Anorexia Nervosa and Functional Motor Symptoms: Two Faces of the Same Coin?

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The aim of this study was to compare anorexia nervosa (AN) patients and functional motor symptoms (FMS) patients by assessing their variability in demographic and clinical characteristics, risk factors, precipitators, and family history. The authors assessed levels of depression and anxiety, alexithymia, dissociation, body awareness, self-objectification, and interoception in the two groups, using 20 healthy controls (HCs) as a control group for psychometric assessment and for interoception. Unexpectedly, no differences in the three groups were observed for the measures related to awareness of physical state, including body awareness, self-objectification, and interoceptive ability via the heartbeat task. However, the AN and FMS groups were not different from each other but were different from the HC group with regard to anxiety, depression, alexithymia, and dissociation. In light of the similarities found, these data support the hypothesis of a common etiology involving emotional dysfunction in both disorders. These findings suggest that AN and FMS may be disorders belonging to the same spectrum (where emotional dysregulation is a key feature) and that there exist potential opportunities for collaborative, integrated investigations of etiology, diagnosis, and management of these disorders.

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Anorexia nervosa (AN) and functional neurological symptoms (FNS) are two diagnoses typically made in neuropsychiatric settings. AN is an eating disorder characterized by intense concerns over body weight, body image, and dieting. The restriction of food can also be associated with binge eating and purging episodes causing severe and persistent physical and psychological consequences.[1] The term FNS refers to neurological symptoms that are not explained by disease. They may also be called psychogenic, nonorganic, somatoform, dissociative, or conversion symptoms. The most common functional neurological symptoms are nonepileptic attacks and functional motor symptoms (FMS), such as weakness, tremor, or dystonia. These are common in neurology and general medical practice, especially in emergency situations, where they can be mistaken for neurological disorders such as epilepsy or stroke.[2]

Despite major advances and improvements in technology and clinical standards for diagnosing these conditions, their etiology remains poorly understood, their management is difficult, and outcomes are disappointing.

Although apparently quite different, clinical experience leads neurologists and psychiatrists to observe some similarities between patients affected by AN and patients affected by FNS, particularly the ones with symptoms related to movement (FMS), in terms of environmental stressors, psychological profiles, emotional styles, and sensitivity to physiological states.

In terms of environmental stressors, both disorders may develop in vulnerable people as a response to life stressors or traumatic events, serving as strategies for coping with overwhelming emotions or circumstances. Numerous studies have identified the following risk factors for the development of AN: life events, particularly those involving major changes (e.g., loss of a family member or friend, divorce or separation of parents, changing schools or jobs); dieting; peer pressure; inability to effectively deal with stress; personal or family history of obesity, depression, substance abuse, or eating disorders; troubled personal or family relationships; sexual or physical abuse; and history of being teased or bullied, particularly when based on weight or shape.[3,4] Many authors have identified similar environmental stressors in patients affected by FNS, with a major prevalence of life events and sexual or physical abuse.[5,6]

Similar psychological profiles, emotional styles, and sensitivity to physiological states have been observed in both AN and FMS. In terms of personality traits, AN patients demonstrate traits that are highly concordant with obsessive-compulsive personality disorder (OCPD), such as perfectionism, rigidity, higher impulse control, and emotional restraint.[7] According to Lilenfeld et al.,[8] the most common personality traits linked with AN are those of OCPD, including perfectionism and rigidity. Additionally, FMS has been associated with OCPD. Demartini et al.[9] showed a significantly increased proportion of OCPD in FMS patients

compared with patients with organic movement disorders and healthy controls. They speculated that the attribution of sensations to organic rather than psychological or benign causes (typical of FMS patients) might be further fostered in patients with pronounced obsessive-compulsive personality traits. In fact, the pervasive pattern of mental controlling and checking, at the expense of flexibility and openness, might reinforce the patient's belief of illness and exaggerated focus on physical symptoms.

With respect to emotional styles and sensitivity to physiological states, both AN and FMS patients have been found to be significantly more alexithymic than healthy controls.

