

Original Research Article

Performance of OCD Patients on WCST in Context of Comorbid Depression

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ABSTRACT

Introduction: Over the years it has been observed that disturbances in cognitive functions including attention, executive functions, visuospatial functions, verbal and non-verbal memory, in OCD (obsessive compulsive disorder) patients are mediated by co morbid neuropsychiatric conditions. It has been observed that comorbid depression in OCD patients is associated with executive function deficits. Wisconsin Card Sorting Test (WCST) is one of the most widely used tests to assess the executive function deficits.

Methods: 160 patients fulfilling the DSM-IV criteria for OCD & depression were selected and categorized in 2 sample groups namely OCD with depression (OCDD, n=80) & OCD without depression (OCWD, n=80). Yale Brown Obsessive Scale (Y-BOCS) scale was used for assessment of OCD & Hamilton rating scale of depression (HAM-D) was used for further grading the severity of depression into mild, moderate & severe. The executive function deficits in patients of the three categories of depression with OCD were tested with WCST & intergroup comparisons were made.

Results: Both the OCDD & OCWD groups were matched for age, gender, marital status, educational qualification, age of onset of illness & duration of illness. The overall mean age of the patients presenting to the OPD was 32.63 years. The patients in groups OCD with moderate & severe depression completed less categories & committed more perseverative errors as compared to patients in groups OCD without depression & OCD with mild depression.

Conclusion: The observations of this study suggest that patients with OCD have impairment in executive functions which are further worsened by the presence of comorbid depression. Assessment of neurocognitive functions of patients with OCD should always include assessment of comorbid depression which will help in providing a patient tailored treatment.

Key words: Obsessive Compulsive Disorder (OCD), Wisconsin Card Sorting Test (WCST), Comorbid depression.

INTRODUCTION

Obsessive compulsive disorder (OCD) is a neuropsychiatric disorder affecting approximately 1-3% of the population. It is characterized by recurrent intrusive thoughts (obsessions) or impulsive, and repetitive, irresistible and often ritualized behaviors (compulsions), which serve to prevent anxiety and distress or to neutralize the obsessions. ^[1] Over the

years it has been observed that disturbances in cognitive functions including attention, executive functions, visuospatial functions, verbal and non-verbal memory, in OCD patients are mediated by comorbid neuropsychiatric conditions.

Assuming an underlying fronto-striatal loop dysfunction, ^[2] patients with OCD have been examined for executive functions, such as set shifting ability,

fluency, conceptual thinking, and planning abilities. Comparison studies with healthy control subjects using the WCST for testing attentional set shifting ability have reported either no differences, [2-4] or impaired performance in those with OCD. [5,6] Brain imaging studies have documented aberrant hyperactivity of pathways in the orbito frontal cortex, caudate nucleus, and anterior cingulate cortex in OCD. [7]

Recent comorbidity studies indicate that as many as 75% of adults [8] and 52% of children [9] with OCD have a history of major depressive episodes. [10] These figures have led some to suggest that OCD be regarded a variant of affective illnesses. [11] Bipolar comorbidity in OCD is a relevant phenomenon and has clinically significant influence on the symptomatological expression and complications of the disorder. [12] Obsessive-compulsive morbidity is also one of the most disabling co-occurring conditions in bipolar disorder (BD), and these symptoms are frequently encountered in clinical practice. [13]

Executive function (EF) deficits have been seen in several studies among OCD patients. [14-16] These EF deficits may explain partly the performance difficulties seen in patients with OCD in other cognitive domains. [17] Okasha *et al.* [18] suggested that patients with OCD are unable to disregard irrelevant stimuli and may become overwhelmed by this information.

Patients with OCD often function remarkably well in their daily lives, despite severe symptomatology and cognitive difficulties, which are apparent only on specific testing. In contrast to non-verbal memory deficits, verbal memory is generally preserved in studies of patients with OCD. [19-21] Patients with OCD demonstrate normal general intelligence and language abilities. Different subtypes of OCD may have varying neuropsychological deficit profiles. [22]

Analysis by authors over the past decade has revealed that executive function deficits and neurological soft signs in OCD patients are associated with comorbid

depression. In view of the high association rates between cognitive deficits in OCD patients and comorbid depression, this study was undertaken to assess the executive function impairment in OCD patients in context with varying degrees of comorbid depression.

