



Sexual abuse and psychogenic nonepileptic seizures

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Abstract

Objective We investigated the frequency of reported sexual abuse in patients with psychogenic nonepileptic seizures (PNES) in a Middle-Eastern culture (Iran) and tried to characterize the association between a history of sexual abuse and the clinical characteristics of PNES in these patients.

Methods In this retrospective database study, patients with PNES, who were investigated at Shiraz Comprehensive Epilepsy Center at Shiraz University of Medical Sciences, from 2008 until 2018, were studied. Patients were categorized into two groups: (1) those with a history of sexual abuse and (2) those without such a history.

Results A total of 314 patients were studied. Twenty-six patients (8.3%) had a history of sexual abuse, while 288 patients (91.7%) denied having such an experience. Sex ratio (OR: 3.53; 95% CI: 1.14–10.89; $p = 0.02$) and a history of child abuse (OR: 4.85; 95% CI: 1.82–12.96; $p = 0.002$) were significantly associated with a history of sexual abuse.

Conclusion Some people with a history of sexual abuse are at risk of developing PNES later in their lives. While social, cultural, and even genetic predisposition may be interacting for such an association to come to play, there is no concrete direct evidence to clarify this link yet. This should be investigated in future international cross-cultural studies and also highlights the need for planning genetic studies in patients with PNES.

Keywords Psychogenic · PNES · Seizure · Sex · Abuse

Introduction

Psychogenic nonepileptic seizures (PNES) happen in a heterogeneous patient population, and no single mechanism or underlying factor has been recognized that is enough to explain PNES in all patients [1, 2]. Common associated risk factors for PNES include a history of sexual abuse, physical abuse, dysfunctional family, brain injury, and medical comorbidities [1–10]. The relationship between PNES and sexual abuse has been observed in many studies before [1]. But, the degree of interaction between a history of sexual abuse and PNES shows inconsistencies between different studies [1].

Psychogenic nonepileptic seizures (PNES) are common among patients attending epilepsy centers [1]. They consist of paroxysmal changes in responsiveness, movements, or behavior that seemingly look like epileptic seizures, but lack a neurobiological origin similar to epileptic seizures and are not associated with electrophysiological epileptic changes [1]. The aims of this study were to investigate the frequency of reported sexual abuse in patients with PNES in a Middle-Eastern culture (Iran) and to characterize the association between a history of sexual abuse and the clinical characteristics of PNES in these patients. We hypothesized that some demographic variables (e.g., sex) or risk factors (e.g., a dysfunctional family environment) may be associated with a history of sexual abuse in patients with PNES.

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Methods and materials

In the current retrospective database study, patients with PNES, who were investigated at Shiraz Comprehensive Epilepsy Center at Shiraz University of Medical Sciences, from 2008 until 2018, were studied. This is the only epilepsy care center in south Iran, and the only center equipped with

video-EEG monitoring units; therefore, all suspected patients in the region are referred to this center for making a definite diagnosis of their paroxysmal events (i.e., epileptic vs. non-epileptic seizures) by their treating physicians. Since this is a university center and a public hospital, the cost is much more affordable than private centers (which are for example available in the capital city, Tehran, in the north). However, since this is a tertiary care center, the possibility of selection bias always exists. We made the diagnosis after a careful clinical assessment and documented it by recording a seizure during video-EEG monitoring. Patients were excluded if their data were not available.

The epileptologist examined all the patients and if they consented to share their information in the database, it was used in this study. We have been collecting the data on PNES in our database since 2008; basically, we enter any patient to the database after we discussed the details and the purpose of this data collection with the patients (and their caregivers, if necessary) if they agreed and consented. We have kept all the data confidential. Patients were categorized into two groups: (1) those with a history of sexual abuse and (2) those without a history of sexual abuse. Extramarital sexual relationship is banned by law and religion in Iran (and all Moslem countries), and therefore, people might deny being physically or sexually abused due to family or legal concerns. In our experience, taking more history privately (while a nurse is present in case of women) might help overcome this problem, at least to some extent. Age, gender, age at seizure onset, seizure characteristics (semiology and frequency), factors potentially predisposing to PNES [a history of physical abuse (corporal punishment or any physical injury resulted from aggressive behavior towards the patient), child abuse (neglect, emotional or verbal abuse), academic failure (school dropout or repeated grades), head injury, and a family history of seizures], and video-EEG recording of all patients were recorded routinely. Demographic variables and pertinent clinical variables were summarized descriptively to characterize the study population. First, we performed univariate analyses using Pearson Chi-square, Mann-Whitney, Kolmogorov-Smirnov, and *t* test, as appropriate. Then, variables that were significant ($p < 0.05$) were assessed in a logistic regression analysis. Odds ratio (OR) and 95% confidence interval (CI) were calculated. *P* value less than 0.05 was considered as significant. We conducted this study with the approval by Shiraz University of Medical Sciences Review Board.

