Neurological soft signs and insight in obsessive–compulsive disorder

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Background
Obsessive–compulsive disorder (OCD) is an anxiety disorder characterized by the presence of obsessions and compulsions that interfere with the patient's life. It has been shown that patients with OCD have increased rates of neurological soft signs (NSS) when compared with healthy controls. NSS are minor abnormalities like poor motor coordination, sensory and perceptual difficulties, and difficulties in sequencing of complex motor tasks. It has been suggested that OCD patients with poor insight are at the most severe end of this spectrum.
Aim of the work
The aim of this study was to determine the frequency pattern of symptoms (obsessions and compulsions) in OCD patients, to examine NSS in patients compared with healthy individuals, and find any correlation between NSS scores and the severity of OCDs [total Yale Brown Obsessive Compulsive Scale (YBOCS) score] and the degree of insight.
Participants and methods
The study included two groups: 30 OCD patients and 30 healthy individuals as controls. Both groups were subjected to psychiatric and neurological examination using the Cambridge Neurological Inventory (Part 2), the YBOCS checklist to detect types of obsessions and compulsions, and the Overvalued Ideas Scale to assess the degree of insight in OCD patients.
Results
The most common types of obsessions and compulsions among the patients were religious (70%), contamination (77%), and cleaning compulsions (77%). OCD patients recorded significantly higher total scores of NSS and domain scores (motor coordination, sensory integration, and primitive reflexes) compared with the control group ($P<0.05$). A positive correlation was found between NSS scores and total YBOCS scores and Overvalued Ideas Scale scores.
Conclusion
We conclude that OCD patients have higher scores for NSS compared with controls, particularly for motor coordination signs. NSS positively correlated with the severity of disease. There was a positive correlation between NSS scores and OVIS scores, which measures the degree of insight.

Keywords:
insight, neurological soft signs, obsessive–compulsive disorder

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Introduction

Obsessive–compulsive disorder (OCD) is an anxiety disorder characterized by the presence of obsessions, including recurrent, intrusive, and unwanted thoughts, images or impulses, as well as compulsions that interfere with the patient's life (American Psychiatric Association, 1994; Rucio *et al.*, 2010). It has been shown that patients with OCD have increased rates of neurological soft signs (NSS) when compared with healthy controls (Peng *et al.*, 2012).

NSS are minor motor and sensory abnormalities that are present normally in the course of early development but considered abnormal when present beyond childhood. They have been reported with increased frequency in a variety of psychiatric disorders including schizophrenia and OCD. Soft signs lack definitive localizing significance but are indicative of subtle brain dysfunction (Mergl and Hegerl, 2005).

It was assumed and postulated that NSS may in part reflect a state of impairment in several functional systems that may include areas such as the parietal lobe, the cerebral cortex, the cerebellum, and the

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frontal lobe. The actual location of the neurological defect need not to be in these regions of the brain, but may involve components of these systems at another level of the neuroaxis. Several authors suggested that the problem of NSS is likely to be a subcortical one, either at the level of the basal ganglia and/or the brain stem. A recent study suggested that inferior frontal gyrus, middle and superior temporal gyrus, and anterior cingulate gyrus changes represent a common neuroanatomical substrate of NSS (Dazzan *et al.*, 2006).

There is evidence linking neurological dysfunction to OCD, such as onset of OCD following head trauma, encephalitis, and streptococcal infections (Murphy *et al.*, 2010). Abnormalities in the orbital frontal cortex, anterior cingulate, caudate, and thalamus have been demonstrated in OCD patients, suggesting the dysfunction of the frontal–subcortical circuitry (Saxena and Rauch, 2000).

OCD patients showed an excess of NSS, especially in areas of motor coordination, sensory integration, and primitive reflexes. NSS in OCD patients may be associated with more severe obsessions (Mergl and Hegerl, 2005).

Literature reviews on NSS in OCD have shown inconsistency in results. Some found a higher prevalence of NSS in OCD patients compared with healthy controls (Hollander *et al.*, 1990; Hymas *et al.*, 1991; Guz and Aygun, 2004; Sevincok *et al.*, 2006). However, other studies did not find any difference between OCD patients and controls in either NSS total score or specific NSS domains (Jaafari *et al.*, 2011).

OCD is a clinically heterogeneous disorder with an insight spectrum ranging from full recognition of obsessions and compulsions as irrational to accepting that the symptoms are truly realistic and rational (Solyomol *et al.*, 1985).

