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Personality profile in essential tremor: A case-control study

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Abstract

Background—Neuropsychiatric findings described in essential tremor (ET) include depression and anxiety. There may be personality features as well; in 2004, we demonstrated higher harm avoidance (HA) scores in ET patients than controls. We now (1) determined whether this finding could be replicated in a new sample of cases and controls, and (2) analyzed HA sub-scores (HA1–HA4) to further understand case-control differences.

Design/Methods—60 ET cases and 35 controls were evaluated using the Tridimensional Personality Questionnaire (TPQ), which assesses three domains of personality: HA, novelty seeking (NS), and reward dependence (RD).

Results—Total HA and total NS scores were marginally higher in cases than controls (14.8 ± 7.6 vs. 12.4 ± 5.3 , $p = 0.09$) and (13.8 ± 5.4 vs. 11.8 ± 4.9 , $p = 0.09$), respectively. When adjusted for age and gender, cases and controls differed with respect to total HA score ($p = 0.03$) but not total NS score ($p = 0.10$). Further analysis of HA subscores demonstrated that HA1 (anticipatory worry and pessimism) and HA4 (fatigability and asthenia) were most robustly elevated in cases vs. controls ($p = 0.04$ and $p = 0.01$, respectively).

Conclusions—This study suggests that ET cases have a personality profile characterized by a greater HA, with certain domains of HA most affected. It is unclear whether this personality profile is pre-morbid or is a co-morbid feature of the illness, nor it is known whether the greater tendency towards HA in ET lessens receptivity to deep brain stimulation surgery and other therapies.

Keywords

essential tremor; movement disorders; non-motor; personality; neuropsychiatric

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Statistical Analyses: The statistical analyses were conducted by Dr. Louis.

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Introduction

Over the past ten years, non-motor features of essential tremor (ET) have been increasingly recognized [1–3]. These include cognitive impairment as well as dementia [3]. Neuropsychiatric features, including depression, anxiety and social phobia have been reported in ET as well [4,5]. Awareness of these non-motor features is important since they may be associated with functional disability among ET patients [5].

Personality features have been well-described in several movement disorders, including Huntington's disease and Parkinson's disease (PD) [6, 7]. There are, however, surprisingly few studies evaluating personality traits in ET [1, 2]. We previously conducted a case-control study using the Tridimensional Personality Questionnaire (TPQ) to evaluate personality in ET [1]. The TPQ evaluates three domains of personality: harm avoidance (HA), novelty seeking (NS) and reward dependence (RD) [8]. In that initial study, the mean HA score was higher in cases vs. controls [1]. A German study employed the Eysenck Personality Questionnaire to evaluate personality in 105 ET cases [2]; ET cases had a more tender-minded and controlled personality type when their scores were compared with reference (i.e., normative population) data.

We now conduct a second case-control study to: (1) validate our previous findings in a new sample of cases and controls and (2) analyze HA sub-scores (HA1, HA2, HA3, and HA4) to further understand any observed case-control differences. Identifying specific personality characteristics in ET patients would enable treating physicians to better understand the behavior and therapeutic choices of their patients.

Methods

ET cases were ascertained from a computerized billing database at the Center for Parkinson's Disease and Other Movement Disorders, Columbia University Medical Center. The protocol was approved by the institutional review board, and all subjects provided written informed consent. We searched the database for patients (2005 – 2010) with the ICD-9 code 333.1 (ET), excluding patients with ICD-9 codes 332.0 (PD) or 333.6 (idiopathic torsion dystonia). The search yielded 567 potential ET cases. Normal controls were spouses of PD or idiopathic torsion dystonia patients (ICD-9 codes 332.0 or 333.6 seen between 2009 and 2010) who were identified from the same database (n = 2,116 names). Clinical records were selected in alphabetical order, and ET diagnoses were confirmed. Our plan was to enroll 60 ET cases in a 2:1 matching scheme with 30 controls (see sample size calculations). Questionnaires were mailed to 224 subjects and returned by 60 (50.9%) ET cases and 35 (33.0%) controls.

The questionnaire included demographic and clinical items (e.g., past or present medical conditions), and the TPQ, a 100-item, 30-minute, self-administered, true/false test [8]. The TPQ measures three domains of personality: HA, NS and RD [8]. Each domain is assigned a total score and each domain is divided into subcategories (Table 1). The TPQ has been used to study personality in various disorders including migraine and PD [9].

To assess tremor severity, each subject was assigned a spiral score (range = 0 – 12) based on a 0 – 3 rating of tremor in four Archimedes spirals (2 right- and 2 left-hand) (M.A.T) [10].

Statistics

Statistical analyses were performed in SPSS (version 19; Chicago, Illinois). We used chi-square tests (X^2) to assess categorical variables and Student's t-tests and Pearson's correlation coefficients for continuous variables. Nonparametric tests were used when

applicable. Linear regression analyses were used to assess differences between TPQ scores (dependent variable) and diagnosis (ET vs. control), while adjusting for two confounders (age and gender).

