Seizure 23 (2014) 25–28

Contents lists available at ScienceDirect

Seizure

journal homepage: www.elsevier.com/locate/yseiz

Spirituality aspects in patients with epilepsy☆

Glória Maria Almeida Souza Tedrus, Lineu Corrêa Fonseca *, Gabriela Chaves Höehr [1]

Faculty of Medicine, Pontifícia Universidade Católica de Campinas (PUC-Campinas), São Paulo, Brazil

ARTICLE INFO

Article history:
Received 31 March 2013
Received in revised form 4 September 2013
Accepted 6 September 2013

Keywords:
Epilepsy
Religiosity
Spirituality
Spirituality self-rating scale

ABSTRACT

Purpose: Do epilepsy and spirituality interact? This study aimed to determine whether an easy-to-administer scale, such as the spirituality self-rating scale (SSRS), could detect increased religiousness in people with epilepsy and verify how epilepsy influences spirituality.
Methods: A total of 196 consecutive patients with epilepsy (epilepsy group, EG) with a mean age and standard deviation of 46.5 ± 14.8 years and 66 subjects with no history of neurological or other chronic disorders (control group, CG) were assessed by the SSRS and neurologically.
Results: The SSRS scores of the EG and CG did not differ significantly (22.8 ± 5.1 and 22.0 ± 5.7, respectively). Patients with mesial temporal lobe epilepsy with hippocampal sclerosis (MTLE-HS) had significantly higher SSRS scores than those with other epileptic syndromes and, than in individuals of the CG. Multiple regression showed that the factors significantly associated with greater spirituality (greater SSRS score) for the EG, were lower education level, abnormal background EEG activity, and MTLE-HS. Other relationships with the clinical features of epilepsy and with the presence of psychiatric co-morbidity were not found.
Conclusion: The present findings do not confirm a specific role of epilepsy in spirituality or of "epileptic hyperreligiosity," but suggest that spirituality in people with epilepsy is influenced by education level, and may also stem from epilepsy-related factors such as abnormal background EEG activity and the presence of MTLE-HS.

1. Introduction

In the last decades, the relationship between spirituality and health has aroused great scientific interest and been extensively documented.[1–3]

The literature recognizes that spirituality is a quality of life dimension, especially in people with chronic or terminal illness.[4]

Some studies relate spirituality and health and point out the positive aspects of this association, such as the protection it provides to physical, mental, and social health. Religious practices and beliefs influence how individuals look after their health and may help them to avoid risky situations.[1,4] However, not enough studies exist on the spirituality of individuals with epilepsy (epilepsy group, EG).[5,6]

Studies on the spirituality and religiosity of people with epilepsy regard religious experiences,[7,8] spiritual treatment,[9] the relationship between epileptic seizures (ES) and the mystical state,[10–12] or hyperreligiosity as a personality feature of patients with temporal lobe epilepsy (TLE).[13,14]

These studies consider the clinical aspects related to spiritual experiences important, but attention to spirituality as a life dimension in EG is still limited.[6]

Spirituality and religiosity are related but not synonymous. Spirituality includes transcendence, connectedness, purpose, and values (e.g., faith, forgiveness, gratitude, sense of belonging, love) that may be shared by people with different ethnic, cultural, and religious backgrounds. Religiosity is embedded in organized systems of faith or religions.[4]

The spirituality self-rating scale (SSRS) is a simple scale that assesses spirituality. Its items reflect spirituality, that is, how important individuals consider issues regarding their spiritual dimension and whether they apply those issues to their lives.[15] This scale was transculturally adapted in Brazil in 2009.[16]

The authors are unaware of any studies on the relationship between spirituality and epilepsy using the spirituality self-rating scale (SSRS).

Spirituality may have a positive or negative impact on epilepsy. In light of the literature concerning spirituality and health conditions, we hypothesized that the clinical variables of epilepsy (age at seizure onset, seizure type and frequency, duration of epilepsy, and epileptic syndrome) could impact spirituality.

