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How childhood trauma and emotions influence essential tremor and its severity in Sakarya Province

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Abstract. – OBJECTIVE: Essential tremor (ET) is among the most common central nervous system disorders. It is characterised by symmetrical and bilateral postural tremor, usually affecting the hands. Alongside such motor symptoms, psychiatric symptoms, such as anxiety and depression, often occur. This study aimed to investigate how anxiety, depression and childhood trauma influence ET patients' tremor frequency and severity.

PATIENTS AND METHODS: The participants comprised 85 patients and 70 control volunteers. Participating patients have been admitted to our clinic for hand tremor complaints and diagnosed with ET, according to the Washington Heights Inwood Genetic Study of Essential Tremor (WHIGET) diagnosis criteria, and they returned for follow-up for at least one year after their initial treatment. Patients with thyroid dysfunction, Parkinson's disease, central nervous system pathology, a history of smoking or alcohol use or a history of drug use that may cause tremor were excluded from the study. Patients' demographic data, such as their age and gender, age at disease onset, disease duration, family history and tremor severity were recorded. The Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI) and Childhood Trauma Questionnaire (CTQ) were applied to all patients.

RESULTS: Statistically significant differences were found in BDI score averages and BAI score averages between the patient and control groups ($p = 0.002$; $p = 0.001$) and physical abuse, emotional neglect and sexual abuse scores on the CTQ scale ($p = 0.001$, $p = 0.007$ and $p = 0.001$, respectively).

CONCLUSIONS: Childhood mental trauma and emotional mood disorders are more common among ET patients. However, these disorders do not appear to affect ET severity.

Key Words:
Essential tremor, Childhood trauma, Anxiety, Depression.

Introduction

Essential tremor (ET) is a disease that presents with a bilateral, constant tremor of the hands and forearms[1]. It usually begins as an asymmetrical and postural tremor before spreading to the patient's other side over time, and it may only occur at a specific position. A patient's tremor intensity may vary when the positioning of the affected area changes. Generally, it increases with movement and ceases when at rest; however, rarely, it can also occur during rest. Tremor frequency is generally high, but it can also range from 4 to 12 Hz. Additionally, ET can affect any body part (such as the hands, head, legs and vocal cords). When it affects the hands, it can impair a patient's eating, drinking and writing[2]. ET is the most common movement disorder among the adult population[3], yet it can begin at any age. Although ET's prevalence across all age groups is 0.9%, it affects 4.6% of people 65 years old and over[4]. The aetiology of ET is not clearly understood due to the heterogeneous nature of the underlying pathological process[5]. However, research has suggested that this may be due to central abnormal oscillator dysfunction in the Guillain-Mollaret triangle, a network between the brainstem's nucleus ruber, the inferior olivary nucleus and the dentate nucleus of the cerebellum[6]. For years, the disease has been thought to present with motor symptoms, but recent studies[7,8] and publications have revealed that the disease also has non-motor characteristics, such as cognitive, sensory, and psychiatric symptoms.

Such non-motor psychiatric symptoms – including anxiety, social phobia and particularly depression – have been thought to initially decrease patients' quality of life; however, whether these symptoms result from feeling ashamed or socially excluded due to one's tremor, rather than a direct disease symptom, has not been fully explained[9].

Childhood trauma occurs when a child experiences distress deliberately caused by their caregiver or other adults that harm the child physically, emotionally, mentally or sexually[10]. Although studies have demonstrated a relationship between

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childhood trauma and many neurological diseases, no study has previously examined how childhood trauma affects ET patients. Therefore, we investigated how ET patients' emotional state and childhood trauma influenced their tremor frequency and severity.

Patients and Methods

Patients who applied to the neurology outpatient clinic of Sakarya University Training and Research Hospital between July 2017 and December 2017 with the complaint of hand tremor and were diagnosed with ET according to the diagnostic criteria of the Washington Heights Inwood Genetic Study of Essential Tremor (WHIGET) and followed up for at least one year were included in the study.

Patients with thyroid dysfunction, Parkinson's disease, central nervous system pathology, a history of smoking or alcohol use or a history of using medicine that may cause tremor were excluded from the study. Patients' demographic data, such as their age and gender, age at disease onset, symptom duration, family history, tremor location, tremor type and tremor severity were recorded. The Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI) and Childhood Trauma Questionnaire (CTQ) were applied to all patients.

The BDI was used to determine whether patients had depression. Developed by Beck et al[11], the BDI comprises 21 multiple-choice questions which determine a score of 0-63 points. BDI scores of > 10 points were considered to indicate depression. This inventory investigates not only emotional symptoms, such as despair and guilt, but also physical symptoms – such as fatigue and weight loss. The Turkish version of the BDI's validity and reliability study were confirmed by Hisli et al[12] in 1989, and the scale has been deemed appropriate for Turkish society.

The BAI was used to evaluate patients' anxiety. The Turkish version of this scale's validity and reliability has been confirmed. High scores on this scale indicate higher anxiety. The BAI comprises 21 items which determine a score of 0-63 points. A BAI score of ≥ 17 points was considered to indicate anxiety[13,14].