Numerous studies have suggested that people who develop AN are likely to have poor awareness of personal emotions during starvation and after weight restoration (alexithyimia).[10–12] In addition, the study by Pollatos et al.[13] suggested that patients with AN not only have problems in recognizing certain visceral sensations related to hunger and satiety but also exhibit a generally reduced capacity to accurately perceive signals from within the body (interoceptive awareness). They have also shown that self-objectification (the tendency to focus on the external features of the body) is a risk factor for AN: the preoccupation with the outside appearance of the body may use up some of the valuable resources needed for interoceptive awareness, and thus these individuals become less aware of their own internal conditions, including emotional cues and bodily states such as hunger and satiety.[14] Several psychometric studies have confirmed the association between self-objectification and eating disorders, and more recently interoceptive awareness has been found to actually mediate the relationship between self-objectification and disordered eating.[15]

Similarly, Demartini et al.,[9] found alexithymia to be a significant marker of FMS. They proposed that FMS patients are able to perceive signals of high autonomic arousal triggered during a (physical or psychosocial) precipitating event, but they do not interpret them as such and misattribute them to a somatic illness. In line with this, Ricciardi et al.[16] showed that FMS patients present reduced awareness of internal body signals and speculated that individuals with FMS may dedicate much attention to their bodily symptoms as perceived from the outside because they have limited ability to perceive the internal states of the body and vice versa.

We hypothesized that although patients with AN and FMS have different clinical presentations, they may have similar demographic features (in terms of age, gender, marital status, and educational level), clinical characteristics (in terms of history of abuse, precipitating stressors, presence of chronic pain disorder, subjective fatigue, sleep disorder, subjective cognitive complaints, alcohol and drug abuse, and family history), and etiopathological basis profiles (in terms of alexithymia, dissociation, body awareness, self-objectification, and interoceptive awareness).

In the present study, we directly compared AN patients and FMS patients by assessing their variability in demographic features, clinical characteristics, symptomatology, risk factors, precipitating stressors, and psychiatric family history. We also assessed levels of depressive and anxious symptoms, alexithymia, dissociation, body awareness, self-objectification, and interoceptive awareness in the two groups, using 20 healthy subjects as a control group for the psychometric assessment and for interoception.

METHODS

Subjects

Consecutive patients affected by AN and FMS were recruited respectively at the Eating Disorder Center of San Paolo Hospital and at Besta Neurological Institute in Milano. Twenty patients affected by AN assessed between January and May 2015 were included in the study, and they were compared with 20 patients with a diagnosis of FMS. We also recruited 20 healthy subjects, mainly comprising visitors to the hospital, as a control group for the psychometric assessment and for interoception.

Diagnosis of AN was made according to DSM-5 diagnostic criteria; in order to have a more uniform group, we only included patients with restricting type AN. FMS patients were included if they had "clinically definite"[17] FMS according to Fahn and Williams criteria. The diagnosis was ascertained by a neurologist and psychiatrist on the basis of clinical presentation and appropriate investigations. We did not select cases based on etiological assumptions (e.g., presence of psychological factors); rather, we decided to focus on the motor symptoms themselves to formulate a positive diagnosis. All patients with FMS had symptoms at the time of the examination. We specifically selected patients only with nonremittent FMS in order to have a more homogeneous group. The dominant functional symptoms were gait disorders (30%), tremor (20%), dystonia (40%), and myoclonus (10%).

Exclusion Criteria

Exclusion criteria for all three groups were 1) less than 18 years old; 2) inability to communicate with the researcher or complete questionnaires because of language difficulties, severe learning disabilities, or dementia; 3) any other serious neurological or medical illnesses; and 4) overlay between functional and organic movement disorders.

All subjects were assessed by a psychiatrist (B.D.) at San Paolo Hospital. Demographic information was obtained from each participant through a brief self-report questionnaire designed for the study.

All patients and control subjects provided written, informed consent to participate in the study. The Ethics Committee of San Paolo Hospital reviewed and approved the study protocol.

Clinician-Rated Assessment

Background information concerning previous psychiatric disorders was collected by interview. Information about previous psychiatric disorders among relatives was also

obtained by a standardized interview. A semi-structured interview was coined to assess the following aspects: history of abuse, type of abuse, precipitating stressor (within 6 months of the onset of symptoms), presence of chronic pain, subjective fatigue and cognitive complaints, sleep disorders, and alcohol and drug abuse.