☆ This project was supported by FAPESP.
* Corresponding author at: Rua Sebastião de Souza, 205 cj 122, Campinas, SP, CEP 13013.173, Brazil. Tel.: +55 19 32346088; fax: +55 19 32346088.
E-mail address: lineu.fonseca@uol.com.br (L.C. Fonseca).
[1] Undergraduate student with FAPIC (PUC-Campinas) placement scholarship.

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http://dx.doi.org/10.1016/j.seizure.2013.09.005

This study included a large sample of individuals with epilepsy (EG) and had a double purpose: (1) to assess whether an easy-to-administer scale, such as the SSRS, could detect increased spirituality and (2) to verify if epilepsy influences spirituality.

2. Methods

The study included two groups of subjects:

1 Group of patients with epilepsy (EG) – 196 consecutive outpatients of the neurology clinic of PUC-Campinas, Brazil, diagnosed with epilepsy according to the International Classification of Epilepsies and Epileptic Syndromes (ILAE)[17] criteria.
2 A control group consisting of 66 individuals with no history of neurological or other chronic disorders matched for sex and age group. They were preferentially family members of the EG.

The research was approved by PUC-Campinas Research Ethics Committee.

The EG were submitted to:

1 Interview to collect sociodemographic (age, gender, education level, marital status, and occupational status), clinical (age at onset, seizure type and frequency, duration of epilepsy, neurological antecedents, and epileptic syndrome), and religiosity-related characteristics, such as religion and religious practice;
2 Investigation of psychiatric co-morbidity according to the DSM-IV and ICD-10 criteria. The patients were classified into two groups: with and without psychiatric co-morbidity.
3 Digital electroencephalogram (EEG) – investigation of abnormal background EEG activity, and location and side of epileptiform activity.
4 Spirituality self-rating scale (SSRS)[15] – this scale investigates spirituality using the following 6 questions: (1) Is it important for you to spend time privately thinking and meditating about spiritual matters? (2) Do you try hard to live your life according to your religious beliefs? (3) Are the prayers or spiritual thoughts that you repeat when you are alone as important to you as those that you recite during services or spiritual gatherings? (4). Do you enjoy reading about your spirituality and/or your religion? (5) Does spirituality help to keep your life balanced and steady in the same way that your citizenship, friendships and other memberships do? (6) Is your whole approach to life based on your spirituality? Five Likert-type answers were available for each question, ranging from 1 (I completely agree) to 5 (I completely disagree). The total score varied from 6 to 30 points; higher scores reflected greater spirituality.[15] The SSRS was administered on the day of the medical appointment. The patients had no trouble understanding the questions. The interview lasted on average 5 min. The scale was corrected according to the scoring system proposed by Galanter et al.[15] The item scores were recoded before the total score was calculated.[15]

The control group was submitted to items 1 and 4 above.

2.1. Data analysis

The patients with symptomatic focal epilepsies included a subgroup of surgery-naïve patients with mesial temporal lobe epilepsy with hippocampus sclerosis (MTLE-HS), characterized by their clinical aspects, the presence of hippocampus atrophy, loss of digitations of the hippocampal head and definition of internal structure in magnetic resonance imaging (MRI).

The SSRS scores of the EG and CG groups were compared.

In the EG group, the relationships between SSRS scores and sociodemographic and clinical aspects were established by parametric or nonparametric statistical tests, depending on the situation.

Multiple regression analysis helped to determine the factors that contributed most to SSRS scores (dependent variable), using variables with $p < 0.10$ in the respective prior correlation analyses (independent variables). The data were treated by the software Statistical Package for the Social Sciences (SPSS), version 10. The significance level was set at 5%.

The effect sizes were measured by calculating Cohen's d from the t-tests and Cohen's f^2 within a multiple regression model.[18] The f^2 were calculated for a combined prediction of the model, and Cohen's f^2 variation was calculated to measure the local effect size.

3. Results

Table 1 shows the sociodemographic characteristics and SSRS scores of the EG and CG.

The EG and CG did not differ significantly with respect to age, sex, and education level. According to the ILAE[17] criteria, the EG group consisted of 22 cases (11.2%) of generalized idiopathic epilepsies, 66 cases (33.6%) of probably symptomatic focal epilepsies, and 108 cases (55.1%) of symptomatic focal epilepsies.

