



Clinical study

Personality traits associated with blepharospasm: A comparison with healthy subjects, patients with facial hemispasm and patients with hyperhidrosis

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ABSTRACT

The aim of this study is to explore the existence of specific personality traits related to patients with blepharospasm (BSP), treated with injections of botulinum neurotoxin (BTX). Sixteen patients with BSP, 22 with facial hemispasm (HFS), 20 with essential hyperhidrosis (EH) and 20 healthy controls (HCs) completed the Temperament and Character Inventory-Revised to explore personality traits based on Cloninger's Psychobiological Model. The results revealed that the four groups differed on the Harm Avoidance (HA) scale and fear of uncertainty subscale, as well as on Persistence (PS). On HA, BSP group did not differ from HCs, but had higher scores than HFS and EH groups. On PS scales, BSP and HFS patients did not differ between them but showed higher score than HCs and EH patients. Our findings suggested that a high level of Harm Avoidance and Persistence seem to be associated with BSP, when compared with any disorders treated with BTX. An evaluation of the personality traits might help the clinicians to early identify BSP patients at greater risk of developing psychopathological disturbances.

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1. Introduction

Blepharospasm (BSP) is a focal dystonia presenting with involuntary cranial muscle spasms that cause sustained eyelids closure. Most of BSP patients have an isolated and idiopathic adult onset dystonia. In addition to motor features, BSP is characterized by non-motor manifestations: in particular, depression and obsessive-compulsive symptoms (OCS) occur in BSP patients [1,2] and have been described as factors reducing patient's quality of life [3,4]. In BSP patients, Botulinum toxin (BTX) treatment is very effective to reduce muscle spasms also in severe cases [5] although currently there is no evidence that BTX could help for non-motor symptoms. Benefits of BTX reduce after the first year of treatment in BSP patients whereas BTX efficacy duration seems not change in other conditions. Therefore, patients with BSP need more frequent injections than patients with other dystonias or hemifacial spasm (HFS) [6]. Actually, the occurrence of OCS in some BSP patients might be another factor leading to a higher need of BTX.

Evidence from cross-sectional studies suggests that personality traits strongly relate to psychopathology [7,8]. Longitudinal studies revealed a weak but substantial prospective effect of personality traits on subsequent occurrence of psychopathology [9]. Since patients with obsessive compulsive disturbances (OCD) show specific personality traits (i.e. higher Harm avoidance and low novelty seeking according to Psychobiological Model [10] and OCS frequently occur in BSP patients, it could be relevant to investigate whether even the BSP patients are characterized by a specific personality profile resembling the profile of OCD. The elucidation of a specific BSP personality might have a relevant clinical implication; it could help to early identify those subjects who are at risk of developing psychopathologies, which have been reported in BSP (i.e. OCD and depression).

Taking into account the abovementioned considerations, we performed a study to identify which personality traits (defined according to Psychobiological Model [10]) are distinctive for BSP patients when compared to healthy subjects (HCs) and patients with other pathologies (i.e. patients with essential hyperhidrosis, EH, as well as patients with HFS), which require recurrent BTX treatments and may present anxiety and depression [11]. Moreover, as abovementioned, since OCS are frequently described in

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BSP patients, it could be relevant to investigate whether they are associated with a specific personality profile resembling the profile of OCD.

2. Materials and methods

In the present study, outpatients with BSP, HFS, and EH were recruited at the BTX clinic for movement disorders of Neurosciences Department, Federico II University of Naples, from January 2016 to March 2017. Patient were recruited consecutively regardless of disease duration and duration of the treatment with BTX. Only isolated and idiopathic forms of BSP were included in the study. Primary BSP was diagnosed on the basis of typical clinical features. Patients with BSP associated with other neurological disorders were excluded by clinical assessment and when necessary by brain MRI scan (degenerative disorders, metabolic diseases, Wilson's disease) [12]. Moreover, we recruited only patients with idiopathic HFS in the study. Participants with clinically relevant cognitive deficit defined as an age- and education adjusted score < 15.5 at the Italian Version of the Montreal Cognitive Assessment (MoCA) [13,14] were excluded from the study. Clinical severity of BSP was measured by the total score of the Jankovich Rating Scale (JRS) that evaluates frequency and intensity of spasms; we used the total score of the JRS including both the frequency and the intensity section of JRS.

