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Obsessive–compulsive symptoms in patients with temporal lobe epilepsy

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Abstract

The goals of this work were to: (1) determine the prevalence of clinically significant obsessive–compulsive (OC) symptoms in patients with temporal lobe epilepsy (TLE), (2) characterize the differences in self-reported OC symptoms in patients with TLE and a normative control group, and (3) compare the severity of OC symptoms in right and left hemisphere TLE patients. Patients with TLE ($n = 30$) were administered the Obsessive–Compulsive Inventory (OCI). As a group, patients with TLE had a higher prevalence of OC symptoms than the nonpatient normative sample. In addition, TLE patients exhibited elevated scores on all but 3 of the 16 OCI scales and subscales. There were no reliable differences in OC symptoms in patients with right versus left hemisphere seizure foci, although the right hemisphere patients tended to score higher on both scales of the OCI.

Keywords: Temporal lobe epilepsy; Obsessive–compulsive symptoms; Obsessive–compulsive disorder

1. Introduction

Several small studies have reported an association between temporal lobe epilepsy (TLE) and obsessive–compulsive disorder (OCD) [1–4]. The reports linking OCD and TLE come from case studies and clinical observations, however, and not from group studies. One author [5], for example, noted a phenomenological similarity between OCD and the forced thinking that occurs in ~2% of patients with TLE [6]. To date, no study has examined this possibility on a larger scale, so it is unclear whether these isolated cases of OCD and TLE comorbidity occur by chance or if there actually is a robust association between OCD and TLE. The present study addresses this gap in the literature by assessing obsessive–compulsive (OC) symptoms in a larger sample of TLE patients.

The primary goal of the current study was to perform an in-depth analysis of the possible association between OCD and TLE. We also examined the specific profile of symptoms that occurred in our sample of patients with TLE. Research in this area could shed light on the possibility that OCD and TLE share some common neural mechanisms. Further, the findings could be used for diagnostic and treatment purposes. Treatment of OC symptoms in TLE patients could significantly improve patients' quality of life [7,8].

Early studies suggested a causal relationship between epilepsy and the development of certain specific personality characteristics, including obsessional traits. One review [9] concluded that there was an increased incidence of a general personality disorder in epilepsy, and that different types of epilepsy may be associated with different forms of psychopathology as well. Waxman and Geschwind [10] suggested the existence of a specific TLE behavioral syndrome, including hyposexuality, religiosity, obsessional traits, and hypergraphia. Bear and Fedio [11] identified additional psychological features

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that, according to their study, reliably identified patients with TLE compared with patients with other neurological illnesses.

Several recent case studies detailed the co-occurrence of epilepsy and OCD. One OCD patient with intractable right mesiotemporal epilepsy had remission of her OCD following a right anterior temporal lobectomy [12]. A second study presented two cases of adolescent male patients, one with TLE and the other with primary generalized epilepsy, with interictal OC symptoms that began shortly after the onset of epilepsy [2]. A young girl with TLE developed aphasia, coprolalia, and compulsive-like behaviors [1]. Her seizures and behavioral symptoms were relieved following surgical resection of a left anterior temporal lobe ganglioglioma. The co-occurrence of OCD and left-sided TLE has also been described [3]. Notably, in each of these cases, the epilepsy patients did not evidence OC symptoms prior to the onset of seizures.

These studies suggest a possible association between TLE and the expression of OC symptoms. If this is true, one would predict that TLE patients should have a higher prevalence rate of OCD than the 2.5% rate observed in the general population [13]. This investigation tested this prediction in the following manner. First, OC symptoms in patients with TLE were assessed based on their responses to a standardized measure of OC symptoms (Obsessive–Compulsive Inventory) [14]. Second, the participants' scores were compared with those of a normative control sample [14] to determine whether TLE patients' scores were significantly higher than the normative sample with respect to specific symptoms of OCD. A number of studies suggest that right hemispheric abnormalities occur in OCD patients. Right hemisphere structural abnormalities were found in some OCD patients [15], and both magnetic resonance imaging and EEG studies have described marked differences in overall right hemisphere activity relative to left hemisphere activity in OCD patients [16,17]. Post hoc analyses were also conducted to determine whether OC symptom frequency or distress differed with respect to side of seizure onset (i.e., right vs left hemisphere).

