



## RESEARCH ARTICLE

# Cognitive distortions in epilepsy patients: metacognitive functions, automatic thoughts and dysfunctional attitudes

Filiz Ozsoy<sup>1</sup>, Irem Tasci<sup>2</sup>

<sup>1</sup>Tokat State Hospital, Department of Psychiatry, Tokat - Turkey

<sup>2</sup>Malatya Training and Research Hospital, Malatya - Turkey

### ABSTRACT

**Objective:** The association of psychiatric disorders with epilepsy was shown in many studies, but there are very few studies dealing with the cognitive distortions in epilepsy patients. In our study, we aimed to investigate the metacognitive systems, dysfunctional attitudes and automatic thoughts of epilepsy patients.

**Method:** Sixty patients diagnosed with epilepsy based on anamnesis and electroencephalography examination, and 50 healthy controls were included in the study. The socio-demographic data form, Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Automatic Thoughts Questionnaire (ATQ), Dysfunctional Attitudes Scale (DAS) and Metacognition Questionnaire-30 (MCQ) were applied to all participants.

**Results:** BAI and BDI scores were significantly higher in epilepsy group compared to control group ( $p=0.001$ ,  $p<0.05$ ; respectively). The 'uncontrollability-danger' and 'cognitive awareness' subscale scores and the total score of MCQ in epilepsy group were also higher than in control group ( $p=0.001$ ,  $p<0.05$ ,  $p=0.001$ , respectively). The ATQ total score was found to be significantly higher in epilepsy group compared to control group ( $p=0.001$ ).

**Conclusion:** Based on the findings from the present study, in order to better understand epilepsy patients help them better and provide diagnosis/treatment of psychiatric diseases that may be overlooked, it is recommended that neurology and psychiatry physicians evaluate patients in cooperation.

**Keywords:** Cognitive dissonances, dysfunctional attitudes, epilepsy, metacognition

## INTRODUCTION

Epilepsy is a chronic disease whose association with psychiatric diseases was shown in many studies. Anxiety and depressive disorders could be observed in up to 30% of the epilepsy patients (1). The presence of comorbid psychiatric disease in epilepsy patients negatively affects the frequency and severity of seizures,

the course of the disease, the quality of life of patients and their response to treatment (2).

It was mentioned that dysfunctional metacognitive mechanisms play roles in many psychiatric diseases (3). The metacognitive system is an upper system that allows a person to recognize events in his/her own mind and to manage them in a volitional manner. Metacognition has a very important role in the

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**Correspondence:** Filiz Ozsoy, Yeni District, Tokat State Hospital, 60100 Center, Tokat - Turkey

**E-mail:** flzkoseoglu82@gmail.com

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functional and adaptational operation of one's cognitive processes. Any deterioration in this system is thought to lead to the onset and continuation of many psychopathologies (4).

Dysfunctional attitudes and automatic thoughts, on the other hand, are defined as distorted thoughts that directly affect a person's ways of behaviors and mental health (5). Dysfunctional attitudes are negative beliefs against himself/herself, other people and the world, and are created by an individual's communicating with other people. They are characteristically strict, permanent and generalized (6). Automatic thoughts, on the other hand, are the first reactions which occur spontaneously in the mind of a person as quickly as a reflex, without being noticed. When a person is confronted with a particular situation, some underlying beliefs affect the person's perceptions of the event and lead to automatic thoughts. These thoughts change the emotional responses, and these emotional responses in turn change the thinking style, which finally determines the person's response to the involved event (7).

Many studies in the literature found that the frequency of psychiatric disorder is higher in epilepsy patients than in normal population. Anxiety and mood disorders, attention deficits, hyperactivity, psychotic and personality disorders were among the most commonly reported comorbid psychiatric diseases in epilepsy (8,9). There are a limited number of studies examining metacognitive mechanisms in epilepsy patients (10,11). However, no studies were encountered evaluating metacognition system, automatic thoughts and dysfunctional attitudes together. The aim of the present study was to reveal dysfunctional metacognitions in epilepsy patients. Secondly, we aimed to investigate the cognitive schemas, negative automatic thoughts and dysfunctional attitudes of patients. Finally, we also aimed to evaluate the anxiety and depression levels of the patients. Our first assumption was that epilepsy patients have dysfunctional metacognitions in certain areas. Our secondary assumption was that patients have negative cognitive schemas against themselves, their environment and the world. Finally, it was assumed that the levels of depression and anxiety are high in epilepsy patients. Dysfunctional metacognitions and negative cognitive schemas are presumed to increase psychiatric comorbidity rates in epilepsy patients, which in turn could deteriorate the disease and impair the compliance with the treatment. In this context, it was thought that the epilepsy patients should be evaluated by neurology and psychiatry physicians together. Thus, treatment of

