

Original Research Article

Assessment of various cognitive domains in patient with obsessive-compulsive disorder

Jitesh Kumar Gupta¹, Jai Singh Yadav¹, Samir Kumar Singh², Sandeep Kumar¹, Pradeep Kumar^{1*}

¹Department of Psychiatry, ²Department of Physiology, Institute of Medical Sciences Banaras Hindu University, Varanasi, Uttar Pradesh, India

Received: 03 January 2023

Revised: 01 February 2023

Accepted: 06 March 2023

***Correspondence:**

Dr. Pradeep Kumar,

E-mail: Pradeepky136@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: OCD is often chronic disorder and causes impairment of functional efficiency. Various researchers have found that cognitive dysfunction frequently present even when mild symptoms are present. This study aimed to investigate various domains of cognitive function in patients with OCD using cross sectional design. In this study we have tried to find out the various domains of cognitive function in OCD and their relation with clinical severities. We also compared the cognitive function of patients with OCD and their control.

Methods: Total 60 subjects (30 in case group and 30 in control group) were taken for study. The study subjects (OCD group) were taken from psychiatric OPD and control group from general populations. The subjects of both the groups were screened as per inclusion and exclusion criteria and the Y-BOCS, ACE –III scales were applied.

Results: In the case group, 96.70% had a normal ACE-III score and 3.30% had an inconclusive score, while in the control group 100% had a normal score at ACE-III scale, on further scoring. 60% patients have moderate and 33.3% have severe score in the YBOCS scale. We have found the significant decline in total mean ACE-III scores between case and control group (p value 0.000) and decline in memory domain with severity of illness was also significant (p value 0.037).

Conclusions: Decline in cognition domain of memory in patient with OCD, was significant in comparison to control group.

Keywords: ACE-III, Cognitive dysfunction, OCD

INTRODUCTION

Obsessive-compulsive disorder (OCD) is a psychiatric condition involving neurobiological abnormal activity among the cortico-striato-thalamo-cortical (CSTC) circuits, which includes orbitofrontal cortex (OFC), striatum, basal ganglia and the thalamus.¹ CSTC plays an important function in implicit learning of procedural strategies, and their automatic execution thereafter. Neuropsychological testing exhibit impairment in visuo-

spatial abilities, non-verbal memory, executive functioning, poor decision making and mental flexibility.²⁻⁵

OCD is often linked with poor decision-making processes and executive function deficits that is related to orbito-frontal cortex. Previous studies have shown a correlation among OCD and spatial working memory specially for difficult task. Most of the studies regarding cognitive functioning impairment have been done in developed nation and there are limited data are available in other

developing countries. In this study we have worked out different of cognition domains those affected in patients with OCD.

Aim

To find out the various domains of cognitive function in patients with OCD. To compare the cognitive function of patient with OCD to their healthy control.

METHODS

Study design

Study design was cross-sectional comparative analysis.

Sample selection

Sample selection was done from two settings, the 30 patients in study group was selected from psychiatric OPD, dept of psychiatry IMS, BHU, Varanasi. And 30 control subjects were taken from person accompanying with patient but were not relative of the patients. The sample was collected between 1 January 2020 to 30 March 2021.

Ethical consideration

Ethical consideration was taken from the institutional ethical committee of institute of medical sciences, Banaras Hindu University, Varanasi. The written and verbal consent for participation in this study was taken from each of the study participants before data collection. All subjects were informed about the purpose of the study and they were also informed that they have right to withdraw from the study at any point in time. Confidentiality and privacy were maintained throughout the process.

Inclusion criteria

Patients agreed to give consent, age 16-40 years, duration of illness more than 6 months, and minimum educated up to 10th standard. Control group: 30 normal control subjects were selected from patients' attendants match the study group for age, gender, and years of education

Exclusion criteria

Patients having co-morbid physical, organic or other psychotic disorder.

Tools

A socio-demographic data sheet, Yale-Brown obsessive-compulsive scale (Y-BOCS) and Addenbrooke's cognitive examination (ACE-III).^{6,7}

Method

Subjects were divided into case and control groups, and the subject were screened from psychiatric OPD IMS, BHU, Varanasi and the final diagnosis was made by consultant in-charge OPD. Patients were finally selected after fulfilling the inclusion and exclusion criteria. Statistical analysis: The data of the participants were evaluated using the SPSS 23.0. The demographic data were expressed as mean, median, standard deviation, number, and percentage. For intergroup comparisons, the t-test was used as the parametric test for the analysis. $P < 0.05$ was considered to be statistically significant.

