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Rumination and Cognitive Distortion Levels in Temporal Lobe Epilepsy, Psychogenic Non-epileptic Seizures and Healthy Control Groups

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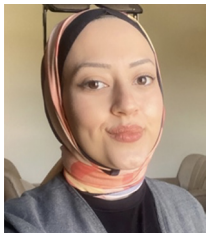

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Abstract

Objective: It is known that various psychopathologies, as well as the current neurological conditions of patients with epilepsy and psychogenic non-epileptic seizures (PNES), affect the disease process. In this study, we aimed to investigate the relationship between cognitive distortions, ruminative thinking, anxiety, and depression in patients with temporal lobe epilepsy (TLE) and compare them with PNES and healthy control groups.

Methods: Between September 2021 and April 2022, 300 volunteers were randomly sampled among individuals who applied to the Department of Neurology, Erciyes University Gevher Nesibe Faculty of Medicine and were included in the research process. The 300 volunteers in the research sample were assigned to 100 volunteers for each group. The self-assessment scales used in the research were personal information form, Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Ruminative Thought Style Questionnaire (RTSQ), and Cognitive Distortion Inventory (CDI).

Results: BDI, BAI, RTSQ, and CDI values were found to be lowest in the control group and highest in the TLE patient group. BDI scores were found to be higher in the TLE group than in both PNES and the control groups ($p<0.001$), while BAI, RTSQ, and CDI scores were similar in the TLE and PNES groups ($p>0.05$), but higher than in the control group.

Conclusion: Our study found that the scores of all scale types in the TLE group were higher than in the PNES patients. We think that this situation is due to neural dysfunctions related to epilepsy, the recurrent seizures experienced by TLE patients, and the neurological, psychological, and social devastation caused by seizure anticipation.

Keywords: Anxiety, cognitive distortions, depression, psychogenic non-epileptic seizures, rumination, temporal lobe epilepsy

INTRODUCTION

Among all types of epilepsy, temporal lobe epilepsy (TLE) is one of the types most associated with psychiatric comorbidities.[1] Psychiatric comorbidity in TLE has been associated with decreased quality of life, impaired cognitive functions, poor seizure control, and hippocampal sclerosis (HS).[2] Psychogenic non-epileptic seizures (PNES) are thought to occur as a dissociative response to various internal or external stimuli.[3] PNES has a complex relationship with emotional disorders. Rates of anxiety disorders and depression are higher in PNES patients than in the general population and in patients with epilepsy.[4] Catastrophic thoughts and rumination are higher in these patients than in patients with epilepsy.[5]

Ruminative thinking style is characterized by the individual constantly thinking about his or her negative experiences. Ordinary individuals can also have ruminative thoughts, but when these thoughts become so severe that they disrupt daily life, they become a pathological condition.[6] One of the main characteristics of obsessive-compulsive disorder (OCD) is that ruminative thinking reaches pathological dimensions. However, over the years, rumination has been associated with many disorders other than OCD, such as depression, anxiety, post-traumatic stress disorder, and eating disorders.[7] The risk of OCD is high in TLE. Obsessive thoughts accompany 10-22% of TLE cases. The structural brain changes that are most common in TLE are discussed among the causes of this condition.[8]

Cognitive distortion is the use of faulty and dysfunctional thought patterns in information processing. According to Beck, cognitive distortions effectively create and maintain mental disorders. The thought patterns here are negative, non-abstract, and prejudiced. Beck proposed that depression results from an individual's cognitive distortion processes. Today, cognitive distortion theory has been linked to the development of not only depression but also many other psychiatric disorders. Studies on this subject relating to epilepsy patients are insufficient in the literature.[9,10]

The aim of this study was to examine the relationship between cognitive distortions, rumination, anxiety and depression in patients with TLE and PNES and to compare the obtained data between the patient groups and the healthy control groups. Here, our first hypothesis is that all psychiatric scales will be higher in the PNES group than in both the TLE and control groups. Our second hypothesis is that rumination, cognitive distortions, depression and anxiety will be related to each other.

METHODS

Participants

Our study included 300 individuals who applied to the Erciyes University Faculty of Medicine Gevher Nesibe Hospital, Clinic of Neurology, Division of Epilepsy between November 2021 and March 2022. Of the patients included in our study, 100 were diagnosed with TLE according to the International League Against Epilepsy (ILAE) diagnostic criteria, and 100 were PNES patients that we followed and whose PNES attacks were proven by video electroencephalography (EEG) monitoring. Attacks of patients with PNES were recorded using a 48-hour video EEG examination.