the patients could be more beneficial in terms of increasing the patient's compliance with the treatment, reducing the negative effects of the disease on the individual and helping in reintegration of the patient to society.

## METHOD

### Participants and Procedure

Our study was carried out in neurology outpatient clinic of Malatya Training and Research Hospital in the period from 01.06.2018 to 31.12.2018. Approximately 200 patients who were diagnosed with focal and generalized epilepsy based on anamneses and electroencephalography (EEG) findings, and who received antiepileptic treatment and were monitored with regular follow-ups were interviewed. The study was approved by Tokat Gaziosmanpaşa University Non-invasive Local Ethic Committee (Date: 08.11.2017 and No: 83116987-433). The study procedures were implemented in accordance with Helsinki Declaration.

The inclusion criteria were volunteering, being 18-55 years of age, at least one-year epilepsy diagnosis, monitoring by neurology physicians and literacy. Exclusion criteria, on the other hand, were being diagnosed with mental retardation, neurodegenerative diseases, chronic diseases, refractory epilepsy diagnosis, surgical intervention for this aim, poor general condition and unwillingness to participate. Individuals with psychiatric illness, alcohol or substance abuse currently or in the past which required treatment were not included in the study. The healthy control group was selected from people with matching demographic characteristics such as age, gender, education level who did not have current or previous fainting incidence. The individuals with psychiatric diseases needing treatment currently or in medical records, with psychiatric medication use and with alcohol/substance abuse were not included in the healthy control group.

A total of 60 patients with epilepsy treated for at least one year and 50 healthy control groups participated in the study. The mean age of the clinical and nonclinical subjects was 24.79 (standard deviation=7.98) years. More than half of the overall sampling were male (56.4%) and 78.2% of the participants were single. None of the participants had a diagnosed psychiatric disease and any additional medical disease currently and before. Sample characteristics are presented in Table 1. The patient group was divided into three sub-groups based on patients' descriptions of seizure during the

**Table 1: Socio-demographic characteristics of the participants**

Variables	Healthy Control Group (n=50) n (%)	Epilepsy Patient Group (n=60) n (%)	X <sup>2</sup> /df	p
<b>Gender (Female/Male)</b>				
Female	20 (40)	28 (46.7)	0.493/1	0.483
Male	30 (60)	32 (53.3)		
<b>Marital status</b>				
Married	8 (16)	16 (26.7)	1.819/1	0.177
Single	42 (84)	44 (73.3)		
<b>Residence Address</b>				
City Center	35 (70)	50 (83.3)	3.273/2	0.195
District	10 (20)	8 (13.3)		
Village	5 (10)	2 (3.3)		
<b>Educational Status</b>				
Literate	2 (4)	0 (0)	9.378/3	0.025*
Primary School Graduate	1 (2)	9 (15)		
High School Graduate	17 (34)	25 (41.7)		
Post- Graduate	30 (60)	26 (43.3)		
<b>Employment Status</b>				
Fulltime job	4 (8)	13 (21.7)	14.370/5	0.013*
Part time job	1 (2)	5 (8.3)		
Housewife	11 (22)	12 (20)		
Student	31 (62)	23 (38.3)		
Retired	1 (2)	7 (11.7)		
Unemployed	2 (4)	0 (0)		
<b>Socio-economic Status</b>				
Low	21 (42)	16 (26.7)	2.894/2	0.235
Moderate	24 (48)	37 (61.7)		
High	5 (10)	7 (11.7)		
<b>Seizure Type</b>				
Generalized	-	24 (40.0)	-	-
Focal	-	10 (16.7)		
Generalized secondary to focal seizure	-	26 (43.3)		

None of the participants have had a diagnosed psychiatric disease and any additional medical disease now and before. Data shown were shown as frequency, percentage (%). Chi-square test was used.

anamnesis, EEG findings and the antiepileptic drugs they used. Twenty-four people were considered to have primary generalized epilepsy, 10 people focal epilepsy, and 26 people generalized epilepsy secondary to focal epilepsy. However, since the mean scores of epilepsy sub-groups were not statistically significant for any of the scales used, the sub-groups were evaluated together.