2. Methods

2.1. Participants

The sample comprised 30 adults with TLE, recruited through the New York University Comprehensive Epilepsy Center. The Epilepsy Center serves a large patient population that is diverse in ethnicity, seizure type, seizure focus, and duration of seizures. Patients treated at the Epilepsy Center often present with more severe and intractable epilepsy than is representative of the larger population of individuals with epilepsy.

Selection criteria for epilepsy patients included: (1) chronological age between 18 and 60; (2) reading level greater than 69, as measured by Wide Range Achievement Test — 3rd Edition Reading subtest; and (3) complex partial seizures of temporal lobe origin. The patients in the sample were not preselected or excluded for any cognitive deficits or psychiatric history. In addition, no effort was made to specifically recruit or exclude participants based on demographic characteristics such as gender, ethnicity, age, and education.

All participants included in the analyses had a diagnosis of TLE, which was confirmed through inpatient assessment using video electroencephalogram (EEG) recording of ictal events and interictal activity. The evaluation period varied in length, depending on seizure frequency and patient availability. The attending neurologists (who were blind to the purposes of the study) then reviewed the tapes and generated a report based on the EEG findings. EEG data were coded based on the summary of findings at the end of the report.

Table 1 summarizes information regarding the epilepsy patients. The nonpatient normative sample comprised of 194 adults, 67% female, mean age 20.3 (SD 5.7). The normative sample had a mean of 13.6 years of education (SD 0.9).

2.2. Procedures

The frequency and severity of OC symptoms were assessed through administration of the Obsessive–Compulsive Inventory [14]. This particular measure was chosen due to its self-report format and ease of administration. The OCI alleviates some of the limitations of

Table 1
Sample characteristics

	n	Percent	*M* (SD)
Gender			
Male	13	43.3	—
Female	17	56.7	—
Ethnicity			
Caucasian	27	90.0	—
African-American	2	6.7	—
Asian	1	3.3	—
Age (years)	—	—	37.3 (11.5)
Education (in years)	—	—	15.0 (2.4)
Duration of seizures (years)	—	—	14.9 (13.4)
Handedness			
Right	26	86.7	—
Left	3	10.0	—
Mixed	1	3.3	—
Video EEG side			
Nonlocalized	1	3.3	—
Right hemisphere	15	50.0	—
Left hemisphere	13	43.3	—
Bilateral	1	3.3	—

measures like the Yale–Brown Obsessive Compulsive Scale (Y-BOCS) [18], which is time consuming and costly because it has to be administered by trained interviewers. The OCI is intended to be applicable to the general population in assessing obsessional thoughts and behaviors. It is a self-report inventory that consists of 42 items; each item is separately rated on a 5-point (0–4) Likert scale for symptom frequency and associated distress. The OCI yields two full scales (symptom frequency and symptom distress) and seven subscales (Washing, Checking, Doubting, Ordering, Obsessing, Hoarding, and Mental Neutralizing). The OCI full scales and subscales have satisfactory internal consistencies (α coefficients range from 0.70 to 0.90s) and test–retest reliabilities (ranging from 0.77 to 0.97 for a 2-week interval) [14].

For some of the analyses, participants were divided into two groups based on their scores on the OCI. A score of 42 on the Frequency and Distress scales is considered to be a clinically relevant cutoff for mild OCD [14]. In addition, on any of the seven subscales, a mean score above 2.5 is considered notable. Accordingly, participants who scored 42 or above on both the Frequency and Distress scales of the OCI were placed in the obsessive–compulsive group ($n = 8$), while the rest were placed in the non-OC group ($n = 22$).

3. Results

To determine if any statistically significant differences existed between participants in the obsessive–compulsive (i.e., OCI $\geqslant 42$) and non-obsessive–compulsive (i.e., OCI < 42) groups, two-tailed independent t tests and χ^2 analyses were conducted comparing the two groups on a number of demographic and seizure variables ($\alpha = 0.05$). Results of the t tests indicated that the two groups did not differ with respect to their mean age, education, or duration of seizures. The χ^2 tests revealed that group classification (i.e., OC or non-OC) was independent of variables such as gender, handedness, and ethnicity.

