

Research Article

Memory Deficits in Obsessive-Compulsive Disorder-Changes over the Course of Cognitive-Behaviour Therapy

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ABSTRACT

A large body of studies demonstrates memory dysfunction in patients with Obsessive-Compulsive Disorder (OCD). Few trials have only equivocally investigated whether this cognitive dysfunction can be improved by treatment. This study aimed to examine the effect of Cognitive-Behaviour Therapy (CBT) on symptom severity and on verbal and non-verbal memory deficits in patients with OCD as an adjunct to pharmacotherapy. Thirty-five OCD patients were compared with thirty-two controls, matched on age, education and diagnosis, on Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) measuring severity of OCD and Auditory Verbal Learning Test (AVLT) and Complex Figure Test (CFT) assessing the verbal and non-verbal memory respectively at the pre-, middle- and post-treatment assessment. OCD patients showed significantly reduced symptoms after completion of their CBT sessions and their memory dysfunctions also ameliorated in the course of treatment. This study indicates that CBT is an effective treatment with those patients who exhibited significant memory deficits and who were severely affected at the beginning of treatment.

Keywords: *Obsessive-Compulsive Disorder; Memory Deficits; Cognitive-Behaviour Therapy*

Obsessive-Compulsive Disorder (OCD) is a chronic and potentially a disabling condition in which a person has uncontrollable, reoccurring thoughts (obsessions) and behaviours (compulsions) that he or she feels the urge to repeat over and over. Both the World Health Organization's International Classification of Diseases, 10th revision (ICD-10) and the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) recognise obsessions and/or compulsions as core symptoms of OCD.

It is quite common for patients with OCD to report that they are uncertain whether they have carried out an action correctly as opposed to merely imagining that they have done so (Jenike et al., 1990). Apparently as a result of these uncertainties, patients with OCD frequently engage in repetitive rituals, such as compulsive checking of doors or locks. On the basis of these clinical observations, researchers became interested in the memory functioning of patients with OCD. In initial studies, it was found that memory for action was impaired

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(e.g., Sher et al., 1983) and more recently it has similarly been suggested that episodic memory appears to be the type of memory process most relevant to OCD (Muller & Roberts, 2005) and therefore studies investigating this form of memory have been exclusively reviewed here. Nonetheless, there are many different types of episodic memory, including memory for verbal (e.g., words) and non-verbal (e.g., specific autobiographical events, visual information) forms of information. It is possible that the nature of the “to-be-remembered” information plays a crucial role in memory functioning of OCD patients.

Deckersbach et al. (2000) examined both verbal and non-verbal memory in a sample of 17 untreated outpatients with OCD and found these patients to have significant impairment in both verbal and nonverbal memory performance. Savage et al. (2004) examined verbal and nonverbal memory performance in 33 OCD patients and 30 normal control participants using Rey-Osterrieth Complex Figure Test and California Verbal Learning Test. OCD patients were found to be impaired on verbal and nonverbal measures of organizational strategy and free recall. Muller et al. (2005) reviewed studies investigating biases and deficits in memory and attention related to OCD and concluded that although the research had been mixed concerning memory for verbal information, there was more consistent evidence suggesting impairment for non-verbal information, particularly for complex visual stimuli and the individual’s own actions. Further, Simpson et al. (2006) evaluated the clinical characteristics and neuropsychological performance of adults with OCD and matched healthy controls to confirm that subjects with OCD have deficits on certain tasks of executive functioning, non-verbal memory, and/or motor speed. They found that OCD subjects differed significantly from healthy controls only on the Benton Visual Retention Test. Studies using positron emission tomography (PET) suggest that the orbit frontal cortex, together with its bi-directional connections to the medial temporal cortex, is a critical frontal region underlying memory formation (Frey and Petrides, 2002). PET studies of OCD have indicated altered activity in the orbital prefrontal cortex (Baxter et al 1987, 1988; Nordahl et al 1989), caudate nuclei (Baxter et al 1987, 1988), anterior cingulate (Swedo et al 1989), and right lateral prefrontal cortex (Swedo et al 1989). Metabolic abnormalities in the orbital prefrontal cortex and caudate nuclei of OCD patients normalized following successful treatment with serotonergic reuptake inhibitors (Benkelfat et al 1990; Baxter et al 1992; Swedo et al 1992) or behavior therapy (Baxter et al 1992; Schwartz et al 1996).