**Measures**

All participants signed a written consent form. Socio-demographic data form, Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Automatic Thoughts Scale (ATQ), Dysfunctional Attitudes Scale (DAS) and Metacognition Questionnaire-30 (MCQ) were administered to all participants.

**Socio-demographic data form:** Prepared by the researchers, this form included questions demographic data such as age, marital status, educational status, working and economic status, as well as some clinical information regarding how long they were diagnosed with epilepsy, and whether they received psychiatric treatment.

**Beck Depression Inventory (BDI):** This self-report scale was developed by Beck et al. and adapted into Turkish by Hisli (12,13). It is used for the evaluation of depression risk and level, and severity of depressive symptoms. Each item is given a score of 0-3, and the total score varies between 0 and 63. Higher scores mean higher depression severity. In Turkish reliability studies, a Cronbach value of 0.80 was calculated for the inventory (12,13).

**Beck Anxiety Inventory (BAI):** This form was developed by Beck et al. and was adapted into Turkish by Ulusoy et al. (14,15). It is used to measure the frequency of anxiety symptoms. This self-reporting scale consists of a total of 21 questions. Each item is given a score between 0 and 3. Higher total scores indicate higher anxiety experienced by the person. The maximum score is 63. Turkish validity of this scale was shown Cronbach Alpha's internal consistency score of 0.93 was reported.

**Metacognition Questionnaire (MCQ-30):** It is a Likert type self-reporting scale, which was developed by Wells and Cartwright-Hatton (4). Each item is scored between 1 and 4. It consists of five subscales, which are conceptually different, but in relation with each other: 'Positive beliefs', 'cognitive confidence', 'uncontrollability-danger', 'cognitive awareness' and 'control needs'. The scores of the scale range from 30 to 120, and the higher scores indicate that metacognitive activity increases in a pathological way. In Turkish validity and reliability study by Tosun and Irak (16), correlations between all items were significant. Correlation coefficients between the items of the questionnaire varied from 0.40 to 0.94, while those between the subscales varied from 0.70 to 0.85. In Turkish reliability studies, a total Cronbach value of 0.86 was calculated for the inventory.

**Automated Thoughts Questionnaire (ATQ):** It was developed by Hollan and Kendal (17). Each item is scored between 1 and 5, and there are a total of 30 items. This is a Likert-type self-reporting scale. It has five subscales: 'self-negative feelings and thoughts', 'confusion-evasion fantasies', 'personal incompatibility and change requests', 'loneliness-isolation' and 'despair'. In Turkish adaptation study by Savaşır and Şahin (18), the internal consistency coefficient was 0.93, and

correlations between the items ranged from 0.36 to 0.69.

**Dysfunctional Attitudes Scale (DAS):** It was developed by Weissman and Beck, and was adapted into Turkish by Şahin and Şahin (19,20). This self-reported scale is used to determine dysfunctional attitudes related to depression. It is a 7-point Likert-type scale consisting of 40 items. 'Perfectionist attitude', 'variable attitude', 'need for approval', 'independent attitude' subscales and total score are calculated in the scale. Higher scores indicate a higher frequency of dysfunctional attitudes. In Turkish validity and reliability study item total correlation was 0.34, and Cronbach alpha value was 0.79.

