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Original Article

Motor and Somatosensory Symptoms Determine Cognitive Error Levels in Functional Neurological Symptom Disorder/Conversion Disorder

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Abstract

Introduction: The level of cognitive error in functional neurological symptom disorder (FNSD, conversion disorder) subtypes [psychogenic non-epileptic seizure (PNES), motor (M), PNES plus motor (PM), motor plus somatosensory (MS)] have not yet been investigated.

Aim: We aimed to qualify the level of cognitive error in FNSD subtypes.

Materials and methods: The disorder symptoms were assessed via the somatoform dissociation questionnaire (SDQ), the symptom check list-90-revised (SCL-90-R), and the global assessment scale (GAS). The cognitive distortions scale (CDS) was used to evaluate cognitive errors.

Results: Mean ages of groups were 28.37±6.99 years (PNES, n=24), 27.90±6.22 years (M, n=21), 30.36±7.86 years (PM, n=19), 31.38±9.02 years (MS, n=21), and 30.87±7.17 years (control, n=48) (p=0.377). In terms of the global severity index of SCL-90-R, there were significant differences between PNES and PM (p=0.003); PNES and MS (p<0.001); M and MS (p<0.001); PM and MS (p=0.001). The scores of CDS-IP were similar between PM and M (p>0.999); PM and MS (p=0.172). There was no significant difference between the CDS-PA scores of the patient groups (p>0.05).

Conclusions: Our study demonstrated that in FNSD, the somatosensory symptoms were more associated with cognitive errors related to interpersonal relationships than the motor symptoms and the motor symptoms were more than PNES.

Keywords

cognition, conversion disorder, functional neurological symptom disorder, psychogenic non-epileptic seizure

INTRODUCTION

Functional neurological symptom disorder (FNSD), also known as conversion disorder (CD), as defined in the Fifth Edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5)[1] describes symptoms such as weakness, abnormal movements, trouble with swallowing, inability to speak, seizures, anesthesia, unusual sensory problems, or a mixture of symptoms that are not attributable to a general medical condition or to feigning and that are judged to be associated with psychological factors. According to the

DSM-5, FNSD is most common after a period of stress and is two to three times more common in women than in men. The prevalence of FNSD is 1%–3% in Western societies[2] and 4%-34% in Eastern societies.[3,4] The FNSD/CD is coded according to symptom type: motor, somatosensory, and PNES. These symptom types mentioned in DSM-5 can be seen either alone or mixed.[1]

Cognitive errors are simply the ways by which our mind convinces us of something that is not really true and they cause instant, unplanned negative automatic thoughts about an event. These negative interpretations have a fundamental role in the emergence of psychological problems.[5] For more than half a century, considerable attention has focused on the relationship between the forms of cognitive errors (e.g., personalizing, overgeneralizing, catastrophizing) and psychopathology.[6,7] While some studies question the existence of cognitive errors in various psychiatric disorders[8,9], some have reported the levels of cognitive errors in these disorders.[10] Although cognitive errors have been studied in many psychiatric disorders[11], they have not yet been investigated in FNSD and its subtypes.

Studying cognitive errors in PNES, motor, somatosensory, and mixed FNSD may provide insights into whether subjects with one subtype of FNSD differ from those with other FNSD subtypes in certain cognitive error features, thence introducing possibilities for qualifying cognitive error profiles of these subtypes.

AIM

In this study, we aimed to compare the cognitive error levels of the FNSD subtypes and the control group. Cognitive error levels were determined on a scale, and ten different cognitive errors were questioned with the help of this scale (mindreading, catastrophizing, all-or-nothing thinking, emotional reasoning, labeling, mental filter, overgeneralization, personalization, should statements, minimizing the positive). Our hypothesis is that the FNSD group has a higher cognitive error level than the control group and that the cognitive error levels of the FNSD subtypes differed among themselves.

MATERIALS AND METHODS

Study design

This is a single blind, cross-sectional study with female patients from the psychiatric outpatient clinic of our hospital. Patients admitted to our outpatient clinic due to the FNSD symptoms were included in the study. Patients whose somatoform dissociation questionnaire (SDQ) responses were compatible with admission complaints were divided into groups. In this way, four patient groups were formed: PNES, motor FNSD (M), PNES plus M (PM), and M plus somatosensory FNSD (MS). The control group consisted of healthy female volunteers. Interviews were conducted in an environment suitable for psychiatric examination. This study was carried out between October 1, 2019 and June 1, 2020. The study was conducted in compliance with the Declaration of Helsinki; the protocol was approved by the Ethics Committee of Adiyaman University and all study participants provided written informed consent (Project Identification Code: 2019/9-18).