RESULTS

A total of 60 participants (30 in case and 30 in the control group) were registered. Majority of participants in case and control groups were male (60% and 70%), single (56.7% and 70%), rural background (60% and 50%), Hindu religion (90% and 93%), nuclear family (73.3% and 60%), students (33.3% and 36%) and middle socioeconomic status (73.3% and 90%) respectively. There was statistically significant difference in family history of OCD in case and control group (36.7% versus 10%, $p = 0.015$) (Table 1).

Majority of participants in case group had moderate YBOCS score (60%) followed by a severe YBOCS score (33.3%). We did not find any significant ACE-III scoring in the case and control group (p value 0.313) but we have found a statistically significant decline in all cognitive domains of ACE-III case as compared to control group ($p < 0.001$). Mean score in case and control group, to be found, in domains of attention (14.23 versus 16.37), memory (24.27 versus 25.07), fluency (12.70 versus 13.63) language (24.60 versus 25.37) and visuospatial (24.03 versus 25.33) and total ACE-III score (90.07 versus 95.83) (Table 2).

We did not find significant decline in Total ACE-III mean score with severity of illness (93.500 versus 89.8889 versus 89.7000, $p = 0.146$) but we have found a statistically decline in memory domain with severity of illness (26.000 versus 24.1667 versus 24.1000, $p = 0.037$) (Table 3).

We found decline in cognition in total ACE-III score with duration of illness (<1 year, 1-3 year, >3 years) but statistically not significant (91.000 versus 89.7857 versus 89.166, $p = 0.342$). We have found that there is decline in cognition in domains of memory (24.5000 versus 24.2857, $p = 0.629$), fluency (13.0000 versus 12.7143 versus 12.1667, $p = 0.095$), language (24.9000 versus 24.5714 versus 24.1667, $p = 0.289$), visuospatial (24.4000 versus 23.6429 versus 24.3333, $p = 0.133$) except attention (14.100 versus 14.285 versus 14.333, $p = 0.943$) with duration of illness but the score was statistically not significant (Table 4).

Table 1: Socio-demographic profile of participants.

Socio-demographic status of participants		Case		Control		P value
		N	%	N	%	
Gender-	Male	18	60	21	70	0.417
	Female	12	40	9	30	
Marital status	Single	17	56.7	21	70	0.284
	Married	13	43.3	9	30	
Domicile	Urban	12	40	15	50	0.436
	Rural	18	60	15	50	
Religion	Hindu	27	90	28	93.3	0.640
	Muslim	3	10	2	6.7	
Family type	Nuclear	22	73.3	18	60	0.273
	Joint	8	26.7	12	40	
Education	High-school	14	46.6	11	36.6	0.698
	Intermediate	11	36.6	14	46.6	
	Graduate	5	16.6	5	16.6	
Occupation	Unemployed	2	6.6	5	16.6	0.192
	Student	10	33.3	11	36.3	
	Homemaker	10	33.3	6	20	
	Farmer	5	16.6	3	10	
	Skilled worker	1	3.3	1	3.3	
	Shopkeeper	2	6.6	3	10	
	Professionals	0	0	1	3.3	
Socio-economic status	Upper	0	0	0	0	0.192
	Upper middle	6	20	10	33.3	
	Lower middle	16	53.3	17	56.6	
	Upper lower	8	26.6	3	10	
History of substance abuse- present		4	13.3	6	20	0.488
Family history of OCD- present		11	36.7	3	10	0.015
Family support- present		25	83.3	30	100	0.020

Table 2: Clinical characteristics of patients and control subjects.

Clinical characteristics		Case (30)		Control (30)		χ^2	P value
		N	%	N	%		
YBOCS score	Normal	0	0	30	100	60.00	0.000
	Mild	2	6.67	0	0		
	Moderate	18	60	0	0		
	Severe	10	33.33	0	0		
ACE-III	Normal	29	96.7	30	100	1.017	0.313
	Inconclusive	1	3.33	0	0		
	Abnormal	0	0	0	0		
Ace-III cognitive domain	Attention mean score (/18)	14.2333±1.47819		16.3667±0.96431		-	0.000
	Memory mean score (/26)	24.2667±1.01483		25.0667±0.63968		-	0.001
	Fluency mean score (/14)	12.7000±0.74971		13.6333±0.49013		-	0.000
	Language mean score (/26)	24.6000±0.89443		25.3667±0.61495		-	0.000
	Visuospatial mean score (26)	24.0333±0.99943		25.3333±0.66089		-	0.000
Total ACE-III mean score (/100)		90.0667±2.57218		95.8333±2.50631		-	0.000

Table 3: Domain-wise cognitive impairment with severity of symptoms.