Meta-analyses suggest that exposure and response prevention (ERP) and cognitive-behaviour therapy (CBT) for OCD are quite equivalent and unquestionably efficacious treatments for OCD (e.g. Franklin, & Foa, 2002; Abramowitz, 1997; van Balkom et al., 1994; Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa, & Marin Martinez, 2008). Kuelz et al (2005) administered a neuro-psychological test battery to 30 unmedicated inpatients with OCD before and after 12 weeks of CBT. 39 carefully matched healthy controls were tested twice within the same interval. They found that major responders improved significantly more than minor responders on the Rey-Osterrieth Figure test, immediate and delayed recall. Gave et al (2009) reviewed studies that compared psychological interventions to treatment as usual

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groups who either received no treatment, or were on a waiting list for treatment or received usual care. Researchers found 8 studies, which together suggested that cognitive and/or behavioural treatments were better than treatment under usual conditions at reducing clinical symptoms. Voderholzer et al. (2013) conducted a cognitive test battery covering a broad range of neuropsychological and clinical variables on 60 medication-free pre- and post-CBT. They found that after CBT patients had significantly improved test results regarding speed of information processing, verbal fluency, visuo-constructive functions and set shifting ability.

The present study aimed to expand the knowledge and understanding about the nature of the verbal and non-verbal memory deficits implicated inconsistently yet frequently in the etiology of OCD. CBT has been seen to produce neuro-structural, neuro-anatomical and neuro-functional changes. However, there has been only handful of studies specifically exploring role of CBT in memory deficits in OCD. On the basis of this picture, there were three objectives to the present study: (a) to study the effect of CBT on severity of OCD symptoms; (b) to examine the effect of CBT on verbal and non-verbal memory deficits in OCD; and (c) to investigate the relationship between OCD symptom severity and verbal and non-verbal memory deficits in patients of OCD.

METHOD

Participants

32 participants in control group and 35 participants in experimental group completed the study. Participants were recruited from the outdoor facilities of a private hospital in New Delhi. Inclusion criteria consisted of a primary diagnosis of OCD as defined by DSM-IV TR, both females and males patients, between age group of 18-50 years, with minimum of higher secondary education, with fair understanding of written and spoken English, who express a willingness and commitment to complete the treatment and required assessments, who obtain the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) total score more than 16 with primary symptom theme being doubts and checking and who obtain a total score of less than 18 on Hamilton Depression Scale (HAM-D). Exclusion criteria included patients with known current or past history of head injury or neurological diseases, patients having mental retardation or organic mental disorder, patients who have a co-morbid condition affecting cognitive functioning, patients who have any such psychiatric co-morbid condition as alcohol or substance dependence in past 6 months, psychotic symptoms, prominent suicidal ideation or any other anxiety spectrum disorder, patients having any physical condition that would prevent completion of treatment and patients undergoing concurrent psychological treatment for any Axis I or II disorder.

Measures

- M.I.N.I. International Neuropsychiatric Interview (M.I.N.I. 6.0), developed in 1990 by David V. Sheehan, is a short, structured diagnostic interview jointly designed for DSM-IV and ICD-10 psychiatric disorders. With an administration time of approximately 15 minutes, the M.I.N.I. 6.0 is the interview of choice for psychiatric

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evaluation and outcome tracking in clinical psychopharmacology trials and epidemiological studies.