3.1. Primary analyses

Means and standard deviations on the Frequency and Distress scales and subscales of the OCI for the entire TLE sample ($n = 30$) are listed in Table 2. Means and standard deviations on the OCI for the subsample of TLE patients meeting criteria for OCD ($n = 8$) are listed in Table 3. TLE patients' mean scores on the OCI were compared with those of the normative sample [14] using independent sample t tests (one-tailed). Statistically significant differences ($P < 0.05$) were found between the two samples on the Frequency and Distress total scales, as well as 11 of the 14 subscales. These subscales included Washing, Neutralizing, Checking, Doubting, and Ordering (both Frequency and Distress), as well as Hoarding (Distress). Fig. 1 shows the TLE patients' elevations on each of the subscales relative to the mean scores of the normative sample; z scores are used to give an indication of the magnitude of these elevations in terms of the standard deviation of the scores in the normative sample [14].

Scores on the OCI were examined to determine the number of participants in the present sample whose scores were in the clinical range for each scale.

Table 2
Temporal lobe epilepsy patients' ($n = 30$) mean scores on the OCI

OCI Scale	*M*	SD
Frequency scale (total)	41.3	27.75
Washing subscale	0.86	0.94
Checking subscale	1.04	0.77
Doubting subscale	1.44	1.20
Hoarding subscale	1.57	1.25
Neutralizing subscale	0.73	0.55
Obsessing subscale	0.69	0.65
Ordering subscale	1.25	1.03
Distress scale (total)	28.8	23.2
Washing subscale	0.53	0.75
Checking subscale	0.67	0.56
Doubting subscale	1.28	1.24
Hoarding subscale	1.07	1.13
Neutralizing subscale	0.51	0.47
Obsessing subscale	0.65	0.69
Ordering subscale	0.67	0.67

Note. Total OCI scale score ranges from 0 to 168. OCI subscales comprise differing numbers of items, all rated for frequency and distress from 0 to 4. Mean item scores for each subscale are shown.

Table 3
Temporal lobe epilepsy patients meeting criteria for OCD ($n = 8$) mean scores on the OCI

OCI scale	*M*	SD
Frequency scale (total)	69.63	11.06
Washing subscale	1.67	1.10
Checking subscale	1.67	0.48
Doubting subscale	2.63	0.70
Hoarding subscale	2.75	0.79
Neutralizing subscale	1.08	0.48
Obsessing subscale	1.25	0.68
Ordering subscale	1.73	0.96
Distress scale (total)	60.88	7.40
Washing subscale	1.36	1.02
Checking subscale	1.32	0.40
Doubting subscale	2.75	0.90
Hoarding subscale	2.17	1.04
Neutralizing subscale	1.00	0.48
Obsessing subscale	1.38	0.78
Ordering subscale	1.35	0.85

Note. Total OCI scale score ranges from 0 to 168. OCI subscales comprise differing numbers of items, all rated for frequency and distress from 0 to 4. Mean item scores for each subscale are shown.