The number of patients to be included in the study was determined by G-Power analysis. Accordingly, under the condition that the G*Power analysis results are: alpha=0.05, power=0.90, and the effect size is 0.395, at least 87 volunteers for each group should participate in the study.

All TLE patients underwent video EEG examination, and their hippocampal magnetic resonance imaging (MRI) was examined. Although interictal EEG abnormalities were present in all patients included in the study, ictal seizures were not recorded in any patient. Sixty-one patients with TLE displayed HS on hippocampal MRI. The inclusion criteria for participants with TLE were as follows: 1) diagnosed with TLE according to ILAE criteria, 2) normal MRI findings or unilateral/bilateral HS evidence consistent with EEG findings, 3) no evidence of a secondary extrahippocampal lesion that may contribute to seizures, 4) followed for at least 1 year, 5) between 18 and 65 years old, 6) possessing literacy skills. The exclusion criteria were as follows: 1) having mental retardation, 2) having a psychotic disorder, having dementia, having visual impairment, 3) alcohol or substance abuse.

MAIN POINTS

- Depression was higher in patients with temporal lobe epilepsy (TLE), compared to the psychogenic non-epileptic seizure (PNES) patient group and the control group.
- Anxiety, ruminative thinking, and cognitive distortions were similar in the TLE and PNES groups, but were significantly higher in these groups than in healthy individuals.
- There was a significant positive relationship between cognitive distortions, depression, anxiety, and rumination across all three groups.

The PNES group was selected from literate patients aged 18-65 years who had PNES, referred to as one of the sub-dimensions of conversion disorders according to DSM-5, who did not have an epileptic seizure, and whose PNES attack was recorded in a 48-hour video EEG examination.

The study included 100 healthy controls matched for age and gender. The control group consisted of healthy volunteers between the ages of 18-65, who were without any neurological or psychiatric diagnosis, not using neurological or psychiatric medication, and literate.

Scales Used in the Study

Basic Demographic Data Form

This form was created to obtain information about the patient's age, gender, region of residence, education status, employment status, income status, marital status, family history, and concomitant disease history and consists of 14 questions in total.

Beck Depression Inventory

The Beck Depression Inventory (BDI) is a 4-point Likert-type self-report scale developed by Beck to measure the severity of depression. The answers given in the scale, which consists of 21 questions in total, are evaluated in the range of 0-3; and a total score range of 0-63 is reached. The score range of 0-9 is grouped as no depression; 10-16 is mild depression; 17-29 is moderate depression; 30-63 is severe depression.[11] Validity and reliability studies regarding the use of the scale in a Turkish sample were conducted by Hisli.[12] As a result of Hisli's[12] studies, the split-half test reliability coefficient of the BDI was 0.74 and the validity coefficient ranged between 0.47 and 0.63.

Beck Anxiety Inventory

The BAI, developed by Beck et al.[13] is designed to determine anxiety levels and consists of 21 questions requiring a 7-point Likert-type assessment. Each item in the scale is evaluated in the range of 0-3 to obtain a total score. The total score is expected to be between 0 and 63 points. The individual's anxiety level is interpreted according to the total score. The range of 0-7 points indicates minimal anxiety, 8-15 points indicates mild anxiety, 16-25 points indicates moderate anxiety, and 26-63 points indicates severe anxiety. Validity and reliability studies on the use of the scale in a Turkish sample were conducted by Ulusoy et al.[14] The alpha value indicating the internal consistency of the scale was reported as 0.93.

Ruminative Thought Style Scale

Ruminative Thought Style Questionnaire (RTSQ), developed by Brinker and Dozois[15] to determine individuals' uncontrolled, repetitive, and harmful thinking tendencies, is a 7-point Likert-type self-report scale consisting of 20 items. The total score obtained by the individual's self-assessment is expected to be between 20 to 140 points. The individual's ruminative thinking tendency can be interpreted according to the total score obtained.[16] Validity and

reliability studies regarding the use of the scale in a Turkish sample were conducted by Karatepe.[16] The Cronbach alpha internal consistency coefficient of the scale was reported as r=0.907, and the sample adequacy in terms of data validity was reported as 0.881.