The mean age and standard deviation of seizure onset was 25.9 ± 18.1 years. Partial complex seizures (54.5%), symptomatic epilepsies (55.1%) and seizures controlled for one year or more (48.9% dos patients) prevailed. A total of 125 patients (63.7%) took one antiepileptic drug and 71 patients (36.3%) took more than one.

3.1. SSRS and sociodemographic and clinical aspects

The SSRS scores did not differ between the EG and CG (Table 1).

Patients in the EG group who reported having a religion (ANOVA; $p = 0.000$) and practicing it (t-test; $p = 0.000$) had higher SSRS scores. EG patients with lower education levels also had significantly higher SSRS scores (Pearson correlation; −0.175; $p = 0.014$). Finally, SSRS scores were not significantly associated with sex, age, marital status, and employment status.

Seventy-three patients (37.2%) presented psychiatric co-morbidity but the latter was not correlated with SSRS score.

SSRS scores were also not correlated with age at seizure onset, seizure type, seizure frequency, and side of epileptiform activity on the EEG. The SSRS scores of individuals with different epileptic syndromes classified by the ILAE (ANOVA; $p = 0.118$) did not differ significantly.

However, MTLE-HS patients had significantly higher SSRS scores than those with other epileptic syndromes or those in the CG (ANOVA, Duncan, $p < 0.05$) (Table 2) and Cohen's d index for effect size was 0.093 (small effect).

Patients with MTLE-HS and right hippocampal sclerosis had higher SSRS scores than those with left hippocampal sclerosis, but the difference was not significant (t-test; $p = 0.089$) (Table 2). Cohen's d index was 0.124 (small effect).

Table 1
Sociodemographic characteristics and SSRS scores of the epilepsy group and control group, and the p values in the comparisons.

	Patients with epilepsy	Control group	Comparison, p-value
Subjects	196	66	
Age (year)	46.5 (14.8)	48.9 ± 15.8	t-test, 0.254
Gender (male/female)	99/97	33/33	Chi-square, 0.528
Education level (years)	5.8 (3.7)	4.9 ± 3.4	t-test, 0.062
SSRS score	22.8 ± 5.1	22.0 ± 5.7	t-test, 0.269

Table 2
Distribution of the SSRS scores according to the epileptic syndrome, and control group, and background EEG activity.

	SSRS score, mean (SD)	Comparison, *p* value
Epileptic syndromes and control group		
MTLE-HS ($n=54$)	24.5 (3.9)	ANOVA
Other epilepsies ($n=142$)	22.2 (5.3)	$F=4{,}626$
Control group ($n=66$)	22.0 (5.7)	$p=0.011$*
MTLE-HS		
Right ($n=25$)	25.5 (3.6)	*t*-test, $p=0.089$**
Left ($n=29$)	23.7 (4.1)	
Background EEG activity		
Abnormal ($N=55$)	24.5 (3.9)	*t*-test, 0.004**
Normal ($N=141$)	22.2 (5.4)	

MTLE-HS: mesial temporal lobe epilepsy with hippocampus sclerosis; SD, standard deviation
* ANOVA: significant value, $p<0.05$.
** *t*-test: significant value; $p<0.05$.

Abnormal background EEG activity was seen in 55 cases (28%), which had higher SSRS scores than those with normal background activity (Table 2). In this comparison, Cohen's *d* was 0.091 (small effect).

Table 3 shows the multiple regression and Cohen's f^2 indices for the EG SSRS scores. Significant predictors were: education, MTLE-HS, and abnormal background EEG activity. The effect size can be considered medium for the combined model and small for the variables taken individually.

4. Discussion

4.1. SSRS and sociodemographic features

Although spirituality and religiosity differ, this study showed a high correlation between SSRS scores and the religiousness and religious practices of those in the EG. Their religiousness and religious practices are similar to those of the general Brazilian population according to a demographic census carried out in 2010 by the Brazilian Institute of Geography and Statistics.[19]

In the EG, lower education level was associated with greater spirituality. Cultural aspects, education level, and socioeconomic level influence how individuals live their spirituality.[20]

4.2. SSRS and epilepsy

The EG SSRS scores in the present study were high compared with those of other studies[15,16] but not different from those of the CG. It is possible that the relatively low education level of the study individuals (EG and CG) justified their high spirituality.