### Statistical Analyses

Data were evaluated using SPSS version 19 (Statistical Package for Social Sciences for Windows 19). Before the scale scores were calculated, descriptive statistical analyses and reliability analyses of the measures were performed and Cronbach's alpha reliabilities of the scales were estimated. Normal distribution was controlled using Shapiro-Wilk (SW) test. Qualitative variables were presented as numbers and percentages where quantitative was means and standard deviation (Mean±SD). The qualitative variables were evaluated using Chi-square tests. For the statistical analysis of normally distributed data, independent samples t-test was used; results were reported with mean and standard deviation. A multivariate logistic regression analysis was performed to assess the effect of the following independent variables on the presence of the dependent variable: age, gender, marital status, settlement, education, employment, socio-economic status. Relations between data within groups were examined using Pearson correlation analysis. Beta coefficient ( $\beta$ ), odds ratio (OR), and 95% confidence interval (CI) were computed for each independent variable. Mean values, standard deviations of the scores, and a correlation were analyzed and it was noted that the p-value was less than 0.05 indicating an acceptable threshold of significance.

## RESULTS

### Sample Characteristics

Using Chi-square test, we found that there was no difference between the epilepsy patient group and healthy control group for the demographic variables studied except for educational level and working status. The mean age was 26.68 (standard deviation=9.76) in the epilepsy group, and 26.62 (standard deviation=5.19)

in the healthy control group ( $p=0.521$ ). Epilepsy patients had lower levels of education than healthy adults ( $\chi^2=9.378, p=0.025$ ). There was a significant difference between groups regarding employment status ( $\chi^2=14.370, p=0.013$ ). The disease period of the patients varied between 1 and 30 years (mean=8.17, standard deviation=7.62). Participants' characteristics are presented in Table 1.

**Correlation Analysis**

Pearson correlation analysis evaluating the relation between BDI score 'uncontrollability-danger' subscale score of MCQ; found that moderate and positive correlation ( $r=0.575, p<0.05$ ). Similarly, BAI showed a moderate positive correlation with 'uncontrollability-danger' subscale score of MCQ ( $r=0.573, p<0.05$ ). 'Uncontrollability-danger' subscale score of MCQ revealed a moderate positive correlation with 'self-negative feelings and thoughts' subscale, 'confusion-evasion fantasies' subscale, 'loneliness-isolation' subscale and 'despair' subscale of ATQ ( $r=0.572, p<0.05; r=0.484, p<0.05; r=0.432, p<0.05; r=0.496, p<0.05$ ; respectively). Correlation analysis findings are shown in Table 2.

**The Cronbach Values Calculated for the Study**

Before the scores of the scales applied to the participants were calculated, the Cronbach Alpha reliability values

were calculated for the study. The Cronbach Alpha values calculated for the MCQ for the control group and epilepsy patients were 0.883 and 0.669, respectively. The total Cronbach Value was calculated as 0.699. The Cronbach Alpha values in the ATQ were 0.925 and 0.889 for the control group and epilepsy patients, respectively. The total Cronbach Alpha value calculated for our study was 0.910. The DAS Cronbach value was calculated as 0.452 and 0.694 for the control group and epilepsy patients, respectively. The total Cronbach value was calculated as 0.608.

**Scale Scores**

The BDI score in the epilepsy group was significantly higher than in the control group ( $f=18.662, t=5.508, p<0.05$ ). Similarly, the BAI score was significantly higher in the epilepsy group compared to control group ( $f=16.608, t=3.567, p=0.001$ ). 'Uncontrollability-danger' subscale score of MCQ was significantly higher in epilepsy group compared to control group ( $f=0.074, t=3.183, p=0.002$ ). The 'cognitive awareness' subscale score of MCQ was significantly higher in epilepsy group ( $f=1.033, t=3.747, p<0.05$ ). All subscale scores of ATQ were significantly higher in epilepsy group than in control group. Merely, the 'need for approval' subscale of DAS was significantly higher in epilepsy group compared to control group ( $f=4.230, t=2.000, p = 0.048$ ) (Table 3).