Cognitive Distortions Scale

The Cognitive Distortions Scale (CDS) is a self-report scale consisting of 10 questions and 10 sub-dimensions developed by Covin et al.[17] to determine the types and frequencies of dysfunctional cognitive interpretations. The intensity of cognitive distortion can be interpreted by taking the average of the two sub-dimensions determined for each type of cognitive distortion in the scale.[17] Validity and reliability studies regarding the use of the scale in a Turkish sample were conducted by Ardaniç.[18] Ardaniç[18] reported the Cronbach's alpha internal consistency coefficient of the scale in a Turkish sample, to be 0.88 in his study.

Ethical Approval

Ethical approval was obtained from Erciyes University Clinical Research Ethics Committee for this study (approval no: 2021/688, date: 20.10.2021). All volunteers who agreed to participate in the study completed an informed consent form.

Statistical Analysis

One-way analysis of variance includes the following data assumptions: i) data normality and ii) variance homogeneity. Therefore, histograms, qq plots and Shapiro-Wilk tests were used to assess data normality, while Levene's test was used to test variance homogeneity. In comparisons between matched groups, independent two-sample t-tests were applied for quantitative variables. Tukey and Tamhane tests were used for multiple comparisons. The relationship between quantitative variables was assessed by Pearson correlation analysis. Values between 0.80 and 1.00 represent very high correlation, values between 0.60 and 0.80 represent high correlation, values between 0.40 and 0.60 represent moderate correlation, values between 0.20 and 0.40 represent low correlation, and values between 0.00 and 0.20 represent negligible correlation. All analyses were performed using TURCOSA (Turcosa Analytics Ltd. Şti., Turkey, www.turcosa.com.tr) and R 4.2.0 (www.r-project.org) software. A p-value below 5% was considered statistically significant.

RESULTS

The mean ages in the patient and control groups were similar between groups and were 34.2±13.2 years in the TLE group, 37.1±10.4 years in the PNES group, and 36.3±10.2 years in the control group. Baseline demographic characteristics of the participants are shown in Table 1.

Negative self-attitude, somatic, cognitive, conceptual subscales, and BDI total score were higher in TLE patients compared to the control group and PNES patient group. Subjective anxiety, somatic symptom subscales, BAI total score, RTSQ total score and CDS subscales were higher in TLE and PNES patients compared to the control group (Table 2).

There was a moderate positive correlation between depression, anxiety, and ruminative thinking, a low positive correlation between depression and selected cognitive distortions, (mind reading, emotional reasoning, labeling, mental filtering, minimizing or excluding the positive), and a weak positive correlation between depression and overgeneralizing cognitive distortions. A moderate correlation was found between anxiety and ruminative thinking, a low positive correlation between anxiety and selected cognitive distortions (emotional reasoning, labeling, mental filtering, overgeneralization, and should statements). A moderate positive correlation was found between ruminative thinking and selected cognitive distortions (catastrophizing, emotional reasoning, labeling, and mental filtering), and a low positive correlation between ruminative thinking and selected cognitive distortions (mind reading, all-or-nothing thinking, overgeneralization, personalization, should statements, minimizing or excluding the positive).

In the PNES patient group, a high positive correlation was found between depression and anxiety, and a moderate positive correlation was found between ruminative thinking and selected cognitive distortions (catastrophizing, labeling, and should statements). A low positive correlation was found between depression and selected cognitive distortions (mind reading, all-or-nothing thinking, emotional reasoning, mental filtering, overgeneralization, personalization, and minimizing or excluding the positive). A moderate positive correlation was found between anxiety and ruminative thinking and selected cognitive distortions (catastrophizing, labeling), and a low positive correlation was found between anxiety and mind reading, all-or-nothing thinking, emotional reasoning, mental filtering, overgeneralization, personalization, should statements, and minimizing or excluding

Table 1. Basic demographic characteristics of participants

Variables	n	%
Age		
18-25	84	28.0
26-33	53	17.7
34-41	72	24.0
42-49	51	17.0
50+	40	13.3
Gender		
Woman	150	50.0
Male	150	50.0
Education level		
Primary school	72	24.0
Middle school	59	19.7
High school	103	34.3
University	66	22.0
Working status		
It works	138	46.0
Doesn't work	143	47.7
Retired	19	6.3
Marital status		
Married	185	61.7
Single	115	38.3

the positive. A moderate statistically significant positive correlation was found between ruminant thinking and mind reading, emotional reasoning, and labeling.