Using published TPQ data in normative population groups [11], our sample size (60 cases and 35 controls) provided 83.6% power to detect as little as a 30% difference between cases and controls in total HA score, 95.7% power to detect as little as a 30% difference in total NS score, and >99% power to detect as little as a 30% difference in total RD score (assuming two-sided tests and $\alpha = 0.05$).

Results

224 subjects were contacted via mail and there were 95 responders (60 cases, 35 controls) and 129 non-responders (58 cases, 71 controls). Within cases, responders ($n = 60$) were similar to non-responders ($n = 58$) in terms of gender ($X^2 = 0.32$, $p = 0.57$), ethnicity (Caucasian vs. non-Caucasian, $X^2 = 0.14$, $p = 0.76$), educational category (high school vs. bachelor's degree vs. graduate degree, $X^2 = 1.25$, $p = 0.54$) and family history of ET (yes vs. no, $X^2 = 1.65$, $p = 0.20$). Responders were older than non-responders (age category 50, 51 – 80, 81 years, $X^2 = 4.57$, $p = 0.02$), were taking a higher mean number of ET medications (1.2 ± 0.9 vs. 0.7 ± 0.8 , $t = 3.19$, $p = 0.002$) and had a longer mean duration of tremor (27.3 ± 18.3 vs. 19.0 ± 15.4 years, $t = 2.65$, $p = 0.001$). Within controls, responders and non-responders were similar in terms of age category (age 50, 51 – 80, 81 years, $X^2 = 0.18$, $p = 0.83$), gender ($X^2 = 0.02$, $p = 0.90$) and geographic location (New York vs. New Jersey vs. Other, $X^2 = 0.98$, $p = 0.61$); data on education and ethnicity were not available.

60 ET cases and 35 controls completed the questionnaire. These were similar in terms of age, ethnicity and education (Table 2). A greater proportion of controls than cases were women ($p = 0.03$); this was expected, as many controls were spouses of PD patients, who are predominantly male. Cases and controls were similar with regards to a history of diabetes, hypertension or hyperlipidemia, cancer and heart disease. Seven (11.7%) of 60 ET cases vs. 6 (17.1%) of 35 controls were taking an antidepressant medication (Fisher's $p = 0.65$). Twenty-five (41.7%) of 60 ET cases vs. 8 (22.9%) of 35 controls were taking a beta-blocker (i.e., a medication with depression as a potential side effect) (Fisher's $p = 0.099$).

Total HA score was marginally higher in ET cases compared to controls ($p = 0.09$) (Table 2). Total NS score was also marginally higher in cases vs. controls ($p = 0.09$). There was no difference in total RD score between cases and controls ($p = 0.68$).

Total HA score was negatively correlated with age (Pearson's correlation coefficient = -0.21 , $p = 0.05$). Women had a marginally higher total HA score than men (15.0 ± 7.0 vs. 12.4 ± 6.5 , $p = 0.08$). Therefore, both age and gender were potential confounding factors. In a linear regression model, adjusting for age and gender, ET was significantly associated with total HA score ($\beta = 3.46$, $p = 0.03$). Total NS score, after adjusting for age and gender in a linear regression model, was not associated with ET ($\beta = 2.02$, $p = 0.10$).

HA subscores (HA1 – HA4) were compared between cases and controls. ET cases had significantly higher HA1 (worrying and pessimism, 10 items) ($p = 0.04$) and HA4 (fatigue and asthenia, 10 items) subscores ($p = 0.01$) (Table 2). Cases and controls did not differ with respect to HA2 (7 items) or HA 3 (7 items). In cases, total HA score was not correlated with the spiral score (Pearson's correlation coefficient = 0.10 , $p = 0.48$), duration of tremor (Pearson's correlation coefficient = -0.06 , $p = 0.65$) or number of ET medications (Spearman's correlation coefficient = 0.02 , $p = 0.87$). When we stratified the sample based on antidepressant medication use (yes vs. no), the magnitude of the case-control difference in total HA score persisted in each stratum. Similarly, when we stratified the sample based

on beta-blocker use (yes vs. no), the magnitude of the case-control difference in total HA score persisted in each.

Discussion

Using a case-control design, we evaluated three domains of personality (HA, NS and RD), comparing ET patients to controls. In unadjusted analyses, cases had marginally higher HA scores than controls, and in analyses that then adjusted for the confounding effects of age and gender, ET cases were significantly more harm avoidant than controls. Upon further analysis, ET cases scored significantly higher in two specific HA domains: HA1 and HA4. Patients with higher HA1 subscores manifest two distinctive behavioral tendencies. First, these people are pessimistic worriers who tend to anticipate harm and failure. This tendency is especially pronounced in hazardous, unfamiliar, or realistically difficult situations. However, it also occurs during harmless situations, and even with reassurance and supportive circumstances. Secondly, these people have difficulties getting over humiliating and embarrassing experiences; rather, they tend to ruminate about these experiences for long periods of time. Individuals who score high on HA4 appear to be asthenic and to have less energy than most people. In addition, these people typically recover more slowly than most people from minor illnesses or stress. Greater shyness (HA3) was not detected in this study ample; this may have been a feature of the relatively smaller number of questions used to assess this item and the modest overall sample size used in the study.