Psychiatric diagnoses were determined with the Structured Clinical Interview for DSM-IV Disorders (SCID): SCID-I for clinical syndromes and SCID-II for personality disorders. These are structured clinical interviews linked to the DSM-IV diagnostic system.[18] They provide suggested wording for questions and criteria for judging the patient's response but also allow for clinical judgment in interpreting whether the patient's responses meet the criteria. They have been shown to generate reliable diagnosis when used by trained clinicians.[19] The SCID-II interview covers the 11 personality disorder (axis II) diagnoses. The instrument has been validated against "longitudinal expert evaluation using all data"[20] and has high test-retest and interrater reliability.[21]

Patients also scored their level of psychological, social, and occupational functioning over the previous year according to axis V of DSM-IV by means of a validated self-report version of the Global Assessment of Functioning (GAF) scale.[22]

The Hamilton Depression Rating Scale (HAM-D) was used to assess depressive symptoms. This is the most widely used clinician-administered depression assessment scale. The original 1960 version contains 17 items to be rated, but four other questions are not added to the total score and are used to provide additional clinical information.[23] Each item on the questionnaire is scored on a 3- or 5-point scale, depending on the item, and the total score is compared with the corresponding descriptor; it has been showed to yield reliable and internally consistent scores and to demonstrate criterion-related validity.

To assess anxiety, we used the Hamilton Anxiety Rating Scale (HAM-A). This is the first rating scale developed to measure the severity of anxiety symptoms and is still widely used today in both clinical and research settings.[24] The scale consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety). Several studies have shown that it is reliable, internally consistent, and valid.[24]

Self-Report Assessment

- Toronto Alexithymia Scale (TAS-20). The TAS-20 was used as a measure of alexithymia. The TAS-20 is the most commonly used self-report measurement of alexithymia,[25] with demonstrated good reliability and factorial validity.[26] The scale consists of 20 items rated on a 5-point scale, anchored at "1=strongly disagree" to "5=strongly agree," with a total score ranging from 20 to 100. Three subscores can also be calculated, but these were not used in the present study due to the relatively small sample sizes and related power issues. Higher scores indicate greater alexithymia. A total score of above 61 is considered the cut-off score for alexithymia based on studies in the general population.[25]
- Dissociative Experience Scale (DES). The DES[27] was used as a measure of dissociation for comparative purposes. The DES is a 28-item self-report questionnaire designed to assess dissociation as defined by the unidimensional model. Each item describes a different dissociative experience, and participants are asked to indicate the percentage of time they have that experience. The DES score is then calculated as the mean of all item scores, ranging from 0 to 100. The DES has excellent internal consistency[28] and split-half reliability.[27]
- Self-Objectification Questionnaire (SOQ).[29] The SOQ was used to examine the degree to which participants experienced their body on the basis of observable, appearance-based (objectified) aspects versus nonobservable, competence-based aspects. Participants are required to rank 10 body attributes by how important each is to their own physical self-concept, from 0 (for least impact) to 9 (greatest impact). Five of the attributes refer to appearance-based attributes (e.g. physical attractiveness) and five competence-based attributes (e.g. energy level). Scores could range from −25 to+25 with higher scores indicating a greater tendency to view one's body in terms of appearance-related attributes. The measure has been shown to have sufficient convergent validity and high test-retest reliability (r=0.92; 38).
- Body Awareness Questionnaire (BAQ). The BAQ is an 18-item scale, which assesses the self-reported attentiveness to normal, nonemotive bodily processes (such as sensitivity to bodily cycles and rhythms, ability to anticipate body reactions); scoring is from 1 (not at all true) to 7 (very true to me). Reliability and validity of this scale have been demonstrated.[30]
- Traumatic Experience Checklist (TEC). The TEC[31] is a self-report measure addressing potentially traumatizing events. Preliminary findings suggest that the TEC is a reliable and valid self-report instrument that can be used in clinical practice and research. Different scores can be calculated, including a cumulative score and scores for emotional neglect, emotional abuse, physical abuse, sexual harassment, sexual abuse, and bodily threat from a person.

