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The differential impact of executive attention dysfunction on episodic memory in obsessive-compulsive disorder patients with checking symptoms vs. those with washing symptoms

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Abstract

Neuropsychological studies of obsessive-compulsive disorder (OCD) have pointed to memory and attention deficits among its sufferers, but these reports have largely ignored the possibility that cognitive disturbances may vary across OCD clinical subtypes, or that their interactions may differ between subtypes. The purpose of the present study was to determine whether 'checkers' and 'washers' demonstrate differences in their memory and executive attention function. Fifty-three outpatients with primary DSM-IV diagnosis of OCD with typical checking ($n = 27$) or washing ($n = 26$) rituals participated in the study. Patients were administered the Wechsler Memory Scale-Revised and a comprehensive neuropsychological battery to assess executive attention function. Various neuropsychological tests were then subjected to factor analysis. Neuropsychological test results and obtained factor scores were compared between 'washers' and 'checkers'. Effects of these factor scores on memory by OCD subtypes were examined. No significant difference in terms of demographic and clinical variables was found between the two groups. Checkers displayed performance deficits on Stroop test, Trail Making Test, GO/NO GO test (commission errors) and category fluency. Three factors, inhibition, cognitive flexibility, and multi-tasking, were obtained. Statistically significant differences were observed between the two groups on the inhibition and the cognitive flexibility scores, but not on the general memory or the multi-tasking score. There was a statistically significant interaction between groups and the inhibition score. Only among 'checkers', a significant correlation was noted between the inhibition factor and the general memory, while no such correlation was observed among 'washers'. Among 'checkers', poor general memory was related to inhibition deficits.

Keywords: OCD; Clinical subtype; Neuropsychology; Executive attention function; General memory; Inhibition

1. Introduction

Obsessive-compulsive disorder (OCD) is characterized by obsessions and compulsions that are severe enough to interfere with daily functioning and cause significant distress (American Psychiatric Association, 1994). Obsessions are defined as persistent thoughts, impulses or ideas that are experienced as inappropriate and that generate anxiety or distress. Compulsions are defined as repetitive behaviors or mental acts that are typically performed in an attempt to relieve the distress brought on by the obsessions. The two most common types of compulsions are checking compulsions, in which individuals repeatedly check to see if they have correctly completed an activity, and washing compulsions, in which individuals repeatedly wash themselves.

There is substantial evidence that OCD has been associated with brain dysfunction and cognitive abnormalities (Chamberlain et al., 2005). Neural systems involved in OCD have been identified with the use of functional

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neuroimaging methods, such as positron emission tomography (PET) (Baxter et al., 1987; Swedo et al., 1989), single photon emission computed tomography (SPECT) (Machlin et al., 1991; Busatto et al., 2000) and functional magnetic resonance imaging (f-MRI) (Pujol et al., 1999; Ursu et al., 2003). These studies have provided consistent evidence of increased and/or decreased activity in local regions such as the anterior cingulate cortex, the orbitofrontal cortex (OFC) and the caudate nucleus.

Further evidence of frontal-striatal dysfunction comes from studies noting an association between OCD or OCD-like behavior and neurologic disorders, such as Parkinson disease (Daniele et al., 1997), Gilles de la Tourette syndrome (Como et al., 2005), Huntington disease (Cummings and Cunningham, 1992) and frontal lobe injury (Donovan and Barry, 1994; Berthier et al., 1996).

These findings, taken together, have led investigators to hypothesize that OCD subjects have specific neuropsychological deficits related to changes in brain function and these deficits exacerbate and/or maintain symptoms. Many studies have examined memory and executive attention function in OCD. However results of these studies were frequently inconsistent. Several studies have found that OCD patients have selective neuropsychological deficits in executive attention function, verbal and non verbal memory, and visuospatial and visuoconstructial skills (Kuelz et al., 2004; Muller and Roberts, 2005). A number of studies have also investigated interrelations between different neuropsychological variables in OCD and these found that impaired use of organization strategies may also contribute to memory dysfunction (Savage et al., 1999, 2000). On the other hand, some studies found no evidence of neuropsychological deficits in OCD (Abbruzzese et al., 1995; Simpson et al., 2006).

OCD is a heterogeneous condition that is likely composed of multiple clinical subtypes that are unique in terms of their etiological pathways and their psychological correlates (McKay et al., 2004). Nonetheless previous work on neuropsychological deficits has largely ignored the possibility that cognitive disturbances may vary across subtypes, and the possibility that their interactions may differ between subtypes.

We therefore set out to compare the neuropsychological performance in the domains of memory, executive attention function among checkers and washers, and to evaluate the mediating effects of executive attention function on memory in OCD.

2. Methods

2.1. Subjects

Study patients were consecutive Japanese patients with OCD who attended the outpatient clinic at the Nagoya City University Hospital between October 2001 and June 2005. Diagnosis was made on the basis of a structured interview by trained psychiatrists using the structured Clinical Interview for DSM-IV Patient Version (SCID-P). Participants had to be between 18 and 55 years of age. Exclusion criteria were current or past neurological or other significant medical illness, current or past substance dependence, current or past psychiatric disorder including schizophrenia, mood disorder or anxiety disorder other than OCD, mental retardation and pregnancy. Because depressive mood and anxiety could interfere with neuropsychological performance, Beck Depression Inventory-II (Beck et al., 1996) and State-Trait Anxiety Inventory (Spielberger et al., 1970) were administered.

Severity of OCD was assessed with the clinician-rated 10-item Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) (Goodman et al., 1989a,b).

In order to compare the medication dosage of different drugs prescribed for the patients, the equivalence of each drug was calculated in accordance with the advice of previous study (Bollini et al., 1999), as follows by standardizing the recommended therapeutic doses with respect to the recommended dose of clomipramine (150 mg/day). For instance, fluvoxamine, whose therapeutic daily dosage is 150 mg, was considered equivalent to clomipramine. The therapeutic daily dosage for paroxetine was 30 mg and so the prescribed dosage was multiplied by five.

The study was approved by the Ethics Committee of Nagoya City University Medical School and was conducted in accordance with the Helsinki Declaration. Written informed consent was obtained from each subject before enrollment into this study.

2.2. Definition of clinical subtypes of OCD

To compare neuropsychological deficits between 'pure checkers' and 'pure washers', we defined clinical subtypes of OCD as follows. First, we ascertained OCD symptoms using the Y-BOCS symptom check list (Goodman et al., 1989a,b), a comprehensive list with examples of the most common obsessions and compulsions organized into 13 categories (seven obsessions; aggressive, contamination, sexual, hoarding, religious, symmetry, somatic. Six compulsions; cleaning, checking, repeating, counting, ordering, hoarding). Five symptom dimensions of these 13 categories were identified in a previous study (Mataix-Cols et al., 1999), namely contamination/cleaning, aggressive/checking, symmetry/ordering, hoarding, and sexual/religious. In this study, we quantified responses on each of the 13 major categories in accordance with the advice of previous study (Mataix-Cols et al., 1999) as follows: 0 (absent) = patient did not have any of the symptoms under that category; 1 (mild) = patient had at least one of the symptoms under that category, but it was not considered as major problem; 2 (major problem) = at least one of the symptoms in that category was considered as major problem. Subsequently we determined the patient's score on each dimension by the highest score for any of the symptom categories comprising that dimension.