METHODS

160 patients meeting the DSM IV criteria for OCD were selected amongst the patients coming to the psychiatry OPD of Career Institute of Medical Sciences & Hospital, Lucknow and Major S D Singh Medical College & Hospital, Farrukhabad, over a period of 15 months from February 2016 to April 2017. The sample comprised 2 patient groups, one OCD with depression (OCDD, n=80) and another OCD without depression (OCWD, n=80). In the OCDD group, 14 patients dropped out of the study due to unknown reasons leaving 66 patients in the study group. In the OCWD group, 12 patients dropped out of the study leaving 68 patients in the study group. Informed consent was obtained from all of the patients. Patients were examined in a cross sectional design and the assessments were completed in 1-2 sessions within 24-48 hours. Both the groups were matched for age, gender, marital status, age of onset of illness & duration of illness.

Inclusion criteria:

1. Age 18- 60 years
2. Patients fulfilling DSM-IV diagnostic criteria for OCD & Depression.
3. YBOCS scale >15

Exclusion criteria:

1. Age <18 years and >60 years.
2. Patients having psychotic features.
3. Patients meeting criteria for schizophreniform disorder, schizoaffective or bipolar disorder.
4. Patients with history of neurological disease or any other past / current physical disorder that could have affected the brain.

5. Patients with substance abuse in past/present.
6. Patients having weight loss of >20 percent in last 6 months.

ASSESSMENT TOOLS

1. Patients were assessed on the following parameters:
2. Detailed history
3. Socio demographic profile
4. Yale Brown Obsessive Scale(Y-BOCS)
5. Hamilton rating scale of depression (HAM-D)
6. Wisconsin Card Sorting Test (WCST)

Detailed interviews with the patients were undertaken to elicit personal history including age, sex, marital status, age of onset of illness, duration of illness & prior treatment history to confirm the DSM-IV diagnostic criteria.

Patients were further administered the following tests:

1. Y-BOCS ^[23]

The Yale-Brown Obsessive Compulsive Scale (Y-BOCS) is a 10-item scale designed to measure the severity and type of symptoms in people with obsessive-compulsive disorder (OCD) over the past seven days. The symptoms assessed are obsessions and compulsions. This scale is useful in tracking OCD symptoms at intake and during/after treatment.

Interpretation

Total Y-BOCS scores range from 0 to 40, with higher scores indicating greater severity of OCD symptoms. Scores on the obsession and compulsion subscales range from 0 to 20, but only the total Y-BOCS score is interpreted. Total scores can be split into five categories, based on severity of symptoms. People who have a total Y-BOCS score:

Under 7 are likely to be subclinical,
8-15 are likely to have a mild case of OCD,
16-23 are likely to have a moderate case of OCD,
24-31 are likely to have a severe case of OCD,

32-40 are likely to have an extreme case of OCD.

2. HAMILTON RATING SCALE FOR DEPRESSION (HAM-D): ^[24]

Although the HAM-D form lists 21 items, the scoring is based on the first 17. It generally takes 15-20 minutes to complete the interview and score the results. Eight items are scored on a 5-point scale, ranging from 0 = not present to 4 = severe. Nine are scored from 0-2. It provides a simple way for assessing the severity of depression. To rate the severity of depression in patients who are already diagnosed as depressed, administer this questionnaire. The higher is the score, the more severe the depression.

Total HAM-D Score/ Level of Depression

- 0 - 7 = Normal
- 8 - 13 = Mild Depression
- 14-18 = Moderate Depression
- >19 = Severe Depression

3. WISCONSIN CARD SORTING TEST (WCST): ^[25]

In WCST the subject is asked to match 128 response cards to one of four stimulus cards on the basis of a sorting rule that is determined by the examiner. Each response card contains a design represented by three features: color (yellow, green, red, blue), number (1-4), and form (circles, stars, triangles, crosses). Sorts can be made by any of these features.

To determine whether each card is sorted correctly, a specific rule is chosen. A trial is correct if it is placed in the pile which matches the card on the dimension of the rule. The participant must deduce the current sorting rule on the basis of on feedback from the examiner. After the participant has matched 10 consecutive cards correctly, the examiner covertly changes the rule. This change requires the subject to deduce the new rule and successfully employ it. The task continues for 128 trials or until all rule changes have been accomplished successfully (called achieved categories).

Statistical analysis was performed using the SPSS version 10.0. Differences between the OCDD & OCWD group on demographic characteristics were examined using t-tests for the continuous variables and χ^2 for the categorical demographic variables. Comparison between different subgroups was done using analysis of variance (ANOVA) & post-hoc Tukey's tests. A $p < 0.05$ was considered statistically significant.

