Nonverbal memory and organizational dysfunctions are related with distinct symptom dimensions in obsessive-compulsive disorder

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ABSTRACT

Recent acceptance that obsessive-compulsive disorder (OCD) represents a heterogeneous phenomenon has underscored the need for dimensional approaches to this disorder. However little is known about the relation between neuropsychological functions and symptom dimensions. The purpose of this study was to identify the cognitive deficits correlated with specific symptom dimensions. Thirteen categories in the Yale-Brown Obsessive Compulsive Scale symptom checklist from 144 patients with OCD were analyzed by principal component analysis. Correlations between identified symptom dimensions and neuropsychological functioning, measured by the Boston Qualitative Scoring System, were analyzed. Five factors or dimensions were identified: contamination/cleaning, hoarding, symmetry/ordering, obsessions/checking, and repeating/counting. Dysfunctions in nonverbal memory and organizational strategies were related to the symmetry/ordering dimension and the obsessions/checking dimension, respectively. The results of the present study support a transculturally stable symptom structure for OCD. They also suggest the possibility that nonverbal memory dysfunction and organizational impairment are mediated by distinct obsessive-compulsive dimensions.

1. Introduction

According to Diagnostic and Statistical Manual of Mental Disorders (4th Edition, DSM-IV), the current dominant nosological system, obsessive-compulsive disorder (OCD) is defined as the presence of recurrent obsessions and compulsions that cause marked distress or impaired functioning. Although it has been regarded as a unitary psychiatric disorder, heterogeneity in OCD has been suggested not only by the diversity of clinical and demographic characteristics of OCD patients (Foa et al., 1983; Rasmussen and Tsuang, 1986; Zohar et al., 1997) but also by genetic findings (Leckman et al., 2001). Therefore, some recent efforts to expand understanding of the causes and treatment of OCD have attempted to identify subtypes. Several methods for developing such subtypes have been proposed (Insel and Akiskal, 1986; Khanna and Mukherjee, 1992; Calamari et al., 1999; Abramowitz et al., 2003). The most popular basis for deriving subtypes of OCD has been the overt symptoms of patients, and the results pointed to several replicable subtypes such as washing,

doubting-checking, and obsessional phenomena. However, attempts to dissect the phenotype of OCD into homogenous subtypes have been limited by the difficulty of recruiting pure subtypes of patients (McKay et al., 2004).

In recent years, factor analytic studies using the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) symptom checklist (Goodman et al., 1989) have reduced the symptoms of OCD into a few meaningful dimensions that better account for the heterogeneity of the disorder (Baer, 1994; Leckman et al., 1997; Mataix-Cols et al., 1999b; Summerfeldt et al., 1999). They have consistently identified four or five symptom dimensions and have suggested the temporal and transcultural stability of symptom structures of OCD (Mataix-Cols et al., 2002b; Kim et al., 2005; Mataix-Cols et al., 2005; Rufer et al., 2005; Matsunaga et al., 2008). A recent meta-analysis reported that the four-factor structure explained a large proportion of the heterogeneity in the clinical symptoms of OCD (Bloch et al., 2008).

On the other hand, many neuropsychological studies have yielded diverse findings regarding the cognitive dysfunctions of OCD patients. Several studies have reported deficits in attentional set-shifting ability and response inhibition in patients with OCD (Head et al., 1989; Martinot et al., 1990; Veale et al., 1996), while others have found deficits in visual memory and visuospatial ability (Christensen et al., 1992; Savage et al., 1999; Tallis et al., 1999; Okasha et al., 2000). Motor

slowness or the impairment of spatial working memory has been reported as well (Purcell et al., 1998a,b; Mataix-Cols et al., 1999a). Among them, the deficit in nonverbal memory is one of the most consistently reported neuropsychological abnormalities in OCD.

