Most of the sample were female (70.3%). Epilepsy was reported by 5.3% of participants. Among them, 9.2% declared their epilepsy as primary type, 18.5% declared it as secondary, and 70.8% declared that they were unaware of their epilepsy type (data were unavailable for 1.5% of the EA group). The mean ± SD age at epilepsy diagnosis was 25.15 ± 16.1 years.

When comparing EA and NEA, we observed that these groups were similar on sociodemographic data, except in the level of education expressed in years. Indeed, the NEA group showed a significantly higher number of years of education (12.1 ± 2.9 vs 11.2 ± 3.2; $P = .011$). The sociodemographic characteristics of the sample are summarized in Table 1.

Concerning clinical characteristics (Table 2), we observed that 77.1% of the whole sample suffered from somatic disorders other than epilepsy. When we compared EA and NEA on somatic illness variables, we observed a significantly higher rate of head trauma in the EA group (29.2% vs 16.2%; $P = .007$). With respect to treatment prescribed at inclusion, EA reported significantly higher rates of use of AED compared with NEA (35.4% vs 23.8%; $P = .036$).

Table 1. Comparison of Sociodemographic Variables Between Epileptic and Nonepileptic Attempters[a]

Variable	NEA (n = 1,164)	EA (n = 65)	OR (95% CI)	*P* Value
Age, mean ± SD, y[b]	41.52 ± 13.45	40.68 ± 14.03	0.96 (0.79–1.15)	.626
Sex				
Male	29.6 (345)	30.8 (20)	1	.846
Female	70.4 (819)	69.2 (45)	0.95 (0.55–1.63)	
Marital status				
Single	59.3 (690)	61.5 (40)	1	.718
With a partner	40.7 (474)	38.5 (25)	0.91 (0.54–1.52)	
Years of education, mean ± SD[c]	12.19 ± 2.963	11.22 ± 3.252	0.59 (0.39–0.89)	.011

[a]Values shown as % (n) unless otherwise noted.
[b]For age, the OR is for 10-year increase.
[c]For years of education, the OR is for 5-year increase.
Abbreviations: EA = epileptic attempters, NEA = nonepileptic attempters, OR = odds ratio.

Table 2. Comparison of Clinical Characteristics Between NEA and EA[a]

Variable	NEA, 94.7 (1,164)	EA 5.3 (65)	OR (95% CI)	*P* Value
Somatic (Lifetime)				
Somatic diseases other than epilepsy	76.7 (893)	84.6 (55)	1.67 (0.84–3.32)	.144
Migraine	40.2 (468)	43.1 (28)	1.13 (0.68–1.86)	.646
Head trauma	16.2 (188)	29.2 (19)	2.14 (1.23–3.74)	.007
Other[b]	26.1 (304)	21.5 (14)	0.78 (0.42–1.42)	.413
Psychopathological (Lifetime)				
Psychiatric disorders (any)	98.1 (1,142)	98.5 (64)	1.23 (0.16–9.29)	.839
Mood disorders	96.0 (1,117)	92.3 (60)	0.50 (0.19–1.32)	.162
Major depressive disorder	73.5 (855)	67.7 (44)	0.76 (0.44–1.29)	.309
Manic/hypomanic disorder	25.0 (291)	29.2 (19)	1.24 (0.71–2.15)	.445
Anxiety disorders	69.8 (812)	72.3 (47)	1.13 (0.65–1.98)	.663
Panic disorder without agoraphobia	12.5 (146)	15.4 (10)	1.27 (0.63–2.54)	.504
Panic disorder with agoraphobia	14.7 (171)[c]	23.1 (15)	1.74 (0.96;3.17)	.070
Social phobia	22.4 (261)[c]	26.2 (17)	1.22 (0.69–2.16)	.487
Obsessive-compulsive disorder	11.3 (131)[d]	13.8 (9)	1.27 (0.61–2.62)	.526
Generalized anxiety disorder	47.1 (548)	41.5 (27)	0.80 (0.48–1.33)	.385
Posttraumatic stress disorder	14.1 (164)	15.4 (10)	1.11 (0.55–2.22)	.771
Eating disorder	18.5 (215)	21.5 (14)	1.21 (0.66;2.23)	.537
Substance abuse and/or dependence	36.1 (420)	49.2 (32)	1.72 (1.04–2.83)	.034
Alcohol abuse and/or dependence	29.1 (339)	40.0 (26)	1.62 (0.97–2.71)	.064
Cannabis abuse and/or dependence	12.4 (144)	18.5 (12)	1.60 (0.84–3.07)	.155
Other type of abuse and/or dependence	8.5 (99)	16.9 (11)	2.19 (1.11–4.33)	.024
Medication at inclusion	58.0 (675)	60.0 (39)	1.09 (0.65–1.81)	.749
AED	23.8 (277)	35.4 (23)	1.75 (1.04–2.97)	.036
Antidepressants	42.3 (492)	41.5 (27)	0.97 (0.58–1.61)	.908
Antipsychotics	32.0 (373)	33.8 (22)	1.08 (0.64–1.84)	.762
Mood stabilizers	13.3 (155)	21.5 (14)	1.79 (0.97–3.31)	.064