- Yale-Brown Obsessive Compulsive Scale (Y-BOCS), a 10-item clinician-administered scale, is a widely used rating scale to measure symptom severity of OCD designed by Goodman et al. (1989). It is used extensively in research and clinical practice to determine both severity of OCD and to monitor improvement during treatment. This scale, which measures obsessions separately from compulsions, specifically measures the severity of symptoms of OCD without being biased towards the type of obsessions or compulsions present. It has two general sections – an obsession rating scale and a compulsion rating scale.
- Hamilton Depression Rating Scale (HAM-D), written in the late 1950s by Max Hamilton, has also been considered the ‘gold standard’ in assessment of depressive symptoms. This 21 items scale is scored between 0 and 4 points and is designed to be used by a health care professional during a clinical interview which should typically take between 15 and 20min.
- **Auditory Verbal Learning Test (AVLT), developed by Andre Rey in 1941, is a commonly used neuropsychological measure that assesses verbal memory and learning.** The participants are given a list of 15 unrelated words repeated over five different trials and are asked to repeat. Another list of 15 unrelated words are given and the client must again repeat the original list of 15 words and then again after 30 minutes. Approximately 10 to 15 minutes are required for the procedure (not including 30 minutes interval). Because the test is brief, straightforward, easy to understand, and appropriate for both children and adults (ages 7 through 89), it has gained widespread acceptance.
- Complex Figure Test (CFT), first proposed by Swiss psychologist Andre Rey 1941 and further standardized by Paul-Alexandre Osterrieth 1944, is a widely-used measure of visuospatial construction and nonverbal memory. The 8½" × 11" stimulus card contains the original Rey complex figure. The scoring of drawings is based on the widely used 36-point scoring system; the same scoring criteria apply to all three drawing trials (i.e., Copy trial, 3-minute Immediate Recall trial, and 30-minute Delayed Recall trial). Each of the 18 scoring units is scored based on accuracy and placement criteria.

Procedure

35 OCD patients were compared with 32 OCD controls, matched on age, education and diagnosis, on Y-BOCS measuring severity of OCD and AVLT and CFT assessing the verbal and non-verbal memory respectively at the pre-, middle- and post-treatment assessment. Patients, diagnosed with OCD and undergoing treatment-as-usual, underwent MINI to reaffirm the existing DSM-IV TR diagnosis. Patients meeting the criteria for OCD on MINI were assessed on Y-BOCS to ascertain the level of OCD. Patients also meeting the criteria for Depressive Episode were evaluated using HAM-D to ascertain the level of depression. Patients who met the inclusion criteria were then randomly assigned to two

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groups:

- Treatment As Usual group (control group) constituting patients who continued to receive psychoactive medications
- Treatment As Usual and Cognitive-Behaviour Therapy group (experimental group) constituting patients who continued receiving psychoactive medications with the addition of CBT.

The informed consent was obtained from all the participants of the study. They were further ensured of confidentiality of their data and their right to remain anonymous was well preserved.

RESULTS

Mixed-design ANOVA was performed with the two groups as between-subject factor and pre-, middle and post-treatment assessment as the within-subject factor. We would like to confine the results to the main findings. The mixed-design ANOVA revealed a significant main effect of Groups on Y-BOCS at different time intervals overall ($F(1, 65) = 23.30, p = <0.001, \eta^2 = 0.26$). There was also a significant main effect of Groups on AVL T at different time intervals overall ($F(1, 65) = 165.09, p = <0.001, \eta^2 = 0.72$). Furthermore, there was a significant main effect of Groups on CFT_IR and CFT_DR at different time intervals overall ($F(1, 65) = 129.187, p = <0.001, \eta^2 = 0.665$ and $F(1, 65) = 135.11, p = <0.001, \eta^2 = 0.68$ respectively). These findings imply that there was significantly more reduction in the Y-BOCS score and increase in the AVL T, CFT_IR and CFT_DR scores in the treatment as usual + cognitive behavior therapy group in comparison to the treatment as usual group.

The findings of partial correlation for OCD symptom severity & verbal and non-verbal memory deficits for both treatment as usual group and treatment as usual + cognitive behavior therapy group are suggestive of a negative correlation between Y-BOCS scores and AVL T & CFT (immediate and delayed recall) scores, (i.e., higher level of OCD was related to lower verbal and nonverbal recall).