All BSP, HFS and EH patients were under treatment with BTX, regularly with one of the three brans of neurotoxins available in Italy (anobotulinumtoxinA, abobotulinumtoxinA, incobotulinumtoxinA).

Finally, healthy controls (HCs) were recruited among patients' friends and employees at the clinic or university centres. To be included in the study, HCs had to meet the following criteria: lack of general cognitive decline, as defined by a normal age- and education-adjusted score on the Italian version of Montreal Cognitive Assessment (MoCA > 15.5) [13,14]; no history of neurological and/or psychiatric disorders based on the DSM-V criteria.

To evaluate personality profile, all patients and HCs completed the items of the Italian version of the Temperament and Character Inventory-Revised (TCI-R) [15,16], which evaluate the following four temperament dimensions: Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD), and Persistence (PS) according to Cloninger's Psychobiological Model of Personality [10]. In detail, NS reflects the experience of intense excitement in response to novel and complex stimuli, or cues, that signal reward. The subscales of NS are: Exploratory excitability vs stoic rigidity (NS1); Impulsiveness vs Reflection (NS2); Extravagance vs Reserve (NS3); Disorderliness vs Regimentation (NS4). The HA is a measure associated with anxiety-proneness in the context of cues that signal punishment, uncertainty or frustration. The subscales of HA are: Anticipatory worry & Pessimism vs Uninhibited optimism (HA1); Fear of uncertainty (HA2); Shyness with strangers (HA3); Fatigability & asthenia (HA4). The RD is linked to social relatedness and dependence and it reflects individual differences in sensitivity to signals of social approval. The subscales of RD are: Sentimentality (RD1); Openness to warm communication vs aloofness (RD2); Attachment (RD3); Dependence (RD4). The PS measures individual differences in perseverance, indicates a tendency to be determined, ambitious, industrious and perfectionists. The subscales of PS are: Eagerness of effort vs laziness (PS1); Work hardened vs spoiled (PS2); Ambitious vs underachieving (PS3); Perfectionist vs Pragmatist (PS4). The TCI-R also includes items evaluating the dimensions of the character: Self-Directedness, Cooperativeness, Self-Transcendence.

The response option format of each item of the TCI-R ranged from 1 = definitely false to 5 = definitely true. For each subscale

(e.g. Novelty Seeking subscale), the total value is given by the sum of the items of which it is composed, while the total value is given by the sum of all the item of the TCI-R.

Since we were interested in exploring possible differences among the groups only on personality traits considered as genetic determined temperamental factors rather than those dimensions influenced by environmental factors [10], we employed the subscales of Novelty Seeking, Harm Avoidance, Reward Dependence, Persistence.

To explore a possible relationship of a specific personality trait with severity of obsessions and compulsions within BSP group, BSP patients completed the Maudsley Obsessional-Compulsive Inventory (MOCI) [17], a questionnaire assessing the severity of obsessions and compulsions.

All participants gave their written informed consent to participate to the study, which was approved by the local ethics committee.

2.1. Statistical analysis

To compare the three groups of patients and HCs on cognitive and personality traits, we applied non-parametric tests such as Kruskal-Wallis test to avoid biases due to the small sample size.

Moreover, Mann-Whitney test was used to compare BSP patients with HCs, HFS and EH patients. All tests were two sided, and based on the exploratory nature of the present study we set the significance level at 5% (alpha < 0.05).

Within BSP patients, a correlational analysis between clinical, cognitive variables and personality traits was performed by Spearman correlation coefficient. The correlations were significant with $p < 0.01$.

All analyses were performed using SPSS version-20 (SPSS Inc., Chicago, IL).

3. Results

We enrolled 16 patients with BSP, 22 patients with HFS, 20 patients with EH and 20 HCs. For BSP patients mean disease duration was 8.3 ± 3.4 , mean BTX treatment time was 6 ± 2.6 and the mean of total dose of BTX per session was 110.7 ± 17.5 .

A significant difference among the four groups was found on age, educational level and MoCA. Whereas BSP patients did not differ from HCs, they differed from EH patients on the three variables. Moreover, BSP group was older than HFS group, whereas no significant difference was found between the two groups on MoCA and educational level (Table 1).