Neuropsychological approaches based on dimensions identifying subtypes according to symptoms might enhance understanding of the causes of OCD and lead to the development of more effective treatments that could be specialized for each patient. Studies have suggested specialized cognitive behavioral therapeutic approaches for specific subtypes and necessity to examine cognitive subtypes of OCD for more effective interventions for patients (Williams et al., 2002; Sookman et al., 2005). However, previous studies regarding the relationship between OCD subgroups and neuropsychological deficits have reported primarily negative results. For example, one study examining the relationship between the symptom dimensions of OCD and verbal episodic memory found no significant associations (Deckersbach et al., 1999). Khanna et al. found no differences in neuropsychological test results among washers, checkers, and pure obsessionals (Khanna and Vijaykumar, 2000). A recent study of 60 OCD patients reported that there were few differences in neuropsychological performances of OCD subjects versus those of healthy controls (Simpson et al., 2006). Our previous study also identified no significant differences in regard to nonverbal memory functions between checkers and non-checkers (Shin et al., 2004). These conflicting findings can be explained, in part, by small sample sizes or by the insufficient sensitivity of neuropsychological tests employed. The quantitative scoring system, which has used to measure the organization strategies, has not been able to evaluate the executive functions comprehensively (Shin et al., 2006).

The Boston Qualitative Scoring System (BQSS) for the Rey-Osterrieth complex figure test (ROCF) was developed to assess nonverbal memory functions and organizational abilities and provides comprehensive sets of qualitative ratings in addition to quantitative summary scores (Stern et al., 1999). This measure may more exactly and sensitively identify executive dysfunctions. Studies have demonstrated that the BQSS organization summary score is a clinically useful measure of executive dysfunction (Somerville et al., 2000; Shin et al., 2006), and previous studies of patients with OCD have reported impairments in nonverbal memory and executive function (Olley et al., 2007).

This study was designed to investigate the cognitive deficits – nonverbal memory and organization ability - in OCD patients and to compare these with results obtained from control subjects. It also examined relationships between these deficits and each of the symptom dimensions. We factor analyzed data obtained from OCD patients in response to the Y-BOCS symptom checklist and used the BQSS to examine the correlations between the identified symptom dimensions of OCD and the results of neuropsychological testing.

2. Methods

2.1. Subjects

The sample consisted of 144 patients (93 men and 51 women) meeting DSM-IV criteria for OCD, according to the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (First et al., 1996). At the time of the study, the mean duration of illness was 7.68 years (SD = 6.66) and the mean age of onset was 18.44 years (SD = 6.93). Internet and leaflet advertisements were used to recruit 144 control subjects (93 men and 51 women). Absence of Axis I psychiatric disorders in the control group was confirmed with the Structured Clinical Interview for DSM-IV, Nonpatient Version (SCID-NP). There were no significant differences in regard to age [26.07 years (SD = 7.84) for OCD patients; 24.68 years (SD = 4.79) for controls], and socioeconomic status [2.95 (SD = 0.70) for OCD patients; 2.86 (SD = 0.68) for controls]. The control group obtained a slightly but significantly higher mean IQ score [109.34 (SD = 11.50) for OCD patients; 113.25 (SD = 11.32) for controls], as estimated by the Korean version of the Wechsler Adult Intelligent Scale (Yum et al., 1992), than did the OCD group (p = 0.003).

Patients with histories of psychosis, bipolar disorder, Tourette's disorder or other tic related conditions, substance abuse or dependence, significant head injury, seizure disorder, or mental retardation were excluded from the study. The presence of comorbid major depressive disorder or dysthymic disorder did not constitute an exclusion criterion if OCD was the primary diagnosis. The present study was approved by the institutional review board at Seoul National University Hospital, and written informed consent was obtained from all subjects after the procedures had been fully explained.