Heartbeat Detection Task

Participants were seated, with their wrists gently resting on the band of a heart rate monitor, which was located on a table in front of them. They underwent a "Heartbeat Perception Task," which was performed according to the protocol described by Schandry.[32] This task has good test-retest reliability (up to 0.81) and correlates highly with other heartbeat detection tasks.[33] Heart rate was recorded with a Polar wrist-worn heart rate monitor (model RS 800 CX), as described by Crucianelli et al.[34] Participants were first asked

TABLE 1. Sociodemographic Features of Patients Affected by Anorexia Nervosa, Patients Affected by Functional Motor Symptoms, and Healthy Controls

Characteristic	Anorexia Nervosa Patients	Functional Motor Symptoms Patients	Healthy Control Subjects	p
Gender, female, N (%)	16 (80)	14 (70)	16 (80)	0.143
Age (years), mean (SD)	31.10 (13.11)	45.75 (15.87)	42.10 (13.34)	0.002
Age at onset (years), mean (SD)	17.80 (5.41)	38.85 (16.45)	N/A	<0.001
Body mass index, mean (SD)	15.60 (2.03)	23.70 (3.84)	23.60 (2.05)	<0.001
Marital status, N (%)				0.123
Single	15 (75)	10 (50)	5 (25)	
Married	4 (20)	8 (40)	15 (75)	
Divorced	1 (5)	1 (5)	1 (5)	
Widowed	0 (0)	1 (5)	0 (0)	
Employment, N (%)				0.065
Employed/retired	10 (50)	15 (75)	16 (80)	
Unemployed	10 (50)	5 (25)	4 (20)	
Disabled	0	0	0	
Educational level (years), mean (SD)	13.25 (3.02)	12.45 (3.95)	14.25 (4.07)	0.456

to sit quietly and relax without speaking for 30 seconds before the task started, and they were then asked to count their heartbeats silently. They were asked to concentrate only on their heartbeats and were not permitted to take their pulse or to attempt any other physical manipulations, which could facilitate detection. There were three such counting phases lasting for 25, 35, and 45 seconds and separated by 30-second rest periods. The order of the phases was randomized between participants of each group. The "start" and "stop" signals of each counting phase were provided by the experimenter. After each stop signal, participants had to verbally report the number of counted heartbeats. Participants were informed neither about the length of the counting phases nor about their performance.

Analysis

The accuracy of heartbeat perception (termed interoceptive sensitivity [IS]) was calculated as the mean score of three heartbeat perception intervals according to the following transformation[32]:

$$1/3\sum\left[\left(1-\left(\left|\text{recorded heartbeats} - \text{counted heartbeats}\right|/\text{recorded heartbeats}\right)\right)\right].$$

Using this formula, the IS score can vary between 0 and 1, with higher scores indicating smaller differences between recorded and perceived heartbeats (i.e., more accuracy, or higher IS).

Statistical analysis was performed using SPSS version 23.0 (Statistical Package for Social Science).

The variables were first tested for normality using the Shapiro-Wilks test. The variables that were not normally distributed ($p<0.05$) were log10-transformed. For continuous data, a one-way analysis of variance (ANOVA) was used to test for differences across the three groups with post hoc Bonferroni pairwise comparisons when significant. Chi-square test was used for categorical data. Bonferroni correction was applied to correct for multiple comparisons. Analyses of covariance (ANCOVA) were carried out using scores from the HAM-D and the HAM-A as covariates where appropriate.

A level of $p<0.05$ (two-tailed) was considered significant.

RESULTS

Patients with AN were substantially and significantly younger (mean age=31.1 years) than patients with FMS (mean age=45.8 years) and healthy controls (mean age=42.1 years). Post hoc pairwise comparisons revealed no significant difference between FMS patients and healthy controls in terms of age ($p=0.081$). There was no difference in the proportion of women. BMI was significantly different between the three groups ($p<0.001$): post hoc pairwise comparisons revealed a significant difference between AN patients and FMS patients ($p<0.001$) and between AN patients and healthy controls ($p<0.001$) but no significant difference between patients with FMS and healthy controls ($p=0.125$). The three groups had a similar educational level and marital status (Table 1). Table 2 summarizes factors relating to history of abuse and to specific symptoms.

Both groups reported a similar proportion of abuse (both physical and emotional). There was no difference in the TEC score between the two groups.

Both AN and FMS patients reported a similar prevalence of precipitating stressor within 6 months prior to the onset of the symptoms. Subjective cognitive complaints, sleep disorders, and chronic pain were common in both groups. Subjective fatigue was significantly more common in FMS patients. Alcohol and drug abuse were rare. Global functioning (GAF scale) was similarly impaired in the two groups.