The four groups significantly differed on the following scales and subscales of the TCI-R: i. total Harm Avoidance scale and two subscales anticipatory worry, fear of uncertainty (HA1 and HA2, respectively); ii. total Persistence scale and two of its subscales, such as eagerness of effort and work hardened of persistence (PS1 and PS2, respectively). Moreover, although the four groups did not differ on total Novelty Seeking and Reward Dependence, they differed among them on dependence (RD4) and exploratory excitability (NS1) subscales. The groups did not differ among them on the remaining subscales of the TCI-R.

As for the Harm Avoidance scale, the post-hoc tests revealed that BSP group did not differ from HCs, but had higher scores than both HFS and EH groups. These latter groups did not differ between them. As regards HA subscales, BSP patients had significantly higher scores than HFS and EH, but similar to HCs on the HA2.

As for persistence, BSP and HFS patients did not differ between them on PS scale as well as PS1 and PS2 subscales. BSP patients scored higher than EH on PS1. Moreover, BSP had higher score than HCs on PS1 and PS2.

Table 1
Demographic and psychological parameters of the patients' groups and healthy subjects.

	Hyperidrosis	Blepharospasm	Facial Hemispasm	Healthy controls	K	p
Age	38.2 ± 8.4 †	66.4 ± 9.6	54.6 ± 15.9 †	64.5 ± 8.9	37.412	<0.001
Educational level	15.6 ± 2.9 †	9.6 ± 5.1	10.2 ± 4.7	11.1 ± 4.7	16.795	0.001
MoCA total score	24.8 ± 2.3 †	20.8 ± 4.2	22.3 ± 2.7	22.6 ± 2.4	13.607	0.003
MOCI	–	8.7 ± 4.8	–	–	–	–

MoCA, Montreal Cognitive Assessment; BTX; botulinum neurotoxin; MOCI, Maudsley Obsessive-Compulsive Inventory.

†Different from Blepharospasm group ($p < 0.05$).

Although there was no significant difference among the four groups on NS and RD scales, we found that BSP had lower score than EH but similar score to HFS and HCs on NS1 subscale. Moreover, on RD4 subscale, BSP had similar score than HCs and EH, but significantly higher score than HFS patients (Table 2).

4. Correlational results within BSP group

In BSP patients group we found strong associations of MOCI score with HA total ($\rho = 0.734$; $p = 0.007$) and HA4 (0.839; $p = 0.001$) scores. Finally, we did not find any correlations between MoCA total score, severity of the disease and personality traits (Table 3).

5. Discussion

The present study revealed that patients with idiopathic and isolated BSP have different personality traits in comparison to healthy subjects and patients with HFS and EH. In detail, we found that the level of Harm Avoidance evaluated by the TCI was significantly higher in BSP patients compared to patients with HFS and EH. Our findings evidenced that BSP patients are characterized by a high tendency to be reserved, rigid, fearful and uninterested in new experiences when compared to other types of diseases under BTX. However, the result should be interpreted cautiously since BSP group was not significantly different from healthy subjects on the dimension and, moreover, it was significantly different from EH, HFS groups on demographic and cognitive scores. Therefore, this issue deserves to be better investigated in future studies on larger samples which should be better matched for demographic variables.

Table 2
Comparisons on personality traits among the four groups.