The CTQ is a self-reported scale to retrospectively screen for childhood experiences of abuse and neglect. The scale's physical or sexual abuse scores range from 7 to 35, while its emotional neglect scores range from 16 to 80, its physical neglect scores range from 8 to 40 and its emotional abuse scores range from 12 to 60[14].

We used SPSS Statistics for Windows, Version 21.0 (released 2012, Chicago, IL, USA), for this study's statistical data analysis. We evaluated whether our data were distributed normally. In comparing our study's two groups, we used a *t*-test for normally distributed data and a Mann-Whitney U-test for abnormally distributed data. A chi-square test was used to compare the groups' numerical data. $p < 0.05$ was considered statistically significant.

Results

Our study's participants included 85 patients and 70 control group volunteers with similar age and gender characteristics. Of the study's patients, 34 (40%) were male and 51 (60%) were female. The patient group's mean age was 42.8 ± 18.9, and the control group's mean age was 39.8 ± 8.5. Patients' age at ET onset was 30.3 ± 17.1, and their disease duration was 12.68. Forty-three patients (50.5%) had a family history of ET, while 42 patients (49.5%) did not. No statistically significant difference was found between the patient and control groups' rates of consanguineous marriage ($p = 1.00$). Of the patients, three (3.5%) had postural tremor, 14 (16.5%) had kinetic tremor and 68 (80%) had both postural and kinetic tremor. According to their BDI scores, 46 patients (54.1%) and 26 control group volunteers (37.1%) had depression, and participants' mean BDI scores were 12.8 ± 8.1 for patients and 8.6 ± 6.3 for the control group. A statistically significant difference was found between the patient and control groups' rates of depression, based on their BDI scores ($p = 0.037$). Additionally, the patient group's average BDI score was significantly higher than the control group's ($p = 0.002$). According to participants' BAI scores, 48 patients (56.5%) had anxiety and 13 control group volunteers (18.6%) had anxiety. Participants' mean BAI scores were 19.6 ± 11.2 and 9.4 ± 5.4 for the patient and control groups, respectively. Also, the patient group had statistically higher BAI scores than the control group ($p = 0.001$; $p = 0.001$) (Table I).

For the patient group, tremor severity was not found to correlate with the BDI, BAI or CTQ subscales or participants' total scores (Table II).

Based on CTQ scores, the patient group's mean emotional abuse score was statistically signifi-

Table I. Demographic data of the patient group and control group.

	Patient group	Control group	*p*
Age	42.8±18.9	39.8±8.5	0.212
Gender (M/F)	34 (40%)/51(60%)	22 (31.4%)/48(68.6%)	0.09
Age at onset of disease	30.3±17.1		
Disease duration (years)	12.68		
Family history			
Yes	43 (50.5%)		
No	42 (49.5%)		
Presence of consanguineous marriage	11 (12.9%)	11 (12%)	
Tremor type			
Postural	3 (3.5%)		
Kinetic	14 (16.5%)		
Postural + kinetic	68 (80%)		
Presence of depression BDI 10 and above	46 (54.1%)	26 (37.1%)	0.037
Presence of anxiety BAI 17 and above	48 (56.5%)	13(18.6%)	0.001
BDI	12.8±8.1	8.6±6.3	0.002
BAI	19.6±11.2	9.4±5.4	0.001

cantly higher than the control group's ($p = 0.03$). Meanwhile, CTQ emotional neglect scores and the number of individuals with elevated emotional neglect scores were higher for the patient group than the control group ($p = 0.007$; $p = 0.01$). Physical abuse history and mean physical abuse scores were also higher for the patient group ($p = 0.001$ and $p = 0.047$, respectively). Moreover, the patient group's average sexual abuse score and average total CTQ score were statistically significantly higher than the control group's ($p = 0.03$ and $p = 0.007$, respectively) (Table III).

The mean age at disease onset was 15.1 ± 2.3 for patients with a family history of ET. Meanwhile, the mean age at disease onset for patients without a family history of ET was 19.3 ± 3.05. This difference was statistically significant ($p = 0.381$).

Discussion

According to WHIGET, ET is defined by the presence of kinetic tremor in the extremities when a patient performs a task, affecting at least one daily-life activity. Other causes of tremor and drug-related tremor are excluded under this definition[15-17]. New evidence[18] suggests that ET may not be a single disease but, rather, a variety of neurodegenerative diseases. ET has a bimodal patient age at onset (during youth and adulthood), which is uncommon among other neurodegenerative diseases[19]. One study[20] reported that ET patients' average age is 51.8 ± 19.5, while their average age at disease onset and disease duration are 38.4 ± 21.6 and 13.4 ± 11.2 years, respectively. In our study, however, ET patients' mean age was 42.8 ± 18.9, their age at disease onset was 30.3 ± 17.1 and their disease durations was 12.68 years.

ET is often inherited through autosomal dominant transmission with incomplete penetration; however, polygenic inheritance has also been observed in some families[21]. Moreover, approximately 50% of patients with ET have a first-degree relative with ET, and ET develops five times more often among patients with such family histories than among other patients[22]. In our study, 43 patients (50.5%) had a family history of ET. Previous studies[19,21] have report-

Table II. Relationship between tremor severity and BDI, BAI and CTQ scores.