There was a significant difference in TAS-20 alexithymia scores between the three groups ($F[2, 57]=2.436$, $p=0.018$), as shown in Table 3. Post hoc analysis revealed the following

results: AN group vs. FMS group: p=1.00; AN group vs. healthy controls: p=0.022; FMS group vs. healthy controls: p=0.048). Alexithymia was present in 25%, 25%, and 5% of the AN patients, FMS patients, and healthy controls, respectively. The proportions of high-alexithymia patients (TAS-20 score >61) differed significantly between groups (χ^2[4]=6.195, p=0.046). Comparisons between groups showed a significantly increased proportion of high-alexithymia subjects in the AN group (25%) and in the FMS group (25%) compared with healthy controls (5%) (χ^2[1]=3.287, p=0.048 for AN; χ^2[1]=3.876, p=0.048 for FMS). Significant differences in total alexithymia scores remained when HAM-D and HAM-A scores were entered as covariates using ANCOVA (F[2, 57]=4.753, p=0.023 for HAM-D; F[2, 57]=7.976, p=0.766 for HAM-A).

TABLE 2. Factors Relating to History of Abuse and to Specific Symptoms in Patients Affected by Anorexia Nervosa and Functional Motor Symptoms

Factor	Anorexia Nervosa Patients (N=20) (%)	Functional Motor Symptoms Patients (N=20) (%)	p	Effect Size
History of abuse	13 (65)	12 (48)	0.500	
Physical	4/13 (30)	4/12 (33)		
Emotional	4/13 (30)	4/12 (33)		
Sexual	5/13 (40)	4/12 (33)		
Precipitating stressor	10 (50)	8 (40)	0.167	
Medical	0	4/8 (50)		
Psychosocial	9/10 (90)	3/8 (37)		
Physical	0	1/8 (13)		
Abuse-related	1/10 (10)	0		
Chronic pain disorder	7 (35)	13 (65)	0.064	
GI	1/7 (14)	1/13 (8)		
Headache	5/7 (72)	3/13 (23)		
Fibromyalgia	1/7 (14)	6/13 (46)		
Other	0	3/13 (23)		
Subjective fatigue	5 (25)	12 (60)	0.027	0.42
Sleep disorder	8 (40)	10 (50)	0.376	
Subjective cognitive complaints	8 (40)	4 (20)	0.150	
Alcohol abuse	3 (15)	2 (10)	0.500	
Drug abuse	1 (5)	1 (5)	0.756	
Family history	12 (60)	7 (35)	0.037	0.64
Axis I	11/12 (92)	4/7 (57)		
Alcoholism	0	3/7 (43)		
Drug abuse	1/12 (8)	0		

With respect to DES score, results showed a significant difference between the three groups (F[2, 57]=5.646, p=0.049). Post hoc analysis showed the following: AN group vs. FMS group: p=0.904; AN group vs. healthy controls: p=0.044; FMS group vs. healthy controls: p=0.035.

For both HAM-D and HAM-A, we found a significant difference between the three groups (for HAM-D: F[2, 57]=11.806, p<0.001, post hoc analysis: AN group vs. FMS group: p=1.00, AN group vs. healthy controls: p<0.001, FMS group vs. healthy controls: p<0.001; for HAM-A: F[2, 57]=4.189, p=0.02, post hoc analysis: AN group vs. FMS group: p=0.779, AN group vs. healthy controls: p=0.046, FMS group vs. healthy controls: p=0.017).

With respect to self-awareness and self-objectification, one-away ANOVA revealed no significant effect of group (for BAQ: F[2, 57]=0.202, p=0.543; for SOQ: F[2, 57]=0.654, p=0.987).

For data concerning evaluation scales, see Table 3.

With respect to interoceptive sensitivity, one-away ANOVA revealed no significant effect of group (F[2, 57]=0.202, p=0.681) (see Table 4).