	Hyperidrosis	Blepharospasm	Facial Hemispasm	Healthy controls	K	p
TCI: NS1	32.3 ± 3.8 †	27.5 ± 5.2	28.7 ± 5	26.1 ± 6.4	11.942	0.008
TCI: NS2	21.2 ± 3.6	21.7 ± 5.1	23.1 ± 6	24.5 ± 5.3	3.161	0.367
TCI: NS3	28.8 ± 7.3	24 ± 6.7	26.3 ± 9.5	28.6 ± 7.4	4.492	0.213
TCI: NS4	17.8 ± 3.8	14.7 ± 4.2	18.3 ± 4.3	17.6 ± 5.3	5.314	0.150
TCI: Novelty Seeking total score	99.4 ± 10.9	87.8 ± 13.9	96.6 ± 15.5	96.8 ± 17.4	5.463	0.141
TCI: HA1	29.5 ± 6.9 †	34.7 ± 7.9	30 ± 7.5 †	34.9 ± 6.7	8.361	0.039
TCI: HA2	23.2 ± 4.6 †	27.6 ± 5	23.4 ± 4.3 †	26.3 ± 4.7	12.423	0.006
TCI: HA3	19 ± 5.1	20.6 ± 6.7	19.6 ± 7.2	19.7 ± 5.2	0.441	0.932
TCI: HA4	20.9 ± 5.3	24.8 ± 5.9	21.1 ± 6.7	25.00 ± 6.04	7.446	0.059
TCI: Harm Avoidance total score	92.7 ± 17.7 †	107.9 ± 20.6	94.8 ± 20 †	106.5 ± 18.1	9.761	0.021
TCI: RD1	28.1 ± 4	30.6 ± 4.1	30.1 ± 4.5	28.3 ± 5.6	3.847	0.279
TCI: RD2	35.6 ± 5.3	36.2 ± 7.9	35.6 ± 8.6	35.4 ± 7	0.269	0.966
TCI: RD3	19.8 ± 6.4	17.8 ± 5.4	17.6 ± 5.6	19.2 ± 5.2	1.511	0.680
TCI: RD4	19.0 ± 3.8	18.7 ± 3.6	14.9 ± 4.8 †	18.6 ± 5.2	10.638	0.014
TCI: Reward Dependence total score	102.6 ± 14.5	103.5 ± 13.6	98.4 ± 16.3	101.4 ± 15.7	1.564	0.667
TCI:PS1	30.8 ± 5.9 †	35.0 ± 5.1	34.6 ± 4.7	30 ± 4.1 †	14.412	0.002
TCI:PS2	30.6 ± 4.2	30.6 ± 4.9	32.3 ± 3.4	27.2 ± 4.3 †	14.521	0.002
TCI:PS3	35.8 ± 5.4	33.1 ± 7.8	37.3 ± 6.8	33.4 ± 6.0	6.688	0.083
TCI:PS4	29.1 ± 4.3	27.8 ± 6	30.1 ± 4.6	25.6 ± 5.1	7.232	0.065
TCI: Persistence total score	126.3 ± 15.4	126.6 ± 19.8	134.8 ± 14.7	116.3 ± 14.4	13.288	0.004
TCI Total score	420.9 ± 27.3	426 ± 25	424.7 ± 25.9	421.1 ± 23.7	1.188	0.756

TCI, Temperament and Character Inventory; NS, Novelty Seeking; HA, Harm Avoidance; RD, Reward Dependence; PS, Persistence.

†Different from Blepharospasm group ($p < 0.05$).

Table 3
Correlations between clinical and cognitive variables and personality traits in patients with blepharospasm.

	MoCA total score	Severity of disease	MOCI
TCI: NS1	0.467	0.056	−0.567
TCI: NS2	−0.214	0.466	0.378
TCI: NS3	0.096	0.073	0.235
TCI: NS4	−0.304	−0.033	−0.165
TCI: Novelty Seeking total score	0.133	0.202	−0.014
TCI: HA1	0.050	−0.101	0.582*
TCI: HA2	−0.095	0.180	0.576*
TCI: HA3	0.004	0.005	0.510
TCI: HA4	−0.212	−0.054	0.839**
TCI: Harm Avoidance total score	−0.029	0.033	0.734**
TCI: RD1	0.088	0.006	0.380
TCI: RD2	0.045	−0.062	−0.374
TCI: RD3	0.010	0.026	−0.020
TCI: RD4	−0.188	0.291	0.294
TCI: Reward Dependence total score	0.007	0.183	0.057
TCI:PS1	0.022	−0.086	−0.582*
TCI:PS2	−0.518	0.163	−0.472
TCI:PS3	−0.287	−0.050	−0.078
TCI:PS4	−0.205	−0.310	−0.239
TCI: Persistence total score	−0.254	−0.017	−0.438
TCI Total score	−0.128	−0.084	0.368

MoCA, Montreal Cognitive Assessment; TCI, Temperament and Character Inventory; NS, Novelty Seeking; HA, Harm Avoidance; RD, Reward Dependence; PS, Persistence; MOCI, Maudsley Obsessive-Compulsive Inventory.