**Table 2: Pearson correlation analysis of epilepsy group**

	MCQ 1	MCQ 2	MCQ 3	MCQ 4	MCQ 5	MCQ-total	BDI	BAI
<b>ATQ</b>								
Negative self	0.005	0.050	0.572*	0.372*	0.097	0.476*	0.619*	0.439*
Confusion/flight of ideas	-0.032	-0.06	0.484*	0.327*	0.119	0.373*	0.430*	0.414*
Sef-discrepancy	-0.113	-0.05	0.374*	0.245	0.086	0.290*	0.481*	0.480*
Loneliness/isolation	-0.158	0.027	0.432*	0.283*	-0.040	0.261*	0.525*	0.432*
Abandonment/despair	-0.057	0.007	0.496*	0.309*	0.155	0.455*	0.499*	0.263*
Total score	-0.056	0.000	0.558*	0.360*	0.097	0.435*	0.609*	0.476*
<b>DAS</b>								
Perfectionist attitude	0.090	0.438*	0.277*	0.086	0.086	0.281*	0.090	-0.048
Variable attitude	0.064	-0.251	-0.245	-0.176	-0.176	-0.212	0.064	-0.127
Need for approval	0.083	0.316*	0.274*	0.090	0.090	0.263*	0.083	-0.099
Independent attitude	0.060	0.028	-0.180	-0.119	-0.119	-0.134	0.060	-0.074
Total Score	0.102	0.369*	0.230	0.051	0.051	0.233	0.102	-0.067
BDI	0.117	0.256	0.575*	0.381*	0.167	0.536*	-	-
BAI	0.061	0.225	0.573*	0.371*	0.209	0.514*	-	-

Abbreviations given in the table ATQ: Automatic Thoughts Questionnaire, DAS: Dysfunctional Attitude Scale, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, MCQ: Metacognition Questionnaire; MCQ-1: Positive belief; MCQ-2: Cognitive confidence; MCQ-3: Uncontrollability-danger; MCQ-4: Cognitive awareness; MCQ-5: The need to control the thoughts. Pearson correlation coefficient was used. The values shown in the table are 'r' values. \* $p<0.05$ .

**Table 3: Comparison of scale scores between groups**

	Healthy Control Group (Mean±SD)	Epilepsy Patient Group (Mean±SD)	f	t (df=108)	p
<b>Beck Depression Inventory</b>	5.4±5.3	13.0±8.4	18.662	5.508*	<0.05*
<b>Beck Anxiety Inventory</b>	6.6±7.6	13.9±12.4	16.608	3.567*	0.001*
<b>Metacognitive Questionnaire</b>					
Positive belief	12.9±4.7	12.6±4.0	1.430	0.284	0.777
Cognitive confidence	11.1±4.6	18.0±31.0	1.253	1.563	0.121
Uncontrollability-danger	13.9±5.6	17.2±5.2	0.074	3.183*	0.002*
Cognitive awareness	13.4±4.3	16.5±4.3	1.033	3.747*	<0.05*
The need to control the thoughts	11.0±3.6	12.2±4.0	0.176	1.607	0.111
Total Score	62.4±19.1	73.1±13.8	2.893	3.389	0.001*
<b>Automatic Thoughts Questionnaire</b>					
Negative self	16.7±8.4	22.3±10.7	5.291	2.988*	0.003*
Confusion/flight of ideas	10.4±4.4	13.7±6.0	6.534	3.216*	0.002*
Self-discrepancy	6.2±3.2	9.1±4.1	5.416	4.118*	<0.05*
Loneliness/isolation	7.5±3.7	10.4±4.4	3.039	3.565*	0.001*
Abandonment/despair	7.4±3.7	10.1±5.8	7.305	2.792*	0.006*
Total score	48.8±22.2	65.6±27.0	3.864	3.579*	0.001*
<b>Dysfunctional Attitude Scale</b>					
Perfectionist attitude	51.8±18.4	54.1±20.2	0.539	0.624	0.534
Variable attitude	15.7±5.7	15.5±3.8	9.201	0.232	0.817
Need for approval	35.8±11.4	40.9±14.9	4.230	2.000*	0.048*
Independent attitude	19.8±8.6	19.3±4.7	18.668	0.359	0.720
Total Score	122.0±24.6	130.2±34.7	5.617	1.392	0.167

Data are shown as mean±standard deviation. Independent samples t test was used. \*p<0.05.

A multivariate logistic regression analysis revealed that employed as a housewife or student were the significant predictors for epilepsy ( $\beta=-5.369$ ,  $p=0.014$ ;  $\beta=-4.074$ ,  $p=0.028$ ; respectively). Similarly, the BDI score was a significant predictor for epilepsy ( $\beta=0.245$ ,  $p=0.001$ ) (Table 4).