Inclusion and Exclusion Criteria

Loss of touch or pain sensation, double vision, blindness, deafness, hallucination, anesthesia, hyperesthesia, and paresthesia were accepted as somatosensory symptoms. Coordination and balance disturbance, paralysis, localized weakness, difficulty swallowing, lump in the throat, aphonic, and urinary retention were accepted as motor symptoms.

The study included:

- individuals that met the DSM-5[1] criteria for FNSD diagnosis and agreed to answer the research protocol.

The following were excluded from the study:

- Patients that received psychotropic drugs.
- Patients and controls with mental retardation and organic conditions such as thyroid, liver, and kidney disorders that could directly or indirectly affect their mental state.
- Patients and controls who gave incomplete information during the interviews.
- Six patients with somatosensory FNSD (2 patients with kidney disorders, 1 patient with liver disorder, 1 patient providing incomplete information, 1 patient using sedatives), 5 patients with PNES plus somatosensory FNSD (1 patient liver disorder, 1 patient hypothyroidism, 1 patient intellectual disability, 1 patient incomplete information, 1 patient using antidepressant), 2 patients with somatosensory FNSD plus motor FNSD plus PNES (1 patient using illicit drug, 1 patient liver disorder).
- Apart from these, 11 male patients diagnosed with FNSD (3 males with PNES, 3 patients with PM, 5 patients with MS) because a sufficient number was not reached.

Procedure and assessment

All patients were directly interviewed by a psychiatrist. The research protocol included demographic data, family psychiatric history, and a range of other structured interviews. The main assessment instruments are briefly described below.

Sociodemographic form

A form containing sociodemographic and clinical information was filled in by the researcher. Age, gender, education level, marital status, working status, and family psychiatric history were used as variables in the questionnaire.

Symptom Checklist-90-Revised (SCL-90-R)

SCL-90-R is a 90-item self-report of subjects' symptoms and psychopathologic features on subscales: paranoid ideation (PAR), interpersonal sensitivity (I-S), hostility (HOS), psychoticism (PSY), phobic anxiety (PHOB), anxiety (ANX), somatization (SOM), depression (DEP), obsessive-compulsive (O-C), additional (AD) and global severity index (GSI). It can be filled in approximately 15 minutes. It is a measure of the current psychological symptom status with the time reference of "last 7 days, including today". The scores for each of the nine factors are the average rating given to the symptoms of that factor. The remaining seven items do not measure any particular factor, but are evaluated qualitatively. Three "global" scores were also obtained. GSI is an average of 90 items. There is a scoring range from zero to four. The validity and reliability study of the Turkish version was conducted by Kilic.[12] According to the subscales, the reliability coefficients were 0.82 for SOM; 0.84 for O-C, 0.79 for I-S; 0.78 for DEP; 0.73 for ANX; 0.79 for HOS; 0.78 for PHOB; 0.63 for PAR; 0.73 for PSY; 0.77 for AD. The validity of SCL-90-R was tried to be determined by using similar scales validity method and MMPI inventory was taken as the criterion. The Pearson correlation coefficients between the two scales vary between 0.50 and 0.59.

Cognitive Distortions Scale (CDS)

This is a 20-item self-report, Likert type scale instrument developed by Covin et al.[13] in 2011 to measure 10 cognitive errors (mindreading, catastrophizing, all-or-nothing thinking, emotional reasoning, labeling, mental filter, overgeneralization, personalization, should statements, minimizing the positive) using a 7-point scale (1 = never, 7 = all the time). Each cognitive error is rated in two domains: interpersonal (IP) and personal achievement (PA). According to the results obtained from clinical and non-clinical samples, the Cronbach's alpha value of the scale was 0.933 for clinical cases and 0.918 for non-clinical cases. It was adapted into Turkish by Ozdel et al.[5]

The Somatoform Dissociation Questionnaire (SDQ)

SDQ is a 20-item self-report instrument that evaluates the severity of somatoform dissociation. Some of the items question the motor symptoms, some of them somatosensory symptoms and some question the PNES. It was developed by Nijenhuis et al.[14] The Turkish version of the scale has a 1-month test-retest correlation of 0.95. A cut-off point of 35 yielded a sensitivity of 0.84 and a specificity of 0.87 in a Turkish clinical sample.[15]

Global Assessment Scale (GAS)

It is a grading scale that is applied in a short time and covers all aspects (psychological, social, and professional functionality) of changes in psychopathology. It was developed by Endicott[16] in 1976 and can be scored between 0-100.