A moderate positive correlation was found among depression, anxiety, ruminative thinking, and catastrophizing. A low level positive correlation was found between depression, and the cognitive distortions of mind reading, all-or-nothing thinking, mental filtering, overgeneralization, personalization, and minimizing or excluding the positive. A low-level low positive correlation was found between anxiety and the cognitive distortions of mind reading, catastrophizing, and personalization. A moderate level, significant, positive correlation was found between ruminative thinking and the cognitive distortions of mind reading, labeling, mental filtering, overgeneralization, should statements, and minimizing or excluding the positive. A weak positive correlation was found between ruminative thinking and other cognitive distortions. Correlation results and r values are shown in Table 3.

When evaluated according to gender, BDI total score and all subscale scores ($p<0.001$), BAI total score and all subscale scores ($p<0.001$), RTSQ score ($p=0.005$), emotional reasoning ($p=0.001$), labeling ($p=0.030$), and mental filtering ($p=0.030$) scores were significantly higher in women than in men. When evaluated according to educational status, differences were found in the scales. When examining employment status, it was found that BDI and subscales ($p<0.001$), BAI and subscales ($p<0.001$), RTSQ total score ($p<0.001$), and CDS mental reading subscale total score ($p<0.001$) were lower in unemployed individuals than in employed individuals. When marital status was examined, BDI ($p=0.005$) and negative self-attitude ($p=0.003$), somatic ($p=0.048$), cognitive ($p=0.009$), and conceptual ($p=0.019$) scores of married individuals were found to be lower than those of single individuals (Table 4).

DISCUSSION

In our study, it was observed that the depression level of TLE patients was higher compared to PNES patients and the control group. However, anxiety, ruminative thinking, and cognitive distortions were found to be similar between the TLE and PNES groups, and significantly higher for both groups compared to healthy individuals.

In a study evaluating 30 TLE epilepsy patients and 30 healthy volunteers regarding mood disorders, major depression, and personality disorders, anxiety, depression, antisocial personality disorders, and OCD were found to be higher in patients than in healthy controls.[19] It is thought that the accompanying HSs

Table 2. Comparison results of group variable's sub-dimension and total scores of BDI, BAI, RTSQ and CDS scales

Variables	Groups			p-value
	Patients with TLE (n=100)	Patients with PNES (n=100)	Control (n=100)	
BDI				
Positive negative attitudes	7.61±5.31[a]	4.22±3.88[b]	2.59±2.59[c]	<0.001
Somatic	3.33±2.39[a]	1.69±1.62[b]	1.16±1.29[c]	<0.001
Cognitive	9.12±6.21[a]	4.49±4.18[b]	2.58±2.56[c]	<0.001
Conceptual	3.31±2.51[a]	1.49±1.65[b]	0.88±1.28[c]	<0.001
Total	23.37±15.52[a]	11.89±9.95[b]	7.21±6.43[c]	<0.001
BAI				
Personal anxiety	10.99±8.77[a]	10.75±9.54[a]	4.72±5.53[b]	<0.001
Somatic symptom	6.47±5.39[a]	6.00±6.13[a]	3.05±3.23[b]	<0.001
Total	17.46±13.46[a]	16.75±15.3[a]	7.77±8.36[b]	<0.001
RTSQ				
Total	90.45±28.07[a]	86.89±29.67[a]	53.24±18.99[b]	<0.001
CDS				
Mind reading	7.22±3.13[a]	6.51±3.07[a]	5.19±2.17[b]	<0.001
Catastrophizing	6.44±3.42[a]	6.22±3.47[a]	4.28±2.34[b]	<0.001
All or nothing	6.45±3.37[a]	5.51±3.31[ab]	4.96±2.61[b]	<0.001
Conclusion from emotion	5.99±3.49[a]	5.97±3.28[a]	4.40±2.17[b]	<0.001
Labeling	5.46±3.53[a]	5.57±3.36[a]	3.64±1.75[b]	<0.001
Mental filtering	6.42±3.64 months	5.93±3.55[a]	4.30±2.31[b]	<0.001
Overgeneralization	5.23±3.33[a]	5.55±3.00[a]	3.96±2.13[b]	<0.001
Personalization	6.01±3.32[a]	5.76±2.85[a]	3.97±1.72[b]	<0.001
Difficulty	6.16±3.22[a]	5.81±3.16[a]	4.55±2.19[b]	<0.001
Don't underestimate the positive	4.99±2.97[a]	4.53±2.69[ab]	3.91±2.25[b]	0.016