TABLE 3. Psychometric Scale Scores in Anorexia Nervosa Patients, Functional Motor Symptoms Patients, and Healthy Controls Subjects[a]

Measure	Anorexia Nervosa Patients	Functional Motor Symptoms Patients	Healthy Control Subjects	p	Effect Size
TEC, mean (SD)	4.85 (3.16)	5.80 (5.67)		0.428	
GAF	74.24 (15.921)	70.10 (18.45)		0.432	
TAS-20, mean (SD)	50.80 (11.18)	48.80 (12.06)	40.85 (11.64)	0.046	0.34
TAS-20, score <51, N (%)	11 (55)	14 (70)	17 (85)		
TAS-20, score range 52–60, N (%)	4 (20)	1 (5)	2 (10)		
TAS-20, score >61, N (%)	5 (25)	5 (25)	1 (5)		
DES, mean (SD)	11.5 (11.87)	9.95 (13.99)	3.20 (3.22)	0.049	0.32
BAQ, mean (SD)	71.45 (22.73)	73.20 (20.32)	80.5 (22.1)	0.543	
SOQ, mean (SD)	−10.4 (10.32)	−10.05 (11.04)	−10.3 (8.3)	0.987	
HAM-D, mean (SD)	7.65 (5.09)	7.30 (6.64)	1.05 (0.22)	<0.001	0.65
HAM-A, mean (SD)	6.40 (5.22)	8.40 (7.41)	3.35 (3.21)	0.020	0.61

[a] BAQ=Body Awareness Questionnaire; DES=Dissociative Experience Scale; GAF=Global Assessment of Functioning; HAM-A=Hamilton Anxiety Rating Scale; HAM-D=Hamilton Depression Rating Scale; SOQ=Self-Objectification Questionnaire; TAS-20=Toronto Alexithymia Scale-20; TEC=Traumatic Experience Checklist.

TABLE 4. Mean Heart Beat at Baseline and Interoceptive Sensitivity

Measure	Anorexia Nervosa Patients	Functional Motor Symptoms Patients	Healthy Control Subjects	p
Baseline heartbeat, mean (SD)	225.45 (70.47)	233.80 (55.96)	226.25 (39.84)	0.562
Interoceptive sensitivity, mean (SD)	0.542 (0.220)	0.588 (0.278)	0.634 (0.234)	0.681

Regarding personality disorders, the prevalence of each subtype is shown in Table 5. Chi-square analysis showed a significant difference in the global distribution of personality disorders ($\chi^2[2]=6.190$, $p<0.045$) within the three groups.

DISCUSSION

We directly compared AN patients and FMS patients by assessing their variability in demographic variables, clinical characteristics, symptomatology, risk factors, precipitating stressors, and psychiatric family history. We also assessed levels of depressive and anxious symptoms, alexithymia, dissociation, body awareness, self-objectification, and interoceptive awareness in the two groups, using 20 healthy subjects as a control group.

Our results showed several demographic, clinical, and etiopathological similarities between patients with AN and patients with FMS, as detailed below.

Demographic Similarities

Both AN and FMS are associated with significantly higher prevalence in the female sex. Patients with AN and patients with FMS have similar marital status (the majority are single), educational level (mainly high school), and employment conditions. On the other hand, AN patients are significantly younger and have lower BMI; the onset of AN is at a younger age.

Clinical Similarities

Both groups of patients present similar rates of abuse, and the percentage of subtype of abuse (physical, emotional, and sexual) is similar. A similar proportion of patients (one-half on average in both groups) reported the presence of a precipitating event (mainly psychological) within 6 months prior to the onset of symptoms.

Both groups presented with high rates of subjective cognitive complaints, sleep disorders, and chronic pain. Subjective fatigue was significantly more common in FMS patients. Alcohol and drug abuse were rare. Both groups reported similar family histories of psychiatric disorders and drug and alcohol abuse.

Depressive and anxious symptoms, although mild, are seen at higher rates in AN and FMS patients than in the general population.