Results

During the study period, 325 patients were recorded in our database. Data on history of sexual abuse was available in 314 patients; these were included in the study. Twenty-six patients (8.3%) had a history of sexual abuse, while 288

patients (91.7%) denied having such an experience. The associations between a history of sexual abuse and clinical characteristics of PNES in univariate analyses appear in Table 1. Sex ratio, a positive family history of seizures, and a history of child abuse were significantly associated with a history of sexual abuse in univariate analyses. None of the clinical characteristics of seizures (semiology, frequency, etc.) had a significant association with a history of sexual abuse (Table 1). We then executed a logistic regression analysis, evaluating these three variables. Sex ratio (OR: 3.53; 95% CI: 1.14–10.89; $p = 0.02$) and a history of child abuse (OR: 4.85; 95% CI: 1.82–12.96; $p = 0.002$) remained significant within the model that was generated by regression analysis; 91.7% of the cases were correctly predicted by this model ($p = 0.0001$). A positive family history of seizures ($p = 0.1$) was not a significant risk factor in the model.

Discussion

In the current study, we noticed that only a minority of patients (8.3%) with PNES in Iran reported being sexually abused. It has previously been observed that childhood abuse (either physically or sexually) was a common occurrence among patients with PNES (32–88%), particularly in the Western studies [11–13]; this contradicts our observation from a Middle-Eastern country. This could be methodological. However, there could be real socio-biological dissimilarities between our series and the others'. These dissimilarities, if they exist, might be clinically important and call attention to the possibility that different psychopathological mechanisms may explain development of PNES in a Middle-Eastern Muslim culture compared with that in the Western cultures. Gene-environment interaction may contribute to the risks of psychiatric disorders [14]. Recent studies have shown that interactions between FKBP5 gene variants and early-life stress (e.g., sexual abuse) may increase the risk for stress-associated disorders [e.g., major depression and post-traumatic stress disorder (PTSD)] [14]. Role of genetic factors has even been implicated in psychiatric disorders relevant to PNES (e.g., conversion disorders) [15]. Therefore, genetic variability between countries may explain the observed difference. However, this observed difference should not be overemphasized and may simply have cultural or religious basis; as extramarital sexual relationship is banned by law and religion in Iran, patients might deny being physically or sexually abused due to family or legal concerns. This should be investigated in future international cross-cultural studies and also highlights the need for planning genetic studies in patients with PNES.

In this study, we also observed that female gender (OR: 3.53) was significantly associated with a history of sexual abuse in patients with PNES in Iran. Generally, women more often encounter sexual abuse compared with men [16]; this is

Table 1 Association between a history of sexual abuse and clinical characteristics of PNES in univariate analyses

Risk factor	Patients with a history of sexual abuse, 26	Patients without a history of sexual abuse, 288	<i>P</i> value
Sex ratio (F/M)	22:4	183:108	0.03
Age at onset (years)	20 ± 6	23 ± 10	0.2
Age at diagnosis (years)	25 ± 7	28 ± 10	0.09
Duration of PNES (years)	4.4 ± 5.6	5.3 ± 7.4	0.5
Seizure frequency (per month)	32 ± 61	35 ± 69	0.8
Aura	19	182	0.3
Loss of responsiveness	20	246	0.2
Urine incontinence	6	29	0.09
Ictal injury	10	83	0.3
Generalized motor seizures	20	252	0.2
Akinetic seizures	5	28	0.1
Nocturnal seizures	9	104	0.8
Taking antiepileptic drugs	17	184	0.8
History of significant head trauma	1	13	1
Family history of seizures	13	86	0.04
History of physical abuse	4	36	0.5
History of child abuse	8	24	0.002
History of dysfunctional family	12	98	0.2
History of academic failure	4	21	0.1
Medical comorbidities	8	73	0.6
Comorbid epilepsy	4	57	0.7

Numbers in the cells indicate the number of patients (not the percents)

in particular the case among patients with PNES [17, 18]. Previous self-report studies have shown that 20% of women and 5–10% of men recall a childhood sexual assault or sexual abuse incident (<https://www.victimsofcrime.org/media/reporting-on-child-sexual-abuse/child-sexual-abuse-statistics/10.29.2015>). In a literature review, the authors concentrated on the neurological interrelations in brain structures among people with a history of childhood sexual abuse [19]. They came to the conclusion that a history of childhood sexual abuse had association with irregularities in the cortical and subcortical regions of the brain and these irregularities may lead to various cognitive, behavioral, and psychological health outcomes later in life [19]. In one study [20], the authors discovered that childhood abuse was associated with sex-dependent changes in the functional organization of a neural network mediating inhibitory control of behavior. In summary, sexual abuse happens more frequently for women, it may change the connectivity and even the structure of the brain, and it causes sex-dependent changes in the brain [21]; these could explain why a history of sexual abuse had such a strong association with female gender in our study.

In the current study, we also observed that a history of child abuse (OR: 4.85) was significantly associated with a history of sexual abuse. Basically, a history of child abuse may imply that the family dynamics were not appropriate and as a result

there had been a poor family support for the children. This should be explored in future studies.

In conclusion, some people with a history of sexual abuse are at risk of developing PNES later in their lives. While social, cultural, and even genetic predisposition may be interacting for such an association to come to play, there is no concrete direct evidence to clarify this link yet. This should be investigated in future international cross-cultural studies and also highlights the need for planning genetic studies in patients with PNES [22, 23].

This study has some limitations including its retrospective design and lack of some important data such as psychiatric comorbidities of the patients with PNES.

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Authors' contributions Both authors were involved in the conception, design, review process, and preparing the manuscript. Both have approved this final version and agree to be accountable for all aspects of the work.

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Compliance with ethical standards

Conflict of interest Ali A. Asadi-Pooya, M.D.: Honoraria from Cobel Daruo; Royalty: Oxford University Press (Book publication). Zahra Bahrami, M.D.: none.

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