Data are expressed as mean±standard deviation. Different lowercase letters ([a,b,c]) in the same row indicate a statistically significant difference among groups. One-way analysis of variance was used.
TLE: Temporal lobe epilepsy, PNES: Psychogenic non-epileptic seizures, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, RTSQ: Ruminative Thought Style Questionnaire, CDS: Cognitive Distortions Scale

Table 3. Correlation results between depression, anxiety, rumination and cognitive distortion states by groups

Variables	TLE patients			PNES patients			Controls		
	Depression	Anxiety	Rumination	Depression	Anxiety	Rumination	Depression	Anxiety	Rumination
Depression	1			1			1		
Anxiety	0.550**	1		0.747**	1		0.597**	1	
Rumination	0.467**	0.553**	1	0.565**	0.584**	1	0.446**	0.190	1
Cognitive distortions									
Total mind reading	0.278**	0.225*	0.385**	0.366**	0.334**	0.400**	0.397**	0.262**	0.419**
Total catastrophizing	0.151	0.169	0.427**	0.445**	0.485**	0.346**	0.420**	0.253*	0.375**
Total all-or-nothing thinking	0.077	0.242*	0.279**	0.277**	0.220*	0.334**	0.366**	0.114	0.374**
Total emotional reasoning	0.349**	0.302**	0.456**	0.318**	0.299**	0.439**	0.250*	-0.031	0.316**
Total labeling	0.294**	0.284**	0.490**	0.463**	0.454**	0.407**	0.233*	0.085	0.466**
Total mental filtering	0.304**	0.297**	0.431**	0.334**	0.259**	0.317**	0.336**	0.137	0.466**
Total overgeneralization	0.199*	0.293**	0.384**	0.319**	0.244*	0.332**	0.376**	0.215*	0.437**
Total personalization	0.143	0.240*	0.294**	0.292**	0.278**	0.390**	0.244*	0.137	0.263**
Total should statement	0.193	0.268**	0.393**	0.412**	0.293**	0.392**	0.242	0.088	0.425**
Total minimizing or disqualifying the positive	0.269**	0.208*	0.302**	0.318**	0.296**	0.299**	0.347**	0.103	0.414**

*p<0.05, **p<0.001
TLE: Temporal lobe epilepsy, PNES: Psychogenic non-epileptic seizures

Table 4. Presence of hippocampal sclerosis (HS) in patients with TLE

	Hippocampal sclerosis		p-value
BDI	**None (n=39)**	**Yes (n=61)**	
Negative self attitude	2.36±2.21	10.97±3.75	<0.001
Physical	0.92±0.90	4.87±1.65	<0.001
Cognitive	2.41±2.56	13.41±3.38	<0.001
Conceptual	0.82±1.30	4.90±1.64	<0.001
Total BDI	6.51±5.37	34.15±8.73	<0.001
BAI			
Subjective anxiety	6.33±5.92	13.97±9.04	<0.001
Somatic symptom	4.31±4.55	7.85±5.46	<0.001
Total BAI	10.64±10.17	21.82±13.56	0.001
RTSQ			
Total RTSQ	75.56±28.75	99.97±23.24	<0.001
CDS			
Total mind reading	6.10±2.86	7.93±3.10	0.004
Total catastrophizing	5.74±3.48	6.89±3.32	0.103
Total all-or-nothing thinking	6.18±2.89	6.62±3.66	0.524
Total emotional reasoning	4.67±3.03	6.84±3.53	0.002
Total labeling	4.23±2.93	6.25±3.67	0.003
Total mental filter	5.26±3.07	7.16±3.80	0.010
Total overgeneralization	4.51±2.89	5.69±3.53	0.085
Total personalization	5.44±2.86	6.38±3.56	0.168
Total should statements	5.38±2.71	6.66±3.43	0.053
Total minimizing the positive	4.21±2.31	5.49±3.24	0.023

BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, RTSQ: Ruminative Thought Style Questionnaire, CDS: Cognitive Distortions Scale

underlies the increased psychosocial impairment in TLE. In some studies, it has been theoretically suggested that hyperexcitability may have effects on the connection of hippocampal neurons with other limbic regions, even if the hippocampal volume is decreased or not.[20] We found there was a significant difference in terms of depression and anxiety, between the 61 people with HS and the 39 people without HS findings. This result suggests that the limbic system may be effective in depression and anxiety.The higher rate of depression in the TLE group compared to the PNES group in our study may be related to the limbic system involvement, and a higher susceptibility to depression associated with this type of epilepsy. No previous study in the literature has compared PNES with TLE using depression scales.