** ($p < 0.01$).

* ($p < 0.05$).

Taking into account that individual configurations in personality structure influence the risk of all forms of psychopathology [18] and, in particular, HA has widely been associated with anxiety disorders [19–21] and OCD [22,23], our result might suggest that high levels of HA in BSP may lead to a higher risk of developing OCD or anxiety.

In the present study, the level of persistence evaluated by the TCI-R was significantly higher in both BSP patients and HFS patients when compared to HCs and patients with EH. This temperament is reported to positively correlate with wellness although it may enhance any emotion and can be associated also to occurrence of anxiety and OCD [24,25]. Similar to what has been previously suggested for the relationship between Harm Avoidance and BSP, the present finding suggested that a high level of persistence is a distinctive trait of BSP and might represent a harbinger of psychopathological disorders such as OCS in BSP patients. Since we did not find any difference between BSP and HFS patients on the Perseverance scale, a high level of Perseverance may be a personality trait, which characterizes the HFS patients, too. In support of this interpretation, there may be the previous reports on a similar prevalence of OCS in patients with BSP and HFS [26–28].

Although no significant difference was found among HCs, BSP, HFS and EH groups on Novelty Seeking and Reward Dependence scales, we found that the score on NS1 subscale obtained by BSP patients was similar to that of HFS patients but lower than score of EH. This finding is of interest; in fact, since in factor analyses studies NS1 has been shown to load on to both novelty seeking and, negatively, on harm avoidance [29–32], the results might indicate that BSP as well as HFS are characterized by a tendency to be rigid and to have the difficulty to initiate novel behaviors and to produce active exploration of the environment.

Interestingly, on RD4 subscale, we found that score of BSP patients was similar to that of both HCs and EH groups, but higher than value of HFS group, evidencing that reward dependence and, in particular, the tendency to depend on others approval with low sensitivity to social cues may not to be specific trait for BSP patients.

A significant correlation between more severe obsessive compulsive symptoms, detected at the MOCI, and high levels of Harm Avoidance was found in BSP patients; this finding might be interpreted as a further support to the possible association between BSP and OCD. Moreover, there was no correlation between MOCI score and BSP clinical severity suggesting that the occurrence of obsessive compulsive symptoms would not be reactive to dystonia discomfort.

In the present study, no significant difference was found between BSP group and HCs on age and educational level and cognitive scores; therefore, it is likely that our findings were not influenced by a possible confounding effect of demographic variables. On the contrary, we found that BSP patients were older than EH and HFS patients. Although we could not exclude the possible confounding effect of age on the personality differences between BSP and EH and HFS groups, several normative studies of the TCI-R have demonstrated that age is associated consistently only with Novelty Seeking [32–36]. Regarding the association between age and Harm Avoidance, Persistency and Reward Dependence, the validation studies have revealed mixed results. Moreover, according to the model of person-environment transactions there were no significant changes in personality across the lifespan [37].

As regards cognitive variables, we found that BSP scored lower than EH and HFS on MoCA; this difference could have influenced the findings on the personality comparison between BSP, EH and HFS; however, it is relevant to underline that no patient of BSP group and other groups had an age and education-adjusted score on MoCA above Italian cut-off value for cognitive impairment.

Since our study has a cross-sectional design, it does not allow revealing the causal relationship between personality traits and OCS in BSP; therefore, future longitudinal studies could better elucidate the possible predictive role of these specific personality traits for the development of OCS in BSP.

Taking into account that macro- and micro structural variations of cortical and basal ganglia regions contribute to explain high levels of Harm Avoidance [38], our results of association between higher level of Harm Avoidance in BSP could indirectly be a support the idea that BSP originates from a dysfunction in basal ganglia circuitry, although other brain and brainstem circuits can also be involved [39]. Moreover, our finding on a specific BSP personality might have clinical implications: actually, chemical denervation due to BTX is proved to last longer than clinical effect and especially in BSP time of efficacy seems to be shorter. Clinical response to the treatment is definitely related to severity of dystonia; however, a trend to perfectionism might contribute to the request of frequent injections in BSP. Future studies testing personality traits in other focal dystonia are needed to confirm that only BSP patients present such a specific personality profile.

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