Poor insight has been reported in 15–36% of patients with OCD and it has been suggested to be associated with a specific clinical subtype characterized by an earlier disease onset, a greater severity of obsessive–compulsive and depressive symptomatology, a higher rate of schizophrenia spectrum disorder in first-degree relatives, a higher comorbidity with schizotypal personality disorder, and an insufficient response to both selective serotonin reuptake inhibitors and cognitive behavioral therapy (Tolin *et al.*, 2004; Bellino *et al.*, 2005; Catapano *et al.*, 2010).

Aim of the work

The aim of the current study was to ascertain the frequency pattern of symptoms (obsessions and compulsions in patients with OCD) and examine NSS in OCD patients compared with healthy individuals in order to find the relationship between NSS and severity of the disease and the degree of insight.

Participants and methods

This study was conducted in the outpatient clinic of the Psychiatry Department, Zagazig University Hospitals, Sharkia, Egypt, during the period from November 2014 to May 2015, and was approved by the Ethical committee. Thirty OCD patients who were diagnosed according to DSM IV criteria and 30 healthy participants were enrolled. The control participants were volunteers recruited from among hospital personnel having similar sociodemographic characteristics (i.e. age, sex, education, and residence) to the patient sample. Patients with mental retardation, significant neurological or medical disease, schizophrenia or related disorders, and substance abuse were excluded. The study included both sexes with ages ranging between 15 and 50 years. All participants were informed about the study procedures and their written informed consent was obtained.

Procedures

Both groups were subjected to the following:

A designed questionnaire for collecting socio-demographic data such as age, sex, residence, duration of illness, and family history of medical and psychiatric illness.

Psychiatric and neurological examination.

The structured Clinical Interview for DSM IV, clinical version (SCID-I): It is a clinician-administered, semistructured interview to be used on psychiatric patients or on nonpatient community participants who are undergoing evaluation for psychopathology (First *et al.*, 1997).

(1) The Yale Brown Obsessive Compulsive Scale (YBOCS) (Goodman *et al.*, 1989) for OCD patients: this scale provides a specific measure of the severity of symptoms of OCD and it is a clinician-rated, 10-item scale, each item rated from 0 (no symptoms) to 4 (extreme symptoms) (total range=0–40), with a separate subtotal for severity of obsessions and compulsions. Range of

severity was as follows: 0–7, subclinical; 8–15, mild; 16–23, moderate; 24–31, severe; and 32–40, extreme.

(2) YBOCS Symptoms Checklist (Susanne *et al.*, 2003) for OCD patients: this scale is a measure for types of obsessions and compulsions.

(3) The Cambridge Neurological Inventory (CNI) for patients and controls: the CNI (Part 2) was administered for standardized neurological assessment of psychiatric patients. It was described by Chen *et al.* (1995). The CNI comprises three subscales, including:
   (a) The motor coordination scale involving finger–nose test, finger–thumb tapping, finger–thumb opposition, dysdiadochokinesia, fist-edge-palm test, Oseretsky test, rhythm-tapping, and the go–no go test.
   (b) Sensory integration subscale involving extinction, finger agnosia, stereognosis, agraphesthesia, and left–right orientation.
   (c) Reflex subscale: snout reflex, grasp reflex, and pulmo-mental reflex.

   Each test was performed and rated as 0, 1, or 2, where '0' referred to normal, '1' indicated minor mistakes; and '2' indicated major disruption (Eric and Shapleske, 1995).

(4) The Overvalued Ideas Scale (OVIS) was used to determine OCD patients with poor insight (Neziroglu *et al.*, 1999). Patients with a score of at least 6 on the OVIS were assigned to the OCD with poor insight group (Neziroglu *et al.*, 2004). The OVIS is an 11-item clinician-administered scale used to assess the severity of the overvalued ideation. The OVIS scores range from 0 to 10. Accuracy of belief (item 5) is scored 1 if the belief is totally inaccurate, 3 points if almost inaccurate, 5 points if less than high accuracy, 8 points if almost accurate, and 10 points if totally accurate. Higher scores represent greater overvalued ideas, which have been considered a reliable indicator of poor insight in OCD patients.

Statistical analysis

Statistical analysis was carried out using SPSS for Windows (version 20.0; SPSS Inc., Chicago, Illinois, USA).

Data were expressed as mean±SD for quantitative variables and as number and percentage for categorical variables.

The following tests were done: mean, SD, χ^2-test, Pearson's correlation, and the Mann–Whitney *U*-test. The results were considered significant when the probability of error was less than 5% ($P<0.05$), nonsignificant when the probability of error was more than 5%, and highly significant when the probability of error was less than 0.1% ($P<0.001$).

Results

Demographic and clinical characteristics

The mean age of the studied patients was 28.33 years (SD=9.6, range=18–50). The study included 19 male patients and 11 female patients. There was no significant difference between the two groups in terms of age, sex, residence, and level of education. Positive family history was present in 32% of the patients. Mean age at onset of the disease was 23.41±10.4 years.