Severity of illness	Mild (n=2)	Moderate (n=18)	Severe (n=10)	P value
Attention mean score (/18)	13.5000±2.12132	14.6111±1.61387	13.7000±0.94868	0.233
Memory mean score (/26)	26.0000±0.00000	24.1667±0.85749	24.1000±1.10050	0.037
Fluency mean score (/14)	12.0000±0.00000	12.6667±0.84017	12.9000±0.56765	0.297

Continued.

Severity of illness	Mild (n=2)	Moderate (n=18)	Severe (n=10)	P value
Language mean score (/26)	25.5000±0.70711	24.5000±0.70711	24.6000±1.17379	0.336
Visuospatial mean score (/26)	24.5000±0.70711	14.6111±1.61387	13.7000±0.94868	0.407
Total ACE-III mean score (/100)	93.5000±2.12132	89.8889±2.80522	89.7000±1.76698	0.146

Table 4: Domain-wise cognitive impairment with duration of illness.

Duration of illness	<1 year (n=10)	Year (n=14)	>3 year (n=6)	P value
Attention mean score (/18)	14.1000±1.72884	14.2857±1.58980	14.3333±0.81650	0.943
Memory mean score (/26)	24.5000±1.08012	24.2143±1.12171	24.0000±0.63246	0.629
Fluency mean score (/14)	13.0000±0.66667	12.7143±0.72627	12.1667±0.75277	0.095
Language mean score (/26)	24.9000±0.56765	24.5714±1.08941	24.1667±0.75277	0.289
Visuospatial mean score (/26)	24.4000±0.96609	23.6429±1.00821	24.3333±0.81650	0.133
Total ACE-III mean score (/100)	91.0000±2.78887	89.7857±2.80600	89.1667±0.98319	0.342

DISCUSSION

In our study in the case group, 60% of participants were male and 40% were female, while in the control group 70% of participants were male and 30% were female ($p=0.417$) similar sex ration also reported in his study by Chandra et al. They find that 68.8% of patients were males.⁸ We found in the case group, 56.7% of participants were single and 43.3% were married, while in the control group 70% of participants were single and 30% were married, the contrast finding of Mathis et al reported in his study, that a large proportion of the patients was married, it could, due to our selection criteria where young adult taken in study.⁹ In the case group majority (60%) of the participants in our study belonged to the rural background and 40% of participants belonged to the urban background while in the control group 50% of participants belonged to rural and 50% to the urban background. However, Manchanda et al found that 83.3% of OCD patients belong to an urban area in their study.¹⁰ These findings of our study might be due to the fact that in the last few decades psychiatric awareness increased in rural areas. Most of the participants included in the study belonged to the Hindu religion only 3% belonged to the Muslim religion. The present study is in line with the previous studies conducted by Manchanda et al. They have reported that 88% of patients were Hindu by religion, 10% were Muslim and 2% were of other religions.¹⁰ The high occurrence of OCD patients in Hindus may be due to the majority of Hindu population and awareness so they were more reporting hospitals for help. In our study, we found that in case group 73.3% of participants had a nuclear family and 26.7% had a joint family while in the control group 60% had a nuclear family and 40% had a joint family. A similar result was found by the study by Manchanda et al they find that 63.3% of OCD patients belong to a nuclear family.¹⁰ This shows the current scenario of our society in which there is a trend of urbanization and shifting from joint family to nuclear family.

In the case group 46.6% of people educated up to matric, 36.66% people educated up to intermediate and 16.6%

people educated up to graduation and above, while in the control group 36.6% people educated up to matric, 46.6% people educated up to intermediate and 16.6% people educated up to graduation and above ($p=0.698$). However, the study of Chakraborty et al found that most OCD patients were educated above middle school standard.¹¹ In study we found that case group 6.6% were unemployed 33.3% were students, 33.3% were homemakers, 16.6% were farmers and 3.3% were skilled while in the control group 16.6% were unemployed, 36.6% were students, 20% were homemakers 10% were a farmer and 3.3% skilled which is in line of similar findings have been reported and emphasized in studies by Koran et al and Eisen et al.^{12,13}