ET responders were taking a higher mean number of ET medications and had a longer mean duration of ET than non-responders. However, in our study, neither of these factors was associated with total HA score.

The study had several strengths. It is one of two studies to evaluate personality in ET in a case-control fashion. The study validates previous results demonstrating an association between ET and total HA, and adds more detailed information than the prior study, showing an association between ET and two specific HA subscales. This study provides corroborative evidence supporting a personality profile in ET.

It is unknown from this study whether HA is a pre-morbid personality trait, a consequence of the tremor disorder or manifestation of the underlying disease process. Nonetheless, awareness of a HA personality profile in ET cases may help treating clinicians better understand their patients. It is unknown whether HA affects a patient's receptivity to treatment, especially deep brain stimulation (DBS). There is an anecdotal sense that patients with ET, and even those with severe tremor, seem reluctant to undergo DBS surgery, and limited data show that the number of ET cases referred for DBS surgery is proportionally low [12]. Further studies may investigate the association between HA, embarrassment and receptivity to DBS surgery.

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Table 1

Tridimensional Personality Questionnaire: Temperament Dimensions

Temperament	High Scores	Low Scores
Harm Avoidance (HA)		
HA1	Worrying and pessimistic	Relaxed and optimistic
HA2	Fearful and doubtful	Bold and confident
HA3	Shy	Outgoing
HA4	Fatigable	Vigorous
Novelty Seeking (NS)		
NS1	Exploratory and curious	Indifferent
NS2	Impulsive	Reflective
NS3	Extravagant & enthusiastic	Frugal & detached
NS4	Disorderly	Orderly & regimented
Reward Dependence (RD)		
RD1	Sentimental & warm	Practical & cold
RD2	Persistent	Irresolute
RD3	Dedicated & attached	Withdrawn & detached
RD4	Dependent	Independent

Table 2

Demographics and Clinical Features of ET cases vs. Controls

	ET Cases (n =60)	Controls (n=35)	Significance
Age (years)	68.8 ± 12.1	64.8 ± 10.3	t-test = 1.62, p = 0.11
Women	31 (51.7)	26 (74.3)	X ² = 4.71, p = 0.03
Ethnicity			
Caucasian	59 (98.3)	32 (91.4)	Fisher's exact test, p = 0.14
Non-Caucasian	1 (1.7)	3 (8.6)	
Education			
Bachelor's degree or less	31 (52.5)	14 (40.0)	X ² = 1.39, p = 0.24
Master's degree or higher	28 (47.5)	21 (60.0)	
Spiral score ¹	4.9 ± 3.3	0.2 ± 0.6	t-test = 8.30, p < 0.001
Duration of tremor (years)	27.3 ± 18.3	Not applicable	Not applicable
Current number of ET medications	1.2 ± 0.9	Not applicable	Not applicable
Diabetes mellitus ²			
Yes	8 (13.3)	3 (8.8)	Fisher's exact test, p = 0.74
No	52 (86.7)	31 (91.2)	
Hypertension or Hyperlipidemia ²			
Yes	28 (46.7)	16 (47.1)	X ² = 0.01, p = 0.97
No	32 (53.3)	18 (52.9)	
Cancer ²			
Yes	7 (11.7)	6 (17.6)	Fisher's exact test, p = 0.54
No	53 (88.3)	28 (82.4)	
Heart disease ²			
Yes	9 (15.0)	3 (8.8)	Fisher's exact test, p = 0.53
No	51 (85.0)	31 (91.2)	
Cigarette smoker			
Ever	41 (69.5)	18 (51.4)	X ² = 2.20, p = 0.14
Never	19 (31.7)	16 (47.1)	
Total HA score	14.8 ± 7.6	12.4 ± 5.3	t-test = 1.70, p = 0.09
Total NS score	13.8 ± 5.4	11.8 ± 4.9	t-test = 1.73, p = 0.09
Total RD score	18.9 ± 4.5	18.5 ± 4.4	t-test = 0.41, p = 0.68
HA1 subscore (Anticipatory Worry & Pessimism)	4.1 ± 2.5 Median 4.0	2.9 ± 2.0 Median 2.5	Mann-Whitney test = 2.10, p = 0.04

	ET Cases (n =60)	Controls (n=35)	Significance
HA2 subscore (Fear of Uncertainty)	4.2 ± 1.9 Median 4.0	4.0 ± 1.5 Median 4.0	Mann-Whitney test = 0.65, p= 0.51
HA3 subscore (Shyness with Strangers)	2.9 ± 2.5 Median 3.0	2.9 ± 1.9 Median 3.0	Mann-Whitney test = 0.23, p= 0.82
HA4 subscore (Fatigability & Asthenia)	3.7 ± 2.8 Median 4.0	2.2 ± 2.2 Median 1.0	Mann-Whitney test = 2.51 p = 0.01

All values are mean ± standard deviation or number (percentage) unless otherwise specified.

In some cells, missing data resulted in fewer than 60 cases and 35 controls.

¹ Possible range = 0 – 12.

² Past or present, history obtained by questionnaire.