

Frequency of Impairment of Executive Functioning among Patients having Obsessive-Compulsive Disorder

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ABSTRACT

Introduction: Obsessive-compulsive Disorder (OCD) is a highly debilitating neuropsychiatric condition with an estimated lifetime prevalence of 2-3 percent. Executive function refers to the ability to use high level oversight functions to modulate memory, sensory information, cognition, and affect as a situation evolves, and use of strategies that must shift to maintain performance. Impairment of nonverbal memory has been reported in studies of patients with OCD. The objective of present study was to determine the frequency of impairment of executive functioning among patients having obsessive-compulsive disorder.

Material and methods: A total of 150 patients fulfilling selection criteria were enrolled through the Outpatients Department of Psychiatry, Services hospital Lahore. After taking informed consent, the demographic data i.e. name, age, gender and duration of OCD were noted. All patients were screened using the frontal lobe assessment battery (FAB) by the researcher himself. Impaired executive functioning was categorized as a calculated FAB score <12.

Results: The study revealed that, out of 150 cases of OCD, frequency of impairment of executive functioning among patients was calculated as 22.67%(n=34). 65.33%(n=98) participants were between 18-30 years of age (M=30.05, S.D±5.83 years), 54.67%(n=82) were male and 45.33%(n=68) were females.

Conclusion: Thus, it is concluded that executive functioning is impaired frequently among patients having obsessive-compulsive disorder. So, it is recommended that executive functioning should be monitored among patients who present with OCD. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

Keywords: Obsessive-Compulsive Disorder, Executive Functioning, Cognitive Deficits, Frequency, Prefrontal Cortex

INTRODUCTION

Obsessive-Compulsive Disorder (OCD) is a debilitating mental disorder characterized by recurrent, intrusive thoughts, images or impulses that produce anxiety and significant distress, and result in repetitive, time consuming compulsive acts. Obsessive-compulsive symptoms occur in a variety of clinical conditions and result in loss of self esteem. Obsessive-Compulsive disorder can impair all areas of brain functioning and produce devastating effects on patients and their families. Previous studies reveal impairments in neurocognitive testing and executive dysfunction in patients with obsessive compulsive disorder. Patients with obsessive-compulsive disorder show impairment

in attention, planning, problem-solving and control of behavior.

Executive functions are a set of cognitive processes – including attentional control, inhibitory control, working memory, and cognitive flexibility, as well as reasoning, problem solving, and planning – that are necessary for the cognitive control of behavior: selecting and successfully monitoring behaviors that facilitate the attainment of chosen goals. Executive functions gradually develop and change across the lifespan of an individual and can be improved at any time over the course of a person's life. Similarly, these cognitive processes can be adversely affected by a variety of events which affect an individual.

Cognitive control and stimulus control, which is associated with operant and classical conditioning, represent opposite processes (i.e., internal vs. external or environmental, respectively) that compete over the control of an individual's elicited behaviors; in particular, inhibitory control is necessary for overriding stimulus-driven behavioral responses (i.e., stimulus control of behavior). The prefrontal cortex is necessary but not solely sufficient for executive functions; e.g., the caudate nucleus and subthalamic nucleus are also involved in the inhibitory control of behavior.

Damage to prefrontal-cortical circuits, particularly the ones involving the basal ganglia and functionally related orbitofrontal and anterior cingulate/caudal medial prefrontal cortices can produce Obsessive compulsive disorder. Neuropsychological findings support a relationship between obsessive-compulsive disorder (OCD) and the frontal lobe.¹ Assessment of executive functioning suggests that patients with OCD need more time in planning than controls.

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Subjects with OCD have deficits in scanning, planning time, concept formation, decision making and encoding of non-verbal memory after controlling for the effects of age, sex and education. The profile suggests predominantly executive dysfunction, with difficulties in organizing stimuli and cognitive resources for maximum efficiency.

There is little information available regarding decline in executive functions among patients having OCD specifically. However, literature reports a 19% frequency of impairment of executive functions in multiple domains among 63 patients with anxiety disorders as compared to only 4% of healthy controls according to a study.² Executive function refers to the ability to use high level oversight functions to modulate memory, sensory information, cognition, and affect as a situation evolves, and strategies must shift to maintain performance. Some studies of patients with OCD have found that these individuals do not change strategies when demands or rules of a task change, or have difficulty in set-shifting between tasks (i.e., responding to changes in rules), although not all groups have agreed with this finding. These executive performance deficits may result from frontal–striatal dysfunction. Executive function deficits have been seen in several studies of patients with OCD using tasks designed to test this domain. Difficulties on most of these measures generally are attributed to patients' inability to shift set or adapt a new strategy when rules for successful performance change. Some work questions whether slowness, secondary to indecisiveness, also plays a factor.³ This slowness may include intrusive and perseverative features, which could result from fronto–striatal dysfunction. In the study by Okasha et al.,⁴ event-related potential (ERP) data suggested that patients with OCD are unable to disregard irrelevant stimuli and may become overwhelmed by this information. The same group also found that milder OCD cases had better selective attention than those with more severe symptomatology. These problems with allocation of executive function, along with the set shifting impairment discussed previously, both of which could result from fronto–striatal dysfunction, may partly explain performance deficits in this domain.