In the case group, the majority of participants (73.3%) in our study belonged to the middle socioeconomic status in comprise to upper-middle and lower-middle socioeconomic status and 26.6% belonged to lower socioeconomic class, while in the control group 90% of participants belong to the middle class and 10% belong to lower class, none participants in our study belonged to the upper class. Similar findings reported by Chakraborty et al in their study, found the majority of OCD patients belong to the middle class.¹¹ One reason for this may be due to the patients in high socioeconomic class prefer to visit private clinics and hospitals than government hospitals, and chronic illness and lesser awareness in lower socioeconomic strata so in our study majority of our participants belong to middle socioeconomic status. In this present study, we found that in the case group 13.3% of participants were taking one or more substances while in the control group 20% were substance abusers. In our study, we find that in the case group 36.7% of participants have a family history of OCD, while in the control group 10% of participants have a family history of OCD. which suggests that OCD is having a high genetic predisposition. Our finding is supported by various previous studies which show that OCD is more common in first-degree relatives as compared to the general population. Black et al found that the risk of OCD in first-degree relatives was much higher as compared to normal control (10% versus 1.9%).¹⁴ In our

study, we find that in the case of group 83.3% of participants had family support and 16.7% were not having any family support while in the control group 100% of participants had family support. This finding could be due to a lack of awareness about OCD in the community and some people linked excessive cleaning and washing behavior with religious matters.

The severity of the OCD in the participants was measured by the Yale-Brown obsessive-compulsive scale (YBOCS). In the case group, 60% of participants had moderate grade severity on the YBOCS scale, 33.3% participants had severe grades and 6.6% participants had mild grade severity while in the control group 100% of participants belonged to the normal category. Similar results have been shown by Dhayani et al and Kumar et al.^{15,16}

In our study, we did not find any significant difference in Addenbrooke's cognitive examination-III (ACE-III) score between case and control groups. In the case group, 96.70% had a normal ACE-III score, 3.30% had an inconclusive score, while in the control group 100% had a normal ACE-III score but we have found a statistically significant decline in all cognitive domains of ACE-III case as compared to control group, in domains of attention (14.23 versus 16.37), memory (24.27 versus 25.07), fluency (12.70 versus 13.63) language (24.60 versus 25.37) and visuospatial (24.03 versus 25.33) and total ACE-III score (90.07 versus 95.83). Similar finding has been shown by Shin et al significant impairment in the domains of visuospatial memory, executive function, verbal memory, processing speed and verbal fluency whereas there was no significant differences were present in the domain of attention.¹⁷

In our study, we found non-significant decline in attention, fluency, language and visuospatial domain and total ACE-III mean score with severity of illness but we find a statistically significant decline in memory domain with severity of illness (26.000 versus 24.1667 versus 24.1000, $p=0.037$).

However various previous studies showed a significant decline in cognitive functions in OCD patients like Savage et al and Melloni et al found memory deficits in patients with OCD.^{18,19} But in our study, we did not find significant decline in cognition domain (except memory domain), and total ACE-III score with duration of illness. Those controversial result could be due to age group of subjects i.e., 16 to 40 years with a mean age of cases were 28.45 years, so our study population are relatively younger, and significantly apparent cognitive dysfunction on the ACE- III scale might be seen in older age with long duration of disorder.

There are few limitations of the study. It was a cross-sectional study, and to reduce the controversy of decline in cognition further longitudinal studies are needed. In our study we have taken samples those were on regular

medications or under follow-up, therefore we could not exclude the drug effect on cognition. Due to the limited time factor and resources, many other neurocognitive tests could not be applied.

CONCLUSION

Patients with OCD, suffer excessively from interference with information-processing and the inability to disregard irrelevant cues. Our results supported dysfunctions of earlier suggestions of disturbed striato-cortical neural circuits. Because the cognitive domains those also govern through cortical part of brain were significantly affected in our findings. In OCD cognitive dysfunctions have a direct relationship with severity; however, it did not show a relationship with chronicity.

Recommendations

Further exploration of the effects of various clinical variables on cognitive functioning in patients with OCD and additional investigation, whether the cognitive dysfunction associated with this disorder differs, from or overlap with other disorders like anxiety, phobia etc. are needed.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee Banaras Hindu University, Varanasi

REFERENCES

- Burguière E, Monteiro P, Mallet L, Feng G, Graybiel AM. Striatal circuits, habits, and implications for obsessive-compulsive disorder