Table 1 shows the distribution of different symptoms (obsessions and compulsions) according to the YBOCS checklist. Contamination and cleaning obsessions were present in 77% of patients and religious obsession was present in 70%. Hoarding was the least prevalent obsession, which was present in 17% of the patients.

Table 2 shows that the total NSS scores in the OCD group were significantly higher than those of controls ($P=0.001$). There is also a highly significant difference between patients and controls regarding reflexes, motor, and sensory subscales. The patients have higher levels of NSS compared with controls.

Table 3 shows that the severity of OCD symptoms as measured by YBOCS is positively correlated with the NSS scores as measured by the reflex ($P<0.050$), motor ($P<0.001$), and sensory ($P<0.001$) subscales of CNI in addition to the degree of insight impairment as measured by OVIS ($P<0.001$).

Table 4 shows that there is a positive correlation between NSS as measured by CNI subscales [motor ($P<0.001$), reflexes ($P<0.01$), and sensory ($P<0.001$)] and the degree of insight impairment as measured by OVIS.

Table 5 shows that there was a statistically significant difference between patients with good insight and those with poor insight ($t=4.7$, $P=0.001$) regarding the severity of OCD symptoms.

Table 6 shows the relationship between insight score and NSS. There was a significant difference between patients with good insight and those with poor insight ($P=0.04$) according to the Mann–Whitney test.

Table 1 Distribution of symptoms (obsessions and compulsions) in patients according to the Yale Brown obsessive compulsive scale symptoms checklist

	Contamination		Sexual		Hoarding		Aggressive		Religious		Pathological doubt		Symmetry		Cleaning		Rituals		Ordering		Checking		Collecting	
	No	Y	No	Y	No	Y	No	Y	No	Y	No	Y	No	Y	No	Y	No	Y	No	Y	No	Y	No	Y
Number of patients	7	23	2112	9	25	5	23	7	9	21	10	20	18	12	7	23	12	18	13	17	11	19	38	11
%		77%		30%		17%		23%		70%		67%		40%		77%		60%		57%		63%		37%

No, symptom is not present; Y, symptom is present.

Table 2 Intergroup comparison of neurological soft sign scores

Variables	Patient group (n=30) (mean±SD)	Control group (n=30) (mean±SD)	t	P
NSS total score	11.33±3.17	5.51±2.08	8.39	0.001
Primitive reflexes	0.90±0.803	0.22±0.426	4.10	0.001
Motor coordination	7.40±2.966	3.51±1.45	6.46	0.001
Sensory integration	3.00±1.232	1.74±1.34	3.79	0.001

NSS, neurological soft signs. Significant (P<0.05).

Table 3 Correlation between Yale Brown Obsessive Compulsive Scale score with neurological soft signs and Overvalued Ideas Scale scores

	r	P
YBOCS with NSS		
Primitive reflexes	0.34	<0.050
Motor coordination	0.86	<0.001
Sensory integration	0.68	<0.001
YBOCS with OVIS	0.76	<0.001

NSS, neurological soft signs; OVIS, Overvalued Ideas Scale; YBOCS, Yale Brown Obsessive Compulsive Scale. Significant (P<0.05 high).

Table 4 Correlation of neurological soft signs scores with Overvalued Ideas Scale score

	r	P
NSS with OVIS		
Reflexes	0.40	<0.010
Motor	0.67	<0.001
Sensory	0.46	<0.001

NSS, neurological soft signs; OVIS, Overvalued Ideas Scale; r, Pearson correlation test. Significant (P<0.05); highly significant (P<0.01).

Table 5 Relationship between insight and Yale Brown Obsessive Compulsive Scale

	Insight		t	P
	Poor (n=9)	Good (n=21)		
YBOCS				
Mean±SD	25.9±6.1	16.3±4.6	4.7	0.001
Range	17–36	8–23		

YBOCS, Yale Brown Obsessive Compulsive Scale. Highly significant (P<0.01).

Table 6 Relationship between insight and neurological soft signs

	Insight		MW	P
	Poor (n=9)	Good (n=21)		
CNI				
Range	0–3	0–2	4.09	0.04
Median	1.0	0		

CNI, Cambridge Neurological Inventory.

Discussion

The study included 30 patients diagnosed with OCD according to the DSM IV criteria of diagnosis, and 30 healthy participants as a control group.

The mean age of patients at the time of onset of disease was 23.41+41 years, which does not match the data in the study conducted by Grant *et al.* (2007), who found age at onset to be 38.8±9.7 years. This may be due to different settings and study samples.