In our study, while depression was higher in TLE, anxiety levels were similar to those in PNES. The results of the TLE group and the PNES group were each significantly higher than those of the control group. In the literature, it has been reported that anxiety is higher in patients with PNES than in those with epilepsy. Furthermore, anxiety is also higher in the epilepsy and PNES groups than in healthy controls.[21,22] However, as noted in studies of depression, epilepsy was treated generally in these studies, and TLE was not examined separately.

Depression, anxiety, and ruminative thinking scores were significantly higher in women than in men and higher in unemployed participants than in employed participants. When marital status was examined, depression scores of married individuals were found to be lower than those of single individuals. In general, women are more susceptible to depression and anxiety compared to men.[23] This difference, where females experience higher anxiety and depression levels than males, is even more pronounced in patients with chronic medical comorbidities such as epilepsy.[24] Also, studies showed that marital status and unemployment have a substantial effect on depression, anxiety, and well-being, a finding that is consistent with our study.[25]

In the study of Whitfield et al.[5] which included 26 patients with PNES and 29 patients with epileptic seizures, the levels of catastrophizing and recurrent negative thinking (rumination) were investigated in the two patient groups. As a result of the research, it was seen that the catastrophizing and rumination levels of the PNES patient group were higher than those of the epilepsy group.[5] In another study, rumination of past stressful events was reported at a higher rate in PNES than in epilepsy.[26] The results of these studies are different from ours. The differences between our study and the above studies are that our epilepsy group consisted of TLE, and the number of our patients was higher. We could not find any studies in the literature on rumination in individuals with TLE, and our findings on rumination in epilepsy patients indicate that temporal lobe pathology may play a role in the formation of rumination.

In a study conducted on cognitive distortions, it was observed that cognitive distortions were higher in epilepsy patients than in the control group.[27] Similar results were obtained in our study. It was found that both epilepsy and PNES patients had significantly higher cognitive distortion levels than healthy individuals. Another study showed that metacognitive beliefs, cognitive distortions, contribute to anxiety and depression even more than the perception of illness in epilepsy patients.[28] Hypothetically, we expected the PNES group to perform worse than the TLE and control groups in all scales. However, contrary to our expectations, the results showed that depression was higher in TLE patients, while TLE and PNES showed similar characteristics in other scales. With this study data we do not know the exact reason for psychiatric comorbidity in TLE patients. Psychiatric problems in TLE may be related to the presence of structural lesions in the brain, hippocampal volume changes, drug resistance, and side effects of antiepileptic drugs. We believe that multicenter, randomized controlled studies are needed.

The relationship between depression and anxiety was found to be significant in all three groups. The information in the literature also supports the current relationship between depression and anxiety. Again, significant relationships were found between depression and rumination in all three groups. There are many studies showing that as rumination increases, depression also increases. These data also support our findings.[29,30]

Study Limitations

This study is limited to the participation of 300 volunteers between the ages of 18-65 who applied to the Neurology Polyclinic/ Service of Erciyes University Faculty of Medicine Gevher Nesibe Hospital. The results of this study are limited to the data obtained from the personal information form, BDI, BAI, RTSQ, and CDS. The number and length of the scales in the study may have caused the volunteers to become bored and lose focus. Intelligence and attention tests were not administered to the volunteers because it was anticipated that the process would take too long and their compliance with the study process would decrease. The study is limited to 2021-2022. The data collection process of the study coincided with the period when the coronavirus disease-2019 pandemic occurred. This process may have also psychologically affected the volunteers who participated in the study. For this reason, the volunteers may have evaluated their anxiety and depression experiences at a higher level than normal.

CONCLUSION

In conclusion, psychiatric comorbidity in TLE seems to be very important and reaches even more significant dimensions than in the PNES patient group. Neuropathological processes, psychosocial effects, and treatment-related factors that cause TLE may be responsible for this result. Therefore, in the approach to psychiatric comorbidity in TLE, examining and investigating the mentioned factors will enable us to understand different cause-effect relationships and plan effectively in the follow-up and treatment of patients.

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