[a]Values shown as % (n) unless otherwise noted.
[b]Cancer, diabetes, thyroid disorders, other endocrinopathies, genetic disease, or other neurologic disease.
[c]n = 1,163.
[d]n = 1,162.
Abbreviations: AED = antiepileptic drugs, EA = epileptic attempters, NEA = nonepileptic attempters, OR = odds ratio.

Lifetime psychiatric disorders were reported in 98.1% of the whole sample. The comparison between EA and NEA showed a significant difference in substance abuse and/or dependence, with EA showing higher rates than NEA (49.2% vs 36.1%; $P = .034$). In, addition, a greater proportion of EA had lifetime alcohol abuse and/or dependence and panic disorder with agoraphobia. However, these differences did not reach statistical significance ($P = .064$ and .070, respectively).

Finally, as illustrated in Table 3, multivariate analyses showed that years of education, head trauma, and panic disorder with agoraphobia predicted belonging to the EA group. More specifically, the risk of falling into the EA group decreased by 0.56 for every 5-unit increase in years of education. It increased by 2.16 in the presence of head trauma and by 1.90 in the presence of panic disorder with agoraphobia.

DISCUSSION

Concordant with the few previous studies exploring epilepsy among adult suicide attempters,[10–13] we observed an overrepresentation of this neurologic disorder among people who have made a suicide attempt. Indeed, the rate of epilepsy

Table 3. Multivariate Regression Logistic Model With Epilepsy Status as Dependent Variable

Variable	OR (95% CI)*	*P* Value*
Years of education[a]	0.56 (0.37–0.87)	.009
Head trauma	2.16 (1.21–3.86)	.010
Panic disorder with agoraphobia	1.90 (1.01–3.56)	.045
Substance abuse and/or dependence	1.64 (0.98–2.74)	.061
AED	1.48 (0.76–2.87)	.253
Mood stabilizers	1.18 (0.53–2.60)	.682

[a]The OR is for 5-year increase.
*Adjusted for study center.
Abbreviations: AED = antiepileptic drugs, OR = odds ratio.

in our sample was 5.3%, while the prevalence of epilepsy among the general population is around 0.8%.[14] A similar outcome has been reported in children, as Brent et al[16] observed in a group of 126 children and adolescents having attempted suicide, of whom 7.1% had epilepsy. According to the authors, the frequency of epilepsy in their study was 15 times higher than expected by chance, given the prevalence of epilepsy in the school-aged population. Considering previous research dated from the 1970s and 1980s, we can assume a certain stability in more recent decades concerning the excess of suicidal behaviors among people with epilepsy.

On the other hand, we observed that women predominate in the whole sample of adult suicide attempters. They also account for approximately 70% of EA. This finding is consistent with the higher prevalence of suicide attempts in women compared to men in the general population.[29]

In this study, EA had a lower level of formal education than NEA. In this regard, scholastic difficulties,[30] inadequate schooling, poor academic achievement,[31,32] and increased risk of school dropout have been reported in people with epilepsy.[33] Interestingly, low academic performance has been identified as a risk factor for suicide attempt.[34]

Like epilepsy itself, the lower level of formal education may be related to the increased rate of head trauma observed in the EA group. Indeed, according to Benardo,[35] head trauma accounts for 5% of all epilepsy cases and 20% of symptomatic epilepsy. Conversely, epileptic patients are at higher risk of head injury due to falls during seizures.[36] Moreover, head trauma is also associated with cognitive deficits and academic difficulties[37] as well as with sequelae such as lack of impulse control and mood lability,[38] which in turn may favor suicidal behaviors.[39]

As expected, AED were significantly more prescribed at inclusion (ie, hospitalization) to EA than to NEA. The antiepileptic treatment is necessary for seizure control, and the current consensus is that these drugs are not a risk factor for suicidality in people with epilepsy.[40] However, the literature highlights the importance of considering adverse events of AED in the treatment of non-epilepsy conditions such as psychiatric disorders and pain syndromes, for which these drugs are commonly utilized.[41]