## DISCUSSION

Psychiatric symptoms or psychiatric disorders are frequently observed in epilepsy patients. Psychiatric illness comorbidity can affect the course of the disease (2-5). In the present study, metacognitive functions, dysfunctional attitudes and automatic thoughts, which could play roles in psychiatric comorbidities of epilepsy patients, were evaluated. In our results, the anxiety and depression scores of the patients with epilepsy were significantly higher than the control group. In terms of MCQ, 'uncontrollability and danger', 'cognitive

awareness' subscales and total score were higher compared to the control group. All subscales of ATQ and only the 'need for approval' subscale of DAS was significantly higher in the patient group than the control group. No other study in the literature evaluated epilepsy patients using these scales together. Our results showed that scores of both depression and anxiety scales in patient groups were considerably higher compared to the control group. This finding was consistent with the reports from many studies in the literature (1,2). Although no history of psychiatric treatment was found in epilepsy patients, this finding was somewhat expected due to the fact that regular medical treatment is taken for epilepsy and due to the fact that epilepsy is a disorder that can affect many areas such as family, social and working life.

Only limited number of studies evaluating the epilepsy patients with MCQ was found in the literature. In one of them, the five-factor structure of MCQ was



**Table 4: The effect of variables on epilepsy disease according to logistic regression model**

Covariates	Beta	S.H.	p	Odds ratio	For Odds ratio %95 Confidence Interval	
					Lower limit	Upper limit
<b>Age</b>	0.049	0.060	0.413	1.050	0.934	1.181
<b>Gender</b>	-1.279	0.711	0.072	0.278	0.069	1.121
<b>Marital status</b>	-0.079	1.134	0.944	0.924	0.100	8.526
<b>Residence address</b>						
District	-0.359	0.902	0.690	0.698	0.119	4.089
Village	-1.231	1.425	0.388	0.292	0.018	4.771
<b>Educational status</b>						
Primary School	1.797	0.654	0.976	6.032	0.054	12.430
High School	1.729	0.635	0.987	5.635	0.067	11.248
Post- Graduate	1.997	0.734	0.965	7.367	0.026	13.060
<b>Employment status</b>						
Part time job	-1.616	2.198	0.462	0.199	0.003	14.767
Housewife	-5.369	2.184	0.014*	0.005	0.000	0.337
Student	-4.074	1.857	0.028*	0.017	0.000	0.648
Retired	-3.206	2.224	0.149	0.041	0.001	3.165
Unemployed	-6.591	3.568	0.989	0.001	0.000	5.645
<b>Socio-economic status</b>						
Moderate	0.076	0.656	0.908	1.078	0.298	3.903
High	-2.576	1.694	0.128	0.076	0.003	2.104
<b>BDI</b>	0.245	0.073	0.001*	1.278	1.107	1.475
<b>BAI</b>	-0.050	0.041	0.216	0.951	0.878	1.030
<b>MCQ</b>	0.000	0.023	0.993	1.000	0.956	1.045
<b>ATQ</b>	0.014	0.015	0.341	1.014	0.985	1.044
<b>DAS</b>	-0.024	0.014	0.080	0.976	0.950	1.003

Abbreviations given in the table ATQ: Automatic Thoughts Questionnaire, DAS: Dysfunctional Attitude Scale, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, MCQ: Metacognition Questionnaire. Reference categories: Female for gender, married for marital status, city center for residence address, literate for educational status, fulltime job for employment status, low for socio-economic status. \*p <0.05.