The present findings do not confirm a specific role of epilepsy for spirituality or of "epileptic hyperreligiosity."

No correlation was found between spirituality and clinical epilepsy characteristics, such as age at seizure onset, and seizure type and frequency. We found no studies in the literature that assessed these relationships or generally measured spirituality in individuals with epilepsy.[20]

Patients with MTLE-HS had higher SSRS scores than those with other epilepsies or those in the CG, but MTLE-HS had a small effect size.

The relationship between epilepsy, especially TLE, and hyperreligiosity was established in the 19th century. The temporal lobe would be responsible for the religious cognitive and emotional experiences, and religious fervor would be an interictal manifestation of TLE. However, studies suggest that hyperreligiosity and religious conversion may also occur in individuals with other types of epilepsy.[14,21,22]

The higher level of spirituality of patients with mesial temporal lobe sclerosis, confirming other studies,[14,22] deserves further discussion. For instance, the lack of association between seizure frequency and age at seizure onset suggests that seizures do not specifically influence spirituality, but damage to the temporolimbic structures may play an important role in "amplifying" spiritual experiences. This might confront the notion that the high level of spirituality found in the study patients encourages feelings of hope and acceptance of the condition imposed by the disease.

The present study also found greater spirituality among individuals with MTLE-HS than in those with other epilepsies by using a simple and straightforward instrument, the SSRS.

The spirituality of individuals with MTLE-HS and right or left hippocampal sclerosis did not differ significantly, but those with right hippocampal sclerosis had slightly higher scores and the effect size was significant and small.

Bear and Fedio[13] pointed out that the side of the temporal lobe epilepsy affected the expression of affect: the right could be associated with emotional tendencies in contrast to the ideational traits of the left.

On the other hand, other studies have refuted the finding of a relationship between psychopathological aspects and hemispheric laterality, or mesial topographic differentiation or otherwise in TLE.[14]

A later study found that the volume of the right hippocampus in MRI was associated with hyperreligiosity in patients with refractory and MTLE-HS epilepsies, and suggested a critical role of this structure for the development of religiosity.[5]

One limitation of this study is that the patients are surgery naive, which reduces the possibility of accurately characterizing the side of the focal seizure.

In this study, multiple regression showed that abnormal background EEG activity was another significant factor. This abnormality is usually associated with a dysfunction related to structural changes in the genesis of epilepsy and the action of antiepileptic drugs.[23,24]

There was no relationship between psychiatric co-morbidity and spirituality. These data are similar to those reported by Giovagnoli et al., and suggest that spirituality is an individual characteristic distinct from mood.[6]

In conclusion, the present findings do not confirm a specific role of epilepsy in spirituality or of "epileptic hyperreligiosity," but suggest that spirituality in people with epilepsy is influenced by

Table 3
Multiple regression and Cohen's f^2 indexes for the SSRS scale scores: predictor variables with significant effects for the 196 PWE.

Significant predictor	Adjusted R^2	Coefficient	Standardized coefficient	95% CI for coefficient	*p-value*	Cohen's f^2, combined and local
Constant	0.091	20.662		18.20 to 23.12	0.000	Combined – 0.105
Background EEG activity abnormality		2.154	0.190	0.62 to 3.68	0.006	0.040
MTLE-HS × other epilepsies		2.195	0.193	0.66 to 3.73	0.005	0.0414
Education level (years)		−0.203	−0.148	−0.39 to −0.02	0.033	0.024

MTLE-HS, mesial temporal lobe epilepsy with hippocampus sclerosis.

education level, and may also stem from epilepsy-related factors such as abnormal background EEG activity and the presence of MTLE-HS.

Conflict of interest

G.M.A.S. Tedrus, L.C. Fonseca and G.C. Höehr have no conflicts of interest in relation to this article.