RESULTS

The socio demographic characteristics of the OCDD & OCWD group are presented in Table 1. Both the groups were matched for age, gender, marital status, educational qualification, age of onset of illness & duration of illness. The overall mean age of the patients presenting to the OPD was 32.63 years. The females in OCDD group were 22% while in OCWD group the females were 17% and the statistical difference was insignificant. The age of onset of illness was <35 years in 65% of OCDD patients while 52% OCWD patients had onset of illness before attaining

35 years of age. The OCDD group had a longer duration of illness than OCWD patients & mean duration of illness was 7.12 years for OCDD patients while it was 6.76 years in OCWD patients but the difference is not significant. The mean HAM-D score for OCDD group was 16.83 while the mean HAM-D score for OCWD group was 2.15.

Categorization of patients on the basis of HAM-D & YBOCS into OCD with mild, moderate & severe depression categories is shown in Table 2. Sixty eight patients had OCD without depression. OCD with mild depression was found in 18 patients, OCD with moderate depression was found in 27 while 21 patients had severe depression along with OCD. Categorization of patients into mild, moderate & severe depression was done using HAM-D tests.

The patients of mild, moderate & severe depression with OCD were given the WCST for testing executive functions. Comparison of categories completed (CC) & perseverative errors (PE) revealed significant differences between the groups.

TABLE 1: SOCIODEMOGRAPHIC CHARACTERISTICS OF THE GROUPS

VARIABLES	OCD Overall (N=134)	OCD with Depression (OCDD) (N=66)	OCD without Depression (OCWD) (N=68)	Statistical Tests
Age (years)	32.63±10.34	31.15±10.54	34.07±10.00	t(132)=1.65
Sex		49%	51%	
Female	52(39%)	30(22%)	22(17%)	$\chi^2(1)=1.90$
Male	82(61%)	36(27%)	46(34%)	
Marital Status				
Married	89(67%)	39(59%)	50(73%)	$\chi^2(2)=4.11$
Divorced	7(5%)	3(5%)	4(6%)	
Single	38(28%)	24(36%)	14(21%)	
Educational Qualification				$\chi^2(1)=0.30$
<10 th std	77(57%)	40(30%)	37(28%)	
>10 th std	57(43%)	26(19%)	31(23%)	
Age Of Onset Of Illness				$\chi^2(1)=2.05$
<35years	78(58%)	43(65%)	35(52%)	
>35 years	56(42%)	23(35%)	33(48%)	
Duration Of Illness (Years)	6.94±6.15	7.12±7.36	6.76±4.75	t(132)=0.34
Mean HAM-D Score	-	16.83±4.34	2.15±1.60	t(132)=26.13
Mean Y-BOCS Score	-	23.42±5.95	24.18±5.65	t(132)=0.76

Abbreviations: HAM-D: Hamilton rating scale of depression, Y-BOCS : Yale Brown Obsessive Scale, OCDD: Obsessive Compulsive Disorder with Depression, OCWD: Obsessive Compulsive Disorder without Depression.

Comparison of categories completed (CC) between the groups revealed that there was significant difference between groups OCWD & OCD with severe depression, OCD with mild depression & OCD with severe depression, OCD with moderate

depression & OCD with severe depression [F(3,130) = 22.18, $p < .001$]. Comparison between groups OCWD & OCD with mild depression, OCWD & OCD with moderate depression, OCD with mild depression & OCD with moderate depression did not

reveal any significant difference between the groups.

Comparison of perseverative errors (PE) between the groups revealed a significant difference between groups OCWD & OCD with moderate depression [$F(3,130) = 33.73, p < .05$], OCWD & OCD with severe depression ($p < .001$), OCD with mild depression & OCD with severe depression ($p < .001$), OCD with moderate depression ($p < .001$) & OCD with severe

depression ($p < .001$). Insignificant difference was observed between groups OCWD & OCD with mild depression and OCD with mild depression & OCD with moderate depression.