The most common types of obsessions and compulsions among the patients were religious and contamination obsessions and cleaning compulsions. A similar finding was reported by Okasha *et al.* (2002) in Egyptian people. The emphasis on cleanliness or ritual purity is the cornerstone of most of the compulsive rituals. The number of prayers and the verbal content can be associated with scrupulousness, checking, and repetition. The ritualistic cleaning procedures also can be a source of obsessions and compulsions about religious purity. Another evidence of the religious connotation inherent in OCD in Moslem culture lies in the term 'El Weswas': this term is used in reference to the devil, and at the same time is used as a name for obsessions, which may lead patients to religious healers more than to the medical profession.

In this study, the CNI test revealed a significantly higher incidence of NSS in OCD patients than in controls regarding the total score and the three subscales (primitive reflexes, motor coordination, and sensory integration).

Hymas *et al.* (1991) found that a group of patients with OCD, compared with healthy controls, showed loss of motor fluency, hesitancy in initiation of limb movements, speech and gait abnormalities, co-gwheel rigidity, complex repetitive movements, and tics.

Bolton *et al.* (2000) found that individuals with OCD had elevated levels of soft signs compared with nonclinical controls in many categories of the CNI: motor coordination, sensory integration, primitive reflexes, extrapyramidal signs, and failure of suppression.

Guz and Aygun (2004) found significant differences in total soft sign scores, graphesthesia, and two-point discrimination between OCD patients and controls but did not find significant differences in reflexes and motor subscale scores.

On the other hand, Stein *et al.* (1994) found no significant differences between the patients with OCD and normal controls in both total NSS scores and sensation. A possible explanation for this discrepancy might be that OCD represents a heterogenous psychiatric disease with some patients exhibiting different patterns of motor dysfunction and other patients demonstrating no signs of movement disorders.

From the results we found that the severity of OCD (measured by YBOCS) was significantly correlated with CNI subscales (reflexes, motor, and sensory) in addition to the degree of insight measured by OVIS.

Also, our results showed an association between higher NSS scores, increased symptoms severity, and poor insight.

Bellino *et al.* (2005) found a significant relation between the degree of insight measured by the OVIS and OCD with chronic course.

Turksoy *et al.* (2006) demonstrated a continuum of insight in OCD, which ranged from excellent, through poor insight, to delusional thinking. Thus, insight is an extreme range of OCD severity. With more severe symptoms, insight is gradually lost and the patient becomes unaware of his disease and is considered to have poor insight. This explains the correlation between the degree of insight and the severity of OCD symptoms.

Our research did not study an interesting finding of Hollander, that levels of NSS correlated significantly with severity of obsessions (as measured by the YBOCS Obsession Sub-scale) but not with the severity of compulsions (as measured by the YBOCS Compulsions Subscale). These finding provide evidence that confirms the relation between NSS and OCD symptom severity.

Mataix-Cols and Odile (2006) assumed that OCD patients had abnormalities in the basal ganglia, orbitofrontal cortex, and the thalamus. This would make the basal ganglia and frontal cortex common sites of pathology in both OCD and NSS and further explains why the motor subscale of the CNI was more correlated with the YBOCS score (as the basal ganglia are responsible for control of involuntary movements).

Grant *et al.* (2007) reported that patients with onset of OCD symptoms during childhood were predominantly male, have higher scores on the

YBOCS, suffer from higher rates of comorbid tic disorders, and have higher familial rates of OCD. No similar results could be found in this study. The difference could be attributed to the small number of cases, inaccuracy of detecting age at onset, and cultural differences.

In this study, sex difference had no significant effect on severity of OCD, severity of NSS, or its subscales. Relations between sex and type of obsessions or compulsions proved to be nonstatistically significant, except sexual symptoms, which were statistically significant.

Lensi and Cassano (1996) found different results. OCD in men has been characterized as a subtype with a more frequent history of prominent sexual, exactness, and symmetry obsessions, and checking, symmetry, and bizarre compulsions. Among females with OCD, washing rituals and contamination fears may be more common.

The differences between those studies and the present study could be attributed to the small sample and the cultural differences.

Limitations

Our study was limited by the small number of patients. The effect of sex, age, and duration of illness on NSS and insight was not studied. The influence of drugs and substance abuse has not been taken into account.

Thus, we recommended further studies taking into consideration the previous factors.

OCD patients should be examined for NSS, which will provide an idea about the severity of OCD and the degree of insight.

Conclusion

OCD patients have higher scores for NSS compared with the control group, particularly for motor coordination signs. The NSS positively correlated with the severity of the disease. There was a positive correlation between NSS scores and OVIS score, which measures the degree of insight.

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Conflicts of interest

There are no conflicts of interest.

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