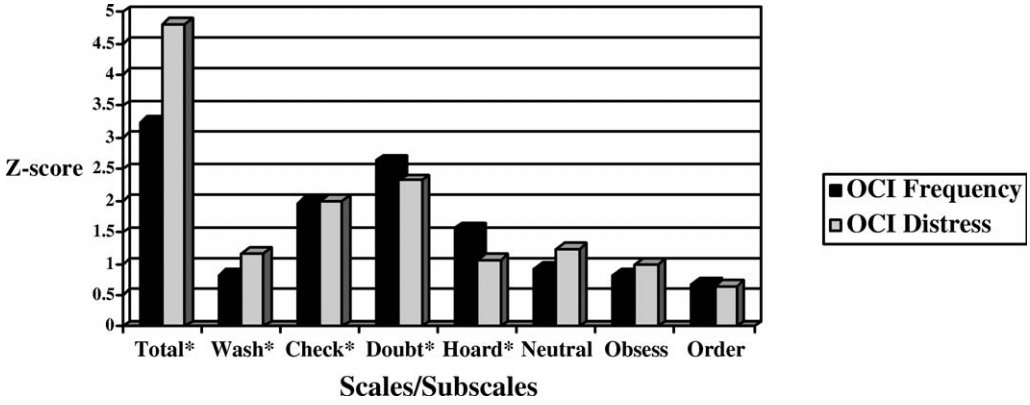

Fig. 1. Temporal lobe epilepsy patients' OCI scale/subscale converted Z scores. Z scores compare TLE patients' mean scale/subscale scores with normative sample data [15]. * Significant difference ($P < 0.05$) between TLE patients' and normative sample mean scores.

Individual scores above 42 (for both the Frequency and Distress scales) and individual mean scores above 2.5 (calculated for each subscale) were counted as being in the clinical range. In our TLE group, 22% of the present sample scored in the clinical range on the Frequency scale and Distress scales (Table 4). Individual subscales showing the most frequent elevations among epilepsy patients included Doubting, Hoarding, and Ordering.

3.2. Right hemisphere versus left hemisphere differences

Patients diagnosed with OCD tend to exhibit impairments in neuropsychological tests involving nonverbal memory and visuospatial reasoning (see [16] for a review), and this has led some investigators to conclude that the brain dysfunctions underlying OCD may be lateralized to right hemisphere structures [16,17]. Although there is some neuroimaging evidence to support this view [19–21], other studies indicate that a variety of cortical and subcortical structures are implicated in OCD—some lateralized to the right hemisphere, others to the left, and still others showing bilateral involvement [e.g., 22,23]. Thus, the degree to which right hemisphere dysfunction predominates in OCD is unclear, but given the neuropsychological evidence implicating right hemisphere structures, the possibility remains that there may be significant differences in OC symptoms between patients with right- and left-sided seizures. To evaluate this possibility, independent sample t tests comparing the two groups on the Frequency and Distress scale scores of the OCI were conducted. Although the mean scores were not significantly different for either Frequency ($t(26) = 0.894, P = 0.380$) or Distress ($t(26) = 1.44, P = 0.165$), patients with right-sided seizures scored an average of 10 points higher on both scales (Frequency: $M = 44.9$, SD = 32.2; Distress: $M = 33.5$, SD = 27.1) compared with patients with left-sided seizures (Frequency: $M = 35.5$, SD = 27.1; Distress: $M = 21.6$, SD = 16.1). In addition, six of the eight patients with OCI scores that indicated mild OCD had right-sided seizures. No differences were observed between right-sided and left-sided seizure patients with respect to specific subscale symptoms on the OCI.

Table 4
Participants in clinical range on OCI scales and subscales

	n	Percent
Frequency scale (⩾42)		
Total score	14	46.7
Frequency subscales (mean ⩾2.5)		
Washing	4	13.3
Checking	1	3.3
Doubting	8	26.7
Hoarding	6	20.0
Neutralizing	0	0.0
Obsessing	0	0.0
Ordering	6	20.0
Distress scale (⩾42)		
Total score	8	21.7
Distress subscales (mean ⩾2.5)		
Washing	1	3.3
Checking	0	0.0
Doubting	8	26.7
Hoarding	4	13.3
Neutralizing	0	0.0
Obsessing	1	3.3
Ordering	1	3.3

4. Discussion

4.1. Prevalence of obsessive–compulsive symptoms in patients with temporal lobe epilepsy

The present study investigated the prevalence of OC symptoms in a larger sample of TLE patients than had been studied in the past. We found that, as a group, TLE patients reported symptoms of OCD at a higher prevalence rate than the general population. Twenty-two

percent of the patients scored in the clinical range on the OCI (i.e., they had scores greater than or equal to 42 on both the Frequency and Distress scales). This is considerably higher than the 2.5% prevalence rate observed in the general population. The present sample's scores were most elevated on the Doubting, Hoarding, and Ordering subscales. In addition, the sample means on both the Frequency and Distress scales were elevated relative to those of the normative sample. Significant between-group differences were observed on the Washing, Checking, Doubting, Neutralizing, and Ordering subscales (both Frequency and Distress), as well as Hoarding (Distress) subscales.