Statistical analysis

Version 22.0 of SPSS (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) was used for all statistical analyses. The numerical data were expressed as means and standard deviations, and the categorical data were expressed as frequencies and percentages. Normal distribution suitability was assessed using visual and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk test). Fisher's exact test was used to analyze the categorical data. One-way ANOVA test was used for five independent groups with no normal distribution. A post-hoc Tamhane's T2 test was used when a significant difference was found between the five independent groups. The relationship between the variables was assessed by the Spearman correlation test. Receiver operating characteristic (ROC) curve analysis was used to measure the diagnostic value of CDS-IP. A p value of less than 0.05 was considered statistically significant.

RESULTS

Sociodemographic Data

There were 133 female subjects (85 patients, 48 healthy controls) in the study. Twenty-four (28.23%) of the patients were PNES, 21 (24.70%) were M, 19 (22.35%) were PM, and 21 (24.72%) were MS. The mean age in the patient group was 29.44±7.57 (min=18; max=45) years, and in the control group, it was 30.87±7.17 years (min=18; max=41) (p=0.289). Age range of patient groups were 18-40 years for PNES, 19-38 years for M, 19-41 years for PM, and 20-45 years for MS. The disorder onset in the patient group was 21.37±4.48 years. There was no history of psychiatric hospitalization in the patient group. The education levels of the patient and control groups were similar (p=0.119). The rate of employment in the control group was higher than in the patient group (p=0.002). The comparison of the sociodemographic data of the patient and control groups is shown in **Table 1**.

Psychological data

In 40 (47.5%) of the patients, the SDQ score was 35 and above. There was no one in the PNES group with an SDQ score of 35 or above. In the M group, there were 2 subjects (5.0%) with an SDQ score of 35 and above. In the PM group, there were 17 subjects (42.5%) with an SDQ score of

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Table 1. Comparison of sociodemographic data of patient and control groups

Variables		Patient n (%)	Control n (%)	*p*
Marital status	Married	48 (56.5)	30 (62.5)	0.055
	Single	25 (29.4)	18 (37.5)	
	Widow	5 (5.9)	0 (0.0)	
	Divorced	7 (8.2)	0 (0.0)	
Working status	Yes	31 (36.5)	31 (64.6)	0.002*
	Housewife	54 (63.5)	17 (35.4)	
Family psychiatric history	Yes	32 (37.6)	7 (14.6)	0.005*
	No	53 (62.4)	41 (85.4)	

*$p<0.05$; Fisher's exact test was used

35 and above. There were 21 people (52.5%) with an SDQ score of 35 and above in the MS group.

Correlation analysis performed after checking the effect of age and education level in the patient group is shown in **Table 2**. There was only one correlation between GAS and GSI in the control group ($r=-0.914$, $p<0.001$).

Comparison of patient subgroups and control groups in terms of various variables is shown in **Table 3**. In terms of GSI, there were significant differences between PNES and PM, MS, control; between M and MS, control; between PM and MS, control; between MS and control groups. In terms of GAS, there were significant differences between PNES and PM, MS, control; between M and PM, MS, control; between PM and control; between MS and control groups. In terms of CDS-IP, there were significant differences between PNES and M, PM, MS, control; between M and MS,

Table 2. Correlation analysis of patient group (n=85)

	Onset of disorder *r, p*	GSI *r, p*	GAS *r, p*	CDS-PA *r, p*	SDQ *r, p*
CDS-IP	−0.226, 0.040*	0.794, <0.001**	−0.753, <0.001**	−0.192, 0.081	0.772, <0.001**

*$p<0.05$, **$p<0.01$; Spearman correlation analysis was used; GSI: Global Severity Index of Symptom Checklist-90-Revised; CDS: cognitive distortions scale; IP: interpersonal; PA: personal achievement; GAS: global assessment scale; SDQ: somatoform dissociation questionnaire

Table 3. Comparison of GSI, CDS, GAS, and SDQ values of patient subgroups and control groups.

Variables	PNES (n=24) Mean±SD	M (n=21) Mean±SD	PM (n=19) Mean±SD	MS (n=21) Mean±SD	Control (n=48) Mean±SD	*p*
Age (years)	28.37±6.99	27.90±6.22	30.36±7.86	31.38±9.02	30.87±7.17	0.377
Education (years)	6.79±2.32[1]	9.33±3.42	8.47±2.93	8.23±2.60	9.04±3.46[1]	0.037*
GSI	1.20±0.37[1]	1.43±0.55[2]	2.00±0.75[1,3]	3.05±0.76[1,2,3,4]	0.20±0.17[1,2,3,4]	<0.001**
GAS	74.62±5.58[1]	73.38±6.38[2]	61.78±9.14[1,2,3]	55.90±7.75[1,2,4]	89.33±4.64[1,2,3,4]	<0.001**
CDS-IP	45.50±6.29[1]	51.71±4.74[1,2]	52.57±6.00[1,3]	57.47±6.60[1,2,4]	26.64±3.02[1,2,3,4]	<0.001**
CDS-PA	27.91±3.67	26.38±4.39	28.31±3.46	27.71±3.43	25.70±2.88	0.068
CDS-T	73.41±7.68[1]	78.09±5.03[2]	80.89±5.07[1,3]	85.19±5.56[1,2,4]	52.35±4.34[1,2,3,4]	<0.001**
SDQ	27.79±7.00[1]	33.52±7.37[2]	47.10±12.28[1,2,3]	61.42±12.69[1,2,3,4]	20.81±1.10[1,2,3,4]	<0.001*

*$p<0.05$, **$p<0.01$; One-Way ANOVA test and Post-Hoc analysis (Tamhane's T2) were used; **Notes:** The numbers given in superscript are related with the results from the Tamhane's T2 (e.g. for GSI; There is a significant difference between PNES and PM, PNES and MS, PNES and control). PNES: FNSD with the Symptom of Psychogenic Non-Epileptic Seizure; M: FNSD with Motor Symptoms; PM: FNSD with PNES and Motor Symptoms; MS: FNSD with Motor and Somatosensory Symptoms; GSI: Global Severity Index of Symptom Checklist-90-Revised; CDS: Cognitive Distortions Scale; IP: interpersonal; PA: personal achievement; T: total; SD: standard deviation; GAS: global assessment scale; SDQ: somatoform dissociation questionnaire

control; between PM and control; between MS and control groups. In terms of CDS-PA, there were no significant differences between the groups.

ROC analysis was performed based on 42 subjects (21 M and 21 MS). The area under the ROC curve of the CDS-IP score for MS was 0.882 (p<0.001; 95% CI 0.758-1.000). The optimal cut-off score for CDS-IP was 55.5, and its sensitivity and specificity for the diagnosis of MS were 90.5% and 91.0%, respectively.

DISCUSSION

In this study, we investigated the level of cognitive errors in IP and PA domains of the FNSD subtypes and compared the results with healthy controls. The similarity of age and education levels between patient and control groups facilitated the interpretation of the findings.

Many psychiatric symptoms are often accompanied by FNSD.[17] Our study revealed that psychiatric symptom comorbidity in FNSD was significantly higher than in the control group. There was a negative relationship between the presence of somatosensory and motor symptoms and the level of functionality and CDS-IP. In line with our findings, Yayla et al.[18] found significant differences between the patient and the control groups concerning comorbidity of bipolar disorder, past hypomania, and current and past posttraumatic stress disorder (PTSD). Sar et al.[17] reported that 89.5% of the patients diagnosed with CD had at least one psychiatric diagnosis at follow-up. Likewise, patients with FNSD frequently report cognitive difficulties. Myers et al.[19] demonstrated that patients with PNES diagnosed with PTSD exhibited more memory impairments compared with patients without PTSD. Heintz et al.[20] found that patients with psychogenic movement disorder reported more cognitive complaints such as attention, executive function, memory, and reaction speed in daily life than the control group. Reuber et al.[21] reported that patient with PNES demonstrated an impairment of working memory. Cognitive errors are also an important part of cognitive processes.[22] Nevertheless, cognitive error levels of FNSD subtypes have not been investigated before.

Dysfunctional beliefs in the cognitive structure shape the individual's thinking and lead to cognitive errors specific to psychopathology.[23] Our study is important in terms of demonstrating that different FNSD subtypes have similar cognitive error levels in the field of personal achievement; whereas they showed differences in the cognitive error levels in interpersonal relationships. Our study showed that the cognitive error level in the FNSD subtype, in which motor and somatosensory symptoms are seen together -MS-, is higher than the cognitive error level in the FNSD subtype, where only motor symptoms are present -M-. Again, the lowest cognitive error level was found in PNES. These findings made us think that FNSD subtypes have different levels of cognitive errors. Consistent with these findings, somatosensory symptoms were found to be associated with poor functionality. In addition, it was determined that the GSI value, which expresses an average of psychiatric symptoms such as paranoid ideation, hostility, depression and somatization obtained by SCL-90-R, is more associated with somatosensory symptoms. In the ROC analysis we performed to see the effect of cognitive error levels in the differentiation of FNSD with motor symptoms and FNSD with somatosensory plus motor symptoms, we found significant differences between the groups. Accordingly, cognitive errors may be more associated with somatosensory symptoms.

The specific findings of this study regarding the cognitive error levels contribute to further identifying discrete intragroup differences within FNSD subtypes. The findings will be relevant to clinicians attempting to treat FNSD symptoms with cognitive behavioral therapy and medication. Identifying the increased level of cognitive error will allow physicians to accurately select the treatment. Because cognitive behavioral therapy is a structured form of therapy that emphasizes how our thoughts determine what we feel and how we behave[24], it can be useful in normalizing the level of cognitive errors, especially in FNSD with somatosensory symptoms.

This is the first study examining the relationship between FNSD subtypes and cognitive error levels. In our study, FNSD, especially in the somatosensory subtype, was associated with high cognitive error levels. In the somatosensory and motor subtypes, cognitive error levels related to interpersonal relationships were higher than the psychogenic non-epileptic seizure. The psychiatric symptom-cognitive error correlation was prominent in the FNSD. The relationship of the personal achievement domain of cognitive errors with FNSD subtypes was not significant. Our study suggests that a detailed evaluation of symptoms and determination of FNSD subtypes will affect treatment outcomes. On the other hand, we also suggest that based on these findings, comments can be made about the cognitive error levels of FNSD subtypes. The fact that some scale scores are similar does not mean that the clinical characteristics of the patient subtypes are similar.

CONCLUSIONS

Our study has several limitations. There is a need to increase the sample size in further studies. Although the recovery of men diagnosed with FNSD takes longer, studies involving both genders can be conducted. Family psychiatric history was statistically different between the patient and control groups, and it was required to be considered as a confounding factor and stated as a limitation. In this study, cognitive error levels were examined only in terms of interpersonal relationships and individual achievement domains. Cognitive error types were not examined separately according to disease diagnoses. It is recommended that future studies should focus on the types of cognitive errors according to the diagnoses. It is thought that the results will be better

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interpreted by increasing the scale diversity, expanding the sociodemographic data, elaborating the FNSD history.

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Statement of Ethics

The study was conducted in accordance with the provisions of the Declaration of Helsinki. The protocol was approved by the Ethics Committee of Adiyaman University. Written informed consent was obtained from all study participants (Project Identification Code: 2019/9-18).

Conflicts of Interest

The authors declare no conflict of interest.

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Author Contributions

M.H.O.: conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing - original draft preparation, writing - review and editing, visualization, supervision, project administration, and funding acquisition; M.A.: review and editing, supervision, project administration, methodology. The authors have read and agreed to the published version of the manuscript.

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Моторные и соматосенсорные симптомы определяют уровни когнитивных ошибок при функциональном неврологическом симптомном расстройстве/конверсионном расстройстве

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Резюме

Введение: Уровни когнитивных ошибок при функциональных неврологических симптоматических расстройствах (FNSD) (конверсионное расстройство) подтипов [психогенный неэпилептический припадок (PNES), моторный (M), PNES плюс моторный (PM), моторный плюс соматосенсорный (MS)] всё ещё не до конца исследованы.

Цель: Здесь мы стремились квалифицировать уровень когнитивных ошибок в подтипах FNSD.

Материалы и методы: Симптомы расстройства оценивали с помощью опросника соматоформной диссоциации (SDQ), пересмотренного перечня симптомов 90 (SCL-90-R) и шкалы глобальной оценки (GAS). Шкала когнитивных искажений (CDS) использовалась для оценки когнитивных ошибок.

Результаты: Средний возраст групп составил 28.37±6.99 года (PNES, n=24), 27.90±6.22 года (M, n=21), 30.36±7.86 года (PM, n=19), 31.38±9.02 года (MS, n=21) и 30.87±7.17 года (контроль, n=48) (p=0.377). Что касается глобального индекса тяжести SCL-90-R, между PNES и PM были значительные различия (p=0.003); PNES и MS (p<0.001); M и MS (p<0.001); PM и MS (p=0.001). Показатели CDS-IP были одинаковыми для PM и M (p>0.999); PM и MS (p=0.172). Достоверной разницы между показателями CDS-PA групп пациентов не было (p>0.05).

Заключение: Наше исследование показало, что при FNSD соматосенсорные симптомы в большей степени связаны с когнитивными ошибками, связанными с межличностными отношениями, чем моторные симптомы, а моторные симптомы больше, чем с PNES.

Ключевые слова

когнитивные функции, конверсионное расстройство, функциональные неврологические симптомы, психогенный неэпилептический припадок