Deficits in executive domain may explain partly the performance difficulties seen in patients with OCD in other cognitive domains.⁵ Although the emphasis of this article is on cognitive deficits in OCD, it should be stressed that the abnormalities in neuropsychological task performance previously described in the various domains are generally subtle and imply focal dysfunction rather than compromise of the entire brain. Patients with OCD often function remarkably well in their daily lives, despite severe psychiatric symptomatology and cognitive difficulties, which are apparent only on specific testing. In contrast to nonverbal memory deficits, verbal memory generally is preserved in studies of patients with OCD. Verbal memory deficits, however, also have been found on measures that stress strategic processing. Patients with OCD also consistently demonstrate normal general intelligence (full-scale IQ) and language abilities. For example, impairment

of attention may affect performance across a broad range of tests. Disturbances in executive functioning also have been shown to affect memory performance.⁶ It also should be remembered that comorbid conditions such as major depression, which is seen commonly in patients with OCD, may influence performance on neuropsychological assessment measures. Medication effects may play a role in the types of deficits seen in some studies; however, a recent study found no evidence of medication effects (SSRI) on cognitive functioning in OCD. It also has been suggested that different subtypes of patients with OCD have varying neuropsychological deficit profiles.

Present study aimed to find the frequency of impairment of executive functioning among patients having obsessive compulsive disorder. As impairment of cognitive functions including executive functioning decreases the quality of life and increases the health care costs, so early detection of cognitive impairment is essential. It will help in early detection and therefore decrease the economic burden on health care system and increase the quality of life of patients.

MATERIAL AND METHODS

Cross sectional study design was used and Non probability consecutive sampling was employed. Study was conducted at the Department of Psychiatry, Services Hospital, Lahore for a duration of six months. A total of 150 cases with 95% confidence level, and 7% margin of error and taking expected percentage of impairment of executive functioning i.e. 19% among patients having obsessive compulsive disorder.

Patients aged between 18-50 years of either gender, diagnosed with OCD for more than 6 months duration were included. However, patients with a history of cerebrovascular accident, head trauma, epilepsy, drug abuse or other psychiatric illness were excluded. Patients with hypertension (BP \geq 140/90mmHg), diabetes (BSR $>$ 186mg/dl), myocardial infarction (medical record), chronic liver disease (ALT & AST $>$ 40IU), tuberculosis (medical record), hepatitis B & C (medical record) were excluded from the study, along with diagnosed cases of other psychiatric illnesses and with a history of substance abuse and mental retardation.

A total of 150 patients fulfilling selection criteria were enrolled through OPD of Department of Psychiatry, Services hospital Lahore. After taking informed consent, the demographic data i.e. name, age, gender and duration of OCD were noted. All patients were screened using frontal lobe assessment battery by the researcher himself. FAB score was calculated and if $<$ 12, then impairment of executive functioning was labeled (as per operational definition). Data was collected through performa (attached).

STATISTICAL ANALYSIS

All the collected data was entered and analyzed into SPSS version 21. The qualitative data like gender and impairment of executive functioning was presented as frequency and percentage. Quantitative data like age, duration of OCD

(Obsessive compliance disorders), FAB score was presented as mean \pm standard deviation. Data was stratified for age, gender and duration of OCD. Post-stratification, chi-square was applied to compare stratified groups. P-value \leq 0.05 was taken as significant.

RESULTS

A total of 150 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of impairment of executive functioning among patients having obsessive compulsive disorder.

General distribution of the patients was done and shown in above (Table 1), age distribution shows that 65.33% (n=98) were between 18-30 years of age while 34.67% (n=52) were between 31-50 years of age, mean \pm sd was calculated as 30.05 \pm 5.83 years. Similarly, gender distribution shows that 54.67% (n=82) were male and 45.33% (n=68) were females. Frequency of impairment of executive functioning among patients having obsessive compulsive disorder was calculated in 22.67% (n=34) while 77.33% (n=116) had no findings of impairment. Further, table 2 show Mean FAB score was calculated as 13.41 \pm 2.52.