References

1. Ellison CG, Levin JS. The religion-health connection: evidence, theory, and future directions. *Health Educ Behav* 1998;**25**:700–20.
2. Faria JB, Seidl EMF. Religiosidade e enfrentamento em contextos de saúde e doença: revisão da literatura. *Psicol Reflex Crit* 2005;**18**:381–9.
3. Koening HG. Research on religion, spirituality, and mental health: a review. *Can J Psychiatry* 2009;**54**:283–91.
4. Koening HG, McCullough M, Larson DB. *Handbook of religion and health: a century of research revised*. New York: Oxford University Press; 2001.
5. Wuefel J, Krishnamoorthy ES, Brown RJ, Lemieux L, Koepp M, vanElst LT, et al. Religiosity is associated with hippocampal but not amygdala volumes in patients with refractory epilepsy. *J Neurol Neurosurg Psychiatry* 2004;**75**:640–2.
6. Giovagnoli AR, Meneses RF, da Silva AM. The contribution of spirituality to quality of life in focal epilepsy. *Epilepsy Behav* 2006;**9**:133–9.
7. Devinsky O. Religious experiences and epilepsy. *Epilepsy Behav* 2003;**4**:76–7.
8. Landtblom AM. The sensed presence: an epileptic aura with religious overtones. *Epilepsy Behav* 2006;**9**:186–8.
9. Cohen MH. Regulation, religious experience, and epilepsy: a lens on complementary therapies. *Epilepsy Behav* 2003;**4**:602–6.
10. Saver JL, Rabin J. The neural substrates of religious experience. *J Neuropsychiatry Clin Neurosci* 1997;**9**:498–510.
11. Dewhurst K, Beard AW. Sudden religious conversions in temporal lobe epilepsy. *Epilepsy Behav* 2003;**4**:78–87.
12. Dolgoff-Kasper R, Ettinger AB, Golub AS, Perrine K, Harden C, Croll SD. Numinous-like auras and spirituality in persons with partial seizures. *Epilepsia* 2011;**52**:640–4.
13. Bear DM, Fedio P. Quantitative analysis of interictal behavior in temporal lobe epilepsy. *Arch Neurol* 1977;**34**:454–67.
14. Trimble M, Freeman A. An investigation of religiosity and the Gastaut-Geschwind syndrome in patient with temporal lobe epilepsy. *Epilepsy Behav* 2006;**9**:407–14.
15. Galanter M, Dermatis H, Bunt G, Willians C, Trujillo M, Steinke P. Assessment of spirituality and its relevance to addiction treatment. *J Subst Abuse Treat* 2007;**33**:257–64.
16. Gonçalves MAS, Pillon SC. Adaptação transcultural e avaliação da consistência interna da versão em português da Spirituality Self Rating Scale (SSRS). *Rev Psiq Clin* 2009;**36**:10–5.
17. Engel Jr J. A proposed diagnostic scheme for people with epileptic seizures and with epilepsy: report of the ILAE task force on classification and terminology. *Epilepsia* 2001;**42**:796–803.
18. Cohen J. A power primer. *Psychol Bull* 1992;**112**:155–9.
19. Instituto Brasileiro de Geografia e Estatística. *Censo Demográfico - 2010: Características Gerais da População: Resultados da Amostra*. 2012. http://www.ibge.gov.br/ibgeteen/datas/religiao/brasil.html (accessed 2012).
20. Sloan RP, Bagliella E, Powell T. Religion, spirituality, and medicine. *Lancet* 1999;**353**:664–7.
21. Tedrus GMAS, Fonseca LC. Epilepsia e espiritualidade/religiosidade. *Rev Cienc Med* 2010;**19**:81–9.
22. Devinsky O, Lai G. Spirituality and religion in epilepsy. *Epilepsy Behav* 2008;**12**:636–43.
23. Blume WT. Drug effects on EEG. *J Clin Neurophysiol* 2006;**23**:306–11.
24. Smith SJM. EEG in the diagnosis, classification, and management of patients with epilepsy. *Neurol Neurosurg Psychiatry* 2005;**76**:ii2–7.