DISCUSSION

In the present study, both treatment as usual and treatment as usual combined with CBT were effective for reducing the severity of OCD symptoms. However, the symptoms reduced more rapidly when treatment as usual was combined with CBT. The results showed a significant difference in the mean Y-BOCS scores of treatment as usual and treatment as usual + cognitive behavior therapy group at middle and post-treatment assessment. At pre-treatment assessment the group were not significantly different in their scores. This clearly implies that addition of CBT to treatment as usual was more effective than treatment as usual alone in improving OCD symptoms. The results are similar to a study by Foa et al (2007) who attempted to examine the relative and combined efficacy of serotonin reuptake inhibitors (SRIs) and CBT and found that clomipramine, exposure and ritual prevention, and their combination are all efficacious treatments for OCD with intensive exposure and ritual prevention being more superior to clomipramine and, by implication, to mono therapy with

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the other SRIs. Although, this study differs in many ways from the present study, in terms of defining drug supervision and placebo control, but it was the one of the study found in the literature review that worked discreetly with the different treatment conditions and their combinations.

A major finding of the present study is that memory functions improved in the course of CBT of OCD. Patients improved to a significant extent on CFT, immediate recall and to a slightly lesser extent on CFT delayed recall and most significantly on AVLT. On comparison of pre-, middle and post treatment findings, there was a significant difference between the two groups. Significant improvement in the memory tasks performance by patients with OCD upon successful CBT is supported by study of Kuelz et al (2006). They studied improvement in neuropsychological impairment over the course of cognitive-behavioural treatment and found that major responders improved significantly more than minor responders on the Rey-Osterrieth Figure, immediate and delayed recall and they concluded that cognitive dysfunction on tasks of nonverbal memory, organizational strategies, flexible, self-guided behaviour and set-shifting in OCD can improve in the course of treatment.

The current findings can be understood in the light of a theory that neuropsychological impairment before therapy is based on metabolic dysfunction of the orbitofrontal feedback-loop that can return to normal during the course of treatment. Previous studies on effects of treatment suggest that neural activity in OCD changes predominantly within the orbitofrontal-striatal circuit (Baxter et al., 1992; Schwartz et al., 1996). Based on the postulation that the observed state-dependency of neuropsychological performance in OCD is secondary to the metabolic changes described in the literature (Baxter et al., 1992; Nakatani et al., 2003; Schwartz et al., 1996; Saxena et al., 1999), it can be assumed that cognitive functions corresponding to the orbit frontal feedback-loop are particularly susceptible to CBT. The study by Kuelz et al. (2006) also suggests that successful CBT may mainly influence performance on cognitive tasks involving the orbitofrontal-striatal feedback loop and/or involving skills that are improved by cognitive treatment in OCD in general (e.g., cognitive flexibility). Furthermore, this finding that memory performance in OCD improves over the course of CBT combined with treatment as usual undermines a trait account of these deficits. Ascertaining whether such cognitive impairments are a function of the OCD state or a long-term stable trait has both heuristic and clinical implications.

In the present study, partial correlation was computed between these clinical variables and the relationship between them was found to be significant. Patients with severe or extreme level of OCD showed poor performance on the AVLT and CFT tasks (both immediate and delayed recall). In other words, the verbal and nonverbal recall was negatively impacted by high levels of OCD. Also, over the course of treatment, as OCD symptoms reduced, the memory improved and more significantly so when CBT was combined with treatment as usual. This also supports the correlation between these two variables. In many previous research studies, the association between OC symptom severity and neuropsychological functioning has not

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been established conclusively. In fact, in a critical review, Kuelz and colleagues (2004) reported that out of 22 studies examining this association almost half found no correlation between OC symptom severity and neuropsychological functioning in individuals with OCD. These findings however, do correspond to a number of previously published studies which have suggested that patients with OCD are also seen to have impaired verbal memory (Deckersbach et al., 2000; Savage & Rauch, 2000; Sher, Mann, & Frost, 1984; Zitter et al., 2001) and also manifest impairment on immediate and delayed visual-recall tasks (Martinot et al., 1990; Cohen et al., 1996; Savage et al., 1999; Deckersbach et al., 2000; Savage et al., 2000).

Some limitations of the present study should be brought to the readers' attention. Firstly, the patients with OCD also taking antipsychotics were not excluded in the present study owing to their suggested impact on cognitive functions. Secondly, the conclusions are based on the few neuropsychological tasks selected for the study.

To conclude, the study results provide further documentation for the efficacy of CBT for patients with moderate to extreme level of OCD and the study also found evidence for CBT as an effective treatment for OCD patients who exhibited significant memory deficits at the beginning of treatment.

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