TABLE 5. Structured Clinical Interview for Personality Disorders (SCID II) Scores

Personality Disorders Subtype	Anorexia Nervosa Patients N (%)	Functional Motor Symptoms Patients N (%)	Healthy Control Subjects N (%)
Avoidant	3 (15)	2 (10)	0 (0)
Dependent	1 (5)	1 (5)	0 (0)
Obsess-compulsive	3 (15)	3 (15)	1 (5)
Passive-aggressive	1 (5)	1 (5)	0 (0)
Depressive	0 (0)	0 (0)	0 (0)
Paranoid	0 (0)	0 (0)	0 (0)
Schizotypal	0 (0)	1 (5)	0 (0)
Schizoid	0 (0)	0 (0)	0 (0)
Histrionic	0 (0)	0 (0)	0 (0)
Narcissistic	0 (0)	0 (0)	0 (0)
Borderline	0 (0)	0 (0)	1 (5)
Antisocial	0 (0)	0 (0)	0 (0)

Etiopathological Similarities

Both AN and FMS patients present with higher levels of alexithymia and dissociation than the general population. No difference was found in terms of interoceptive awareness, self-objectification, and body awareness.

Integration With Literature

To the best of our knowledge, this is the first study to directly compare patients affected by AN with patients affected by FMS. There is only one study that has focused on the relationship between AN and, more generally, psychosomatic syndromes, which was conducted by Abbate-Daga et al,[35] who assessed psychosomatic syndromes in patients affected by AN, using the Structured Interview for Diagnostic Criteria for Psychosomatic Research. They found illness denial and alexithymia to be the most common syndromes in their sample, and they identified three subgroups: moderate psychosomatic (49%), somatization (26%), and severe psychosomatic (25%). Nevertheless, their work did not compare two different populations of patients but generally assessed the prevalence of psychosomatic symptoms in a sample of AN patients. Additionally, to date, no studies to our knowledge have been conducted assessing the comorbidity between these two conditions. There is only one report in the literature describing the case of an adolescent girl who underwent Maudsley family-based treatment for AN for a period of 12 months.[36] Atypical response led to an understanding of her presentation as representing a primary conversion disorder, within which AN symptoms were conceptualized as another somatic conversion of emotional distress.

In light of the similarities we found, our data support the hypothesis of a common etiology involving emotional dysfunction in both disorders. These results are supported by neuroimaging studies showing a dysregulation of the limbic system both in AN patients and in FMS patients.[37,38] In fact,

ample evidence suggests that AN is associated with functional alterations within emotion circuits related to the perception and processing of emotionally salient stimuli. The majority of this research has been performed using symptom-provocation paradigms, in which stimuli are AN-specific (i.e., images of food and bodies). When exposed to such stimuli, patients with AN relative to healthy controls exhibit greater activation in widespread cortical and subcortical brain circuits,[39] including the anterior cingulate, prefrontal, and amygdala cortices.[39,40] These hyperactivations have been interpreted as representing heightened negative emotional arousal. Similarly, patients with FMS have been found to have greater amygdala activity in response to arousing stimuli and impaired habituation, along with greater functional connectivity between the amygdala and supplementary motor areas.[38]

Nevertheless, unlike our expectation, neither the AN group nor the FMS group showed any differences in interoception. This is an interesting and surprising finding and in contrast with previous studies assessing interoception in AN and FMS. In fact, Fischer et al.,[41] Kerr et al.,[42] and Khalsa et al.[43] all reported reduced interoceptive awareness (measured with the heartbeat detection task) in AN patients. They proposed a model in which altered body sensation is a key feature of the disorder (also with its therapeutical implications, favoring physiological interventions). Nevertheless, the three above-mentioned studies were conducted in a small number of patients (N=10–15) and present some methodological issues, limiting their validity.

Limitations

The principal limitation of this study is the small number of patients involved. Second, the control group (healthy subjects) was not matched with the AN patients in terms of age and BMI. Third, the interviewer was not blind to the diagnosis of the patients; however, the data were collected blind to the specific hypotheses being tested. Fourth, the assessment was conducted mainly using clinical scales. Scales assessing dissociation have been largely criticized but still remain the main instruments to measure this construct. Additionally, the choice of the TAS-20 might be criticized (although it is the most widely used instrument for assessing alexithymia), as use of a self-report scale might not be appropriate, since alexithymia patients are not very self-reflective. Fifth, subjects were recruited from different sites and by different physicians, which might represent bias.

CONCLUSIONS

These findings suggest that AN and FMS may be disorders belonging to the same spectrum (in which emotional dysregulation is a key feature) and also suggest potential opportunities for collaborative, integrated investigations of etiology, diagnosis, and management of these disorders. Further studies are needed to better clarify this aspect and to evaluate the overlapping presentations between AN and FMS in clinical populations.

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