These results help to confirm the association between obsessive–compulsive symptoms and epilepsy that was suggested in previous case studies [1–4]. Further, our results identify important information regarding specific symptoms of OCD in patients with TLE. Specifically, TLE patients' symptoms were oriented predominantly around checking, neutralizing, doubting, ordering, hoarding, and washing, whereas symptoms of obsessing were not frequently endorsed by TLE patients. This suggests that TLE patients may be more likely to experience compulsive symptoms (e.g., checking, washing, hoarding) without the obsessional thoughts that usually occur with compulsions in idiopathic OCD. This pattern was evident in both the Frequency and Distress scales. The neurobiological mechanisms and neuroanatomical structures responsible for obsessional thoughts may differ, at least partly, from those associated with compulsions. This might suggest that those areas of the brain responsible for compulsions are particularly vulnerable in patients with TLE. Further investigations (e.g., functional neuroimaging) are needed to examine this possibility in more detail.

Another possible explanation is that the elevations observed on certain subscales of the OCI (e.g., Doubting, Checking, Hoarding) are manifestations of specific cognitive deficits often observed in patients with TLE and/or OCD. For example, reported symptoms of checking and doubting could be related to an underlying memory defect. Similarly, hoarding symptoms could be the result of organizational difficulties due to frontal lobe dysfunction. The relation between OC symptoms and cognitive functioning should be considered for future study.

4.2. Neurobiological implications

Investigators have postulated various explanations for the apparent co-occurrence of epilepsy and OC symptoms. Some theorize a kindling effect, whereby localized seizures lead to progressive synaptic and other changes, predominantly in limbic areas, that lead to the emergence of OC behavior [3]. However, no evidence clearly supports this speculation. An alternative to kindling-type explanations is the possibility that OCD and TLE are linked because they share some common neural mechanisms. Although there is no single locus of cortical or neuronal degeneration in OCD, research has identified frontal, cingulate, and basal ganglia abnormalities in the pathophysiology of OCD (e.g., [24,25]; see also [26]). Limbic areas are involved in both TLE and OCD [12,20,22]. It was beyond the scope of this investigation to distinguish between the kindling hypothesis and the notion of common neural mechanisms as they might contribute to the presence of OC symptoms in TLE patients. However, with respect to the neurobiology of OC symptoms in TLE patients, the present study did consider the issue of the hemisphere of seizure focus as it relates to OC symptoms. We found that patients with right-sided seizures scored an average of 10 points higher on both scales of the OCI than those with left-sided seizures. This difference was not statistically significant, but this should be considered in light of the relatively small number of participants in each group and the correspondingly low power of the statistical test. The possibility remains open, then, that right hemispheric involvement in TLE patients may increase their likelihood of experiencing OC symptoms.

5. Conclusions

In this study, we set out to compare our results with those of an established normative sample. Now that this investigation has provided a first description of OC symptoms in TLE patients, future investigations should explore these issues in comparison with nonclinical control participants who are more precisely matched to the clinical group in terms of demographic variables and testing conditions. It would also be useful to include other groups for comparison such as a nonepilepsy neurological group and a psychiatric OCD group. Additionally, because the patient population sampled in this study likely presented with more severe and intractable cases of epilepsy than are representative of the larger population of individuals with epilepsy, it would be useful to conduct a multicenter investigation to obtain a clinical sample that is more representative of the general population of TLE patients. Such research will be important for characterizing the distribution of OC symptoms across a wider range of TLE severity. If there is indeed an association between TLE and OC symptoms, one might expect this association to be most apparent in patients with more severe epilepsy.

Overall, the results of the study indicated that, as a group, patients with temporal lobe epilepsy displayed symptoms of OCD at a higher prevalence rate than normative samples. The results also indicate particular OC symptoms that may be more commonly associated with TLE. Specifically, the patients' symptoms were

more predominantly oriented around checking, neutralizing, doubting, ordering, hoarding, and washing, while symptoms of obsessing were not frequently endorsed by TLE patients. In addition, hemispheric focus may be a predictor of OC symptoms, though more research is needed to confirm this conclusion.

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