Mental disorders are frequent among people suffering from epilepsy[42] as well as among suicide attempters.[43] This was also the case in this sample (> 98%). Interestingly, few differences were found between EA and NEA on psychiatric comorbidities. This finding is consistent with the fact that these groups were also similar with respect to the psychopharmacologic treatment prescribed at inclusion, except for AED. As we observed through comparison analyses, only substance abuse and/or dependence appears as more frequent among EA. In this regard, there is evidence that substance use disorders are more often seen in people with epilepsy than in the general population.[44] However, there is no consensus as to whether the consumption of psychoactive substances is specific to EA subjects compared with nonepileptic attempters. In fact, Hawton et al[12] reported an increased consumption of alcohol in epileptic subjects with deliberate self-poisoning and self-injury compared to those without epilepsy. However, Mackay[11] reported the inverse result when he compared epileptic and nonepileptic self-poisoners. Substance abuse and/or dependence was not significant in multivariate analysis. In contrast, panic disorder with agoraphobia does appear to be a predictor of epilepsy status. This result may be partially explained by the fact that panic disorder and partial seizures present overlapping manifestations (eg, fear, affective symptoms, altered autonomic function), which makes differentiating them challenging.[45] Along that line, Hingray et al[46] describe anxiety disorders specific to epilepsy such as epileptic panic disorder. In addition, pathological anxiety and avoidant behaviors may arise in people with epilepsy from the fear to suffer epileptic seizures[47] and even as iatrogenic consequences of pharmacologic and chirurgical treatments for epilepsy.[46] Interestingly, there is evidence that anxiety symptoms increase suicide risk in people with epilepsy.[6]

In this study, EA and NEA did not differ on somatic comorbidities except for antecedents of head trauma. Comparison with other research on this aspect is not possible since previous studies of epilepsy among suicide attempters did not report somatic comorbidities.[10–13] However, considering that the literature has highlighted a higher prevalence of most chronic somatic conditions in people with epilepsy when compared with the general population and with selected patient groups,[48] this result is surprising. Two potential reasons may explain it: (1) some common somatic conditions affecting people with epilepsy were not explored in this study (eg, stroke, asthma, anemia, HIV/AIDS),[49] and (2) suicide attempters, with or without epilepsy, have an overrepresentation of somatic comorbidity (present in more than 75% in our sample).

Taken together, these results support the idea that the excess of suicidal behaviors in epileptic subjects is independent of or less explained by psychopathology[6,50] and maybe also by somatic comorbidities. Other factors may play a role in the emergence of suicidal behavior in this population, such as disease-specific factors[6] that should be explored in further research.

Some methodological limitations should be evoked. Somatic variables, including epilepsy, were self-reported. A clinical diagnosis by a neurologist-epileptologist would have increased the scientific reliability of our results and allowed us to refine them. In addition, since this study was not primarily designed to assess suicidality in people with epilepsy, other

variables of interest are lacking, especially those related to epilepsy (eg, seizure localization, frequency and duration of seizures). Moreover, the sample size did not allow performing intragroup comparisons according to the self-reported type of epilepsy. Thus, more studies are needed to elucidate the role of the characteristics of epilepsy in its association with suicidal behavior but also on the psychiatric vulnerability of suicidal adults.

Despite limitations, our results emerged from a large sample of suicide attempters and included variables not explored before. Thus, this research contributes to drawing a clinical profile of EA that deserves to be more deeply investigated to prevent complete suicide in this specific and vulnerable population. Future studies analyzing the relationship between epilepsy-related factors and psychiatric disorders in the suicidal population are needed.

Submitted: August 6, 2021; accepted November 17, 2021.

Published online: May 2, 2022.

Author contributions: Drs Baeza-Velasco and Courtet conceived and designed the study. Ms Akrout Brizard and Dr Baeza-Velasco wrote the manuscript. Dr Jaussent contributed with data management and methodological and statistical advice. Ms Akrout Brizard contributed with data management and performed the statistical analysis. Drs Courtet, Leboyer, and Kahn coordinated the recruitment and clinical assessment of patients. All authors revised the article critically and agreed on the final version of the manuscript.

Relevant financial relationships: None.

Funding/support: This study received financial support from the Clinical Research Unit of the Centre Hospitalier Universitaire of Montpellier (Programme Hospitalier de Recherche Clinique 7653).

Role of the sponsor: The funding body had no role in the design, collection, analysis, and interpretation of data, or in the writing of the manuscript.

Acknowledgments: The authors acknowledge all patients who participated in this study.

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Editor's Note: We encourage authors to submit papers for consideration as a part of our Focus on Suicide section. Please contact Philippe Courtet, MD, PhD, at pcourtet@psychiatrist.com.