Similarly, In Table 3, the data was stratified for age, gender and duration of OCD. Post-stratification, chi-square was applied to compare stratified groups. P-value \leq 0.05 was taken as significant.

Variable	No. of patients	%	Mean \pm SD
Age(in years)			30.05 \pm 5.83
18-30	98	65.33	
31-50	52	34.67	
Gender			
Male	82	54.67	
Female	68	45.33	
Impairment of executive functioning			
Yes	34	22.67	
No	116	77.33	

Table-1: Frequency distribution of age, gender and impairment in executive functioning of (n=150) patients.

	Mean	SD
FAB	13.41	2.52

Table-2: Mean and SD of FAB score of (n=150) patients.

	Impairment of Executive functioning (n=34)		P value
	Yes	No	
Age (in years)			0.18
18-30	19	79	
31-50	15	37	
Gender			0.07
Male	14	68	
Female	20	48	

Table-3: Stratification for frequency of impairment of executive functioning with regards to age and gender

DISCUSSION

Obsessive Compulsive Disorder (OCD) is a highly debilitating neuropsychiatric condition with an estimated lifetime prevalence of 2-3 percent. Executive function refers to the ability to use high level oversight functions to modulate memory, sensory information, cognition, and affect as a situation evolves, and strategies must shift to maintain performance. Impairment of nonverbal memory also has been reported in many studies of patients with OCD. This study was planned to find the frequency of impairment of executive functioning among patients having obsessive compulsive disorder. As impairment of cognitive functions including executive functioning decreases the quality of life and increases the health care costs, so early detection of cognitive impairment is essential.

In our study, out of 150 cases of OCD, 65.33% (n=98) were between 18-30 years of age while 54.67% (n=82) were male and 45.33% (n=68) were females, frequency of impairment of executive functioning among patients having obsessive compulsive disorder was calculated in 22.67% (n=34).

Gualtieri and colleagues² revealed a 19% frequency of impairment of executive functions in multiple domains among 63 patients with anxiety disorders as compared to only 4% of healthy controls. These findings are in agreement with our results.

Visuospatial and visuoconstructional deficits are among the most consistent findings in neuropsychological assessment studies of patients with OCD.⁷ Visuospatial skill is defined as the ability to perceive and manipulate objects in two- and three-dimensional space. Patients with OCD have shown impairment on several tests of visuospatial ability, including the Block Design subtest of the Wechsler Adult Intelligence Scale (WAIS), the Figure Matching Test, the Mental Rotations Test, the copy condition of the Rey-Osterrieth Complex Figure Test (RCFT), and Money's Road Map Test. Visuospatial task performance incorporates differing components, depending on task design and demands. Some groups have suggested the deficits seen in OCD may reflect right temporo-parietal dysfunction because of the demands on spatial reasoning, common to all these measures. Alternatively, frontal-striatal dysfunction, resulting in impairment of executive systems, may impair multiple domains in OCD patients, including visuospatial abilities. Impairment of nonverbal memory also has been reported in many studies of patients with OCD^{7,5} Nonverbal memory is the ability to learn and recall new visual objects and images. OCD patient groups have shown impairment on numerous tests of nonverbal memory, including visual reproduction and delayed recognition of figures, maze learning, and immediate and delayed figure copying.

Several studies have begun to investigate decision-making processes in OCD using paradigms developed to study cognitive deficits associated with lesions in the orbitofrontal cortex (OFC).⁸ For example, in gambling paradigms, patients with OFC lesions consistently play from decks associated with immediate gain but long-term loss. Normal subjects

develop anticipatory skin conductance responses (SCR) before card selection, even before they are able to explicitly describe the rules. Patients with OFC lesions, however, do not. The orbitofrontal cortex is a central neural region where emotions may impact cognition and behavior. Damasio⁷ has described the OFC as an emotional helping system that allocates processing resources so that executive systems can engage in effective strategies. There is evidence that performance on the Iowa Gambling Test predicts response to selective serotonin reuptake inhibitor (SSRI) treatment in patients with OCD. It is possible that executive function deficits in OCD arise from poor decision-making processes tied to the OFC.

The limitation of this study is that healthy controls were not included, who may be enrolled in upcoming trials. However, the findings of this study are helpful in early detection of the deficits needing appropriate management, and therefore increasing the quality of life of patients.

CONCLUSION

Thus, it is concluded that executive functioning is impaired frequently among patients having obsessive-compulsive disorder. So, it is recommended that executive functioning should be monitored among patients who present with OCD. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

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