shown to have internal consistency in epilepsy patients. In addition, metacognitive processes were reported to be effective determinants of anxiety and depression (10). In another study, the effects of metacognitive structure on the perception of disease were investigated. A strong relationships between the metacognitive model and the anxiety and depression levels of epilepsy patients were emphasized (11). In terms of MCQ subscales, ‘uncontrollability and danger’, ‘cognitive awareness’ and total scores were significantly higher in epilepsy patients compared to the control group. The ‘uncontrollability

and danger’ subscale is interpreted so as to mean that the person needs to control his concerns to stay safe or that the concern cannot be controlled (16). Studies in the literature emphasized the strong associations of ‘uncontrollability and danger’ and ‘cognitive confidence’ subscales especially with depression and anxiety scores. Weaker relationships were reported for other subscales (11). In our results, ‘uncontrollability and danger’ subscale had moderate positive correlations with both depression and anxiety scales. In many studies, scores of this subscale were significantly higher in depressive

disorder patients. The obtained results were attributed to depressive disorder patients' future pessimism, exaggeration and generalization of minor mishaps and negative thoughts about themselves and their future (21). Since the depression and anxiety scores of the epilepsy patients are high and their life quality is low as a result of the nature of the disease and medical treatments received by the patients (22,23), pessimistic, negative thoughts of epilepsy patients about themselves and their future, as in the depressive disorder patients, seemed an expected outcome.

"Cognitive awareness" subscale, on the other hand, is interpreted as people's dealing with thoughts in their mind and continuously reviewing and monitoring their opinions (16). In a study, in which the depression model for metacognition was emphasized in epilepsy patients, no significant difference was found for this subscale, and a weak relationship was found with depression scores (11). In many studies with depressive disorder patients, no significant difference was found for this subscale (21). In patients with obsessive-compulsive disorder, 'cognitive awareness' was linked with obsessions, which was in turn associated with a sense of responsibility and perfectionism (24). In our results, the score of this subscale was high and was weakly associated with depression scores. Although this finding could be attributed to the anxiety experienced by the patients, no significant increase was found for this subscale in every anxiety-related disorder. However, it was generally shown to be associated with anxiety scores (21,25).

No other studies were found in which ATQ and DAS were evaluated in epileptic patients. In our results, scores of all ATQ subscales were significantly higher in the patient group compared to the control group. All subscales of the ATQ were strongly correlated with depression and anxiety scores. In the general sense, most of ATQ subscales are related to depression, and could be interpreted as the negative thoughts about themselves and the world, as the idea that they need to change but don't need the energy to do so, and as the feeling that they are all alone in life and should give up everything (19,20). It was shown that automatic thoughts could predict the depression of a person by about 33% (26). In multidimensional logistic regression analysis, with the high depression scores of epilepsy patients, which have considerable effects on the disease, observed negative automatic thoughts in the patients about their future and themselves was an expected outcome.

For DAS, only the subscale of 'need for approval', which is interpreted as in order to be loved and to be a valued person one needs to be approved by other people, was significant. Dysfunctional attitudes were generally examined in depressive disorder patients. Even sub-threshold depression scores were found to be associated with dysfunctional cognitive schemas (27). Women with postpartum depression were reported to have dysfunctional cognitive attitudes, which were mentioned to be responsible for more severe depression (28). The obese individuals who were not diagnosed with depressive disorder were found to have a more dysfunctional schema than the healthy control group (29). In our results, DAS had no correlation with depression or anxiety scales. Only some subscales of MCQ were found to be associated with 'cognitive confidence' and 'uncontrollability and danger'. This finding could be due to the low reliability of the scale calculated or the high scores of the control group in the present study.

Our results should be evaluated considering some limitations. These limitations are related to the cross-sectional nature of the study, the relatively insufficient number of the sample, self-filling of the questionnaires by the patients, and not using SCID-V for our patients (Structured Clinical Interview for DSM-5). These facts limit the generalization and interpretation of the results. Further research with larger sample groups is required for a better generalization and efficient use of our findings.

In epilepsy patients, whose many life characteristics are affected by the disease, psychiatric co-morbidities are known to be high. Thus, we planned our study to evaluate the cognitive schemas of these patients. In the results we obtained, patients had higher depression and anxiety levels, a higher level of dysfunctional metacognition in certain subscales and a higher level of automatic thoughts which are presumed to increase the depression. Based on these differences, in order to better understand and help epilepsy patients, it is recommended that neurology physicians and psychiatrists should evaluate the patients together.

**Ethics Committee Approval:** This study was approved by Gaziosmanpaşa University Non-Interventional Local Ethics Committee (Date: 08.11.2017, Number: 83116987-433).

**Informed Consent:** Written informed consent was obtained from the patients.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** The authors declared no conflict of interest.

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