TABLE 2: CATEGORISATION OF PATIENTS ON THE BASIS OF HAM-D & YBOCS SCORE (n=134)

S. NO.	CATEGORIES	NO. OF PATIENTS
1.	OCD without depression	68
2.	OCD with mild depression	18
3.	OCD with moderate depression	27
4.	OCD with severe depression	21

TABLE 3: WCST ASSESSMENT OF OCD PATIENTS WITH VARYING DEGREES OF DEPRESSION

VARIABLE	OCD overall (n=134)	OCD without depression (n=68) (Group I)	OCD with mild depression (n=18) (Group II)	OCD with moderate depression (n=27) (Group III)	OCD with severe depression (n=21) (Group IV)	ANOVA	Post hoc comparison
WCST	Mean+/-SD	Mean+/-SD	Mean+/-SD	Mean+/-SD	Mean+/-SD	F(3,130)	
Categories completed (CC)	3.42±1.37	3.93±1.16	3.72±1.49	3.30±0.87	1.67±0.91	22.17	I>II>III>IV I>IV II>IV III>IV
Perseverative errors(PE)	25.99±11.02	20.72±7.44	21.17±12.69	26.52±6.85	41.38±8.90	33.73	IV>III>II>I III>I IV>I IV>II

DISCUSSION

Non response or inadequate response to treatment of OCD gave rise to speculations that comorbid conditions present along with might be responsible for it. Several comorbid conditions like psychosis, anxiety disorders, bipolar disorder, ADHD & neurological diseases might co-exist. The presence of a specific comorbid condition could be a distinguishing feature in OCD, with influence on the treatment adequacy and outcome. [26] The association between OCD and depression has been acknowledged since the nineteenth century. [27] While up to 60–80% of patients with OCD experience a depressive episode in their lifetime, most studies agree that at least one-third of patients with OCD have concurrent depression at the time of evaluation. [28,29]

Understanding the organic basis & characterization of neuropsychological deficits in patients of OCD has been the area of research over the past decade. Specifically, orbito-frontal and anterior cingulate regions have been implicated in this disorder. [30-35] Savage [36] proposed that neuropsychological impairment in OCD be

regarded as an intermediate phenomenon linking brain dysfunctions with clinical symptomatology. Cognitive functions studied have included attention, executive functions, visuospatial functions, verbal and non-verbal memory, as well as intelligence. [15] Patients with OCD have been examined for executive functions, such as set shifting ability, fluency, conceptual thinking, and planning abilities.

Wisconsin Card Sorting Test (WCST) [25] is one of the most widely used tasks to assess the executive function of set shifting. Subjects are asked to sort a deck of cards according to three perceptual categories represented by four “Key” cards. OCD patients have demonstrated deficit in WCST performance in previous studies. [25,37]

In our study the OCD patients were selected using the Y-BOCS scale. The patients were categorized into OCD without depression, OCD with mild depression, OCD with moderate depression & OCD with severe depression using the HAM-D score. The executive functions deficit was then assessed using the WCST. Comparison of Categories Completed (CC) &

Perseverative Errors (PE) revealed that OCD patients with moderate & severe depression performed poorly as compared to the group of OCD patients with mild depression & OCD without depression. Our finding of significant difference of executive function impairment between groups of OCD patients with varying degrees of depression supports [38-40] and contradicts [41-43] the existing literature. The variations in observations have prompted the suggestion that the OAT (Object Alternation Test) is a more appropriate test for set shifting ability. [44] OAT and the Delayed Alternation Test, considered to be more sensitive for orbitofrontal damage, [45,46] have been reported to reveal marked deficits in OCD by many investigators. [47,48]

The lack of significant differences in executive function impairment between OCD with mild depression & OCD without depression patients in our study may be related to the matching mechanism & possible different neurocognitive processes in the brain.

D Singh et al., [49] in their study have observed significant impairment of executive functions on WCST in OCD patients with depression as compared to OCD patients without depression & healthy controls. Habibollah et al. [50] observed that executive function impairment on WCST was more in OCD depressed group as compared to OCD non depressed group of patients. Moritz et al. [51] concluded that patients with high HRSD scores performed significantly worse than control subjects and patients with low HRSD scores on the WCST.

The observations of this study suggest that patients with OCD have impairment in executive functions which are further worsened by the presence of comorbid depression. Assessment of neurocognitive functions of patients with OCD should always include assessment of comorbid depression which will help in providing a patient tailored treatment.

Limitations & Scope of future research

The small sample size and inability to address multiple confounding variables are the major limitation of this study and may influence the generalization of the findings. Also, evaluation of neuroimaging correlates of identified neuropsychological deficits was not performed. A study with larger number of patients dealing more confounding variables, and comparing all the WCST subscales like number of trials administered, number and percent of errors, number and percent perseverative errors, perseverative responses, non perseverative errors, conceptual level responses and percent conceptual level responses trials to complete first category, number of categories completed, and learning to learn responses, will able to provide a more comprehensive result.

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