2.2. Pharmacotherapeutic status of OCD patients

At the time of testing, 76 patients (44 drug-naive, 32 drug-free for at least four weeks) were not taking any medication, and 68 were taking medication. The mean daily doses of serotonin reuptake inhibitors were 33.75 mg of citalopram (24 patients), 46.11 mg of fluoxetine (18 patients), 198.33 mg of sertraline (15 patients), 100.00 mg of clomipramine (5 patients), 50.00 mg of paroxetine (5 patients), 30.00 mg of escitalopram (2 patients), and 125.00 mg of fluvoxamine (2 patients). Additional medications included clonazepam (37 patients; 1.06 mg), risperidone (12 patients; 0.81 mg), quetiapine (8 patients; 57.81 mg), olanzapine (5 patients; 12.50 mg), valproate sodium (2 patients; 312.50 mg), alprazolam (1 patient; 1.50 mg), lorazepam (1 patient; 1 mg), and trazodone (1 patient; 125 mg).

2.3. Clinical measures

The Y-BOCS symptom checklist was used to assess OCD symptoms. This measure comprise more than 60 common obsessions and compulsions classified into 13 major symptom categories and two categories of miscellaneous obsessions and compulsions. The severity of OCD symptoms was measured on the 10-item clinician-rated Y-BOCS (Goodman et al., 1989). Their mean score on the total Y-BOCS was 23.10 (SD = 7.08), and mean score on the obsessions and compulsive subscale were 12.15 (SD = 3.83), and 10.95 (SD = 4.20), respectively. The Beck Depression Inventory (BDI) (Beck et al., 1961) and the Beck Anxiety Inventory (BAI) (Beck and Steer, 1990) were also administered. The mean scores for BDI and BAI were 17.95 (SD = 9.98), and 19.67 (SD = 11.90), respectively.

2.4. The BQSS for the ROCF

The BQSS, a method of scoring the ROCF, provides a comprehensive series of scores for sensitively assessing visuoconstructive skills and executive functions (Stern et al., 1999). Organization score, developed to assess the organization aspects involved in reproducing the figure, contributes to understanding the reasons underlying poor recall as well as to identifying executive dysfunction (Somerville et al., 2000; Shin et al., 2006). We employed four summary scores of the BQSS. Copy Presence and Accuracy (CPA) is a composite score of Configural Presence and Accuracy, Cluster Presence and Accuracy, and Detail Presence for the Copy condition. Immediate Presence and Accuracy (IPA), and Delayed Presence and Accuracy (DPA) are composite scores of those for the Immediate Recall condition, and Delayed Recall condition, respectively. Organization is a composite score of Planning and Fragmentation for the Copy condition.

The BQSS measures were scored by two trained psychologists (H.S.K. and N.Y.S.). Inter-rater reliability was evaluated by comparing the scores given by each psychologist for 20 cases (10 OCD patients and 10 control subjects). The spearman's rank correlation coefficients for each summary score were 0.723 (p < 0.001) for CPA, 0.980 (p < 0.001) for IPA, 0.970 (p < 0.001) for DPA, and 0.940 (p < 0.001) for Organization.

2.5. Statistical analyses

The Mann-Whitney tests were used to compare OCD patients and control subjects in regard to baseline demographic measures and summary scores of the BQSS.

Subsequently, principal components analysis was performed following the procedures used in previous studies (Baer, 1994; Mataix-Cols et al., 1999b; Matsunaga et al., 2008). In summary, each of the 13 major symptom categories in the Y-BOCS symptom checklist was assigned a score of two, one, or zero based on the response provided by patients. A score of two was assigned to a category when a patient reported that any of the specific symptoms included in the category represented a principal problem. A score of one was assigned to a category when a patient reported having at least one of the specific symptoms included in the category but did not consider it to present a principal problem. A score of zero was assigned for categories in which the patient did not have any of the symptoms included in that category. Only current symptoms were counted because this study focused on clarifying the relationships between symptom presentation and current neuropsychological functioning. An eigenvalue greater than one (Kaiser's criterion) was used as the criterion for the retention of a factor. Varimax rotation was applied to the initial factor solutions to facilitate interpretation.

Kendall's tau coefficients (τ) were calculated to evaluate the relationship between symptom dimensions and variables regarding demographic and clinical characteristics and summary scores of the BQSS. A level of p < 0.05 was considered significant.