	Tremor severity
BDI score	r: -,069
	p:0.533
BAI score	r:-,058
	p:0.596
CTQ emotional abuse score	r: -,164
	p:0.135
CTQ emotional neglect score	r:,046
	p:0.678
CTQ physical abuse score	r:,164
	p:0.134
CTQ physical neglect score	r:,039
	p:0.724
CTQ sexual abuse score	r:,077
	p:0.481
CTQ total score	r:,035
	p:0.748

Table III. Comparison of the Patient Group and Control Group in Terms of CTQ Sub-Scales and Total Scores.

	Patient group	Control group	*p*
Average emotional abuse score	7.4±3.5	6.4±2.1	0.03
Average emotional neglect score	10.8±5.02	9±3.4	0.01
Average physical abuse score	6.3±2.7	5.5±1.8	0.047
Average physical neglect score	7.5±3.4	7.3±2.2	0.61
Average sexual abuse score	6.1±3.1	5.2±1.2	0.03
CTQ total score average	38.1±13.07	33.4±7.03	0.007
Emotional abuse			
Scored 0-7	55 (64.7%)	55 (78.6%)	0.075
Scored 8-25	30 (35.3%)	15 (21.4%)	
Emotional neglect			
Scored 0-12	53 (62.4%)	58 (82.9%)	0.007
Scored 13-25	32 (37.6%)	12 (17.1%)	
Physical abuse			
Scored 0-5	52 (62.1%)	60 (85.7%)	0.001
Scored 6-25	33 (38.8%)	10 (14.3%)	
Physical neglect			
Scored 0-7	60 (70.6%)	43 (61.4%)	0.238
Scored 8-25	25 (29.4%)	27 (38.6%)	
Sexual abuse			
Scored 0-5	68 (80%)	68 (97.1%)	0.001
Scored 6-25	17 (20%)	2 (2.9%)	
CTQ total score			
Scored 0-34	43 (50.6%)	42 49.4%)	0.05
Scored 35-125	42 (49.4%)	23 (32.9%)	

ed such a family history among 50-70% of ET patients, and family history has been reported to be associated with an early age at onset. In our study, we found that patients with a family history of ET were younger at disease onset than other patients, supporting the literature's previous finding.

In addition to motor symptoms, ET has also been associated with non-motor symptoms, such as mild cognitive impairment and fatigue. It has also been associated with psychiatric symptoms, such as depression, anxiety and sleep disorders. Many studies have reported depressive symptoms and/or depression to be more common among patients with ET than control groups. Although depression is very common among patients with ET, its causes and effects have not been investigated in detail. Evidence[7,23,24] has suggested emphasising that depression precedes motor symptoms and may be the disease's primary symptom since 35% of ET patients had moderate or severe depressive complaints.

Lombardi et al[25] reported that patients with ET experienced depression more frequently and Duane and Vermilion[26] found that 49% of patients with ET have depression. Fabbrini et al[27], however, found that 54.1% of patients with ET had depression, *vs.* 23.5% of their control group. Moreover, Chandran et al[28] found a statistically significantly higher rate of depression among patients with ET compared to their control group, and high depression scores have been associated with severe tremor. In our study, in line with the literature, we found depression among 54.1% of our patient group and 37.1% of our control group, representing a statistically significant difference ($p = 0.037$).

Two studies[29,30] involving Turkish and Asian cohorts also reported anxiety, in addition to depression, as an ET symptom. Duane et al[26] found that 55% of patients with ET had anxiety. Meanwhile, Sengul et al[23] found that 71.1% of ET patients had anxiety, *vs.* 20.0% for their control group. In our study, the anxiety scores of patients with ET were statistically significantly higher than the control group's corresponding scores.

Before the current study, no study evaluated the relationship between childhood trauma and ET.

However, many studies[31-33] have reported that traumatic experiences during childhood can be an aetiological factor for migraine, its pathogenesis is unclear – similar to ET – and that it also known to be affected by genetic factors and family history.

This factor has been explained by childhood trauma's disrupting the pituitary-hypothalamic-adrenal gland, causing chronic stress[34]. In our study, ET patients' CTQ evaluations and emotional abuse, emotional neglect, physical abuse, and sexual

abuse sub-scale scores, as well as their total CTQ scores, were statistically significantly higher than the control groups.

The current study faced some limitations. Since it was cross-sectional, it cannot adequately explain relationships between causes and effects. Screening for traumatic life experiences through retrospective surveys can also be considered a limitation.

Thus, we investigated the relationship between ET – whose aetiology remains inadequately understood – and childhood trauma, anxiety and depression. Although we found childhood mental trauma and emotional mood disorders to be more common among patients with ET, we did not find emotional mood disorders or trauma to affect ET severity.

Conflict of Interest

The authors declare that they have no conflict of interests.

Ethics Committee Approval

Ethics Committee Approval was obtained from the Ethics Committee of Sakarya University Faculty of Medicine (16214662/050.01.04/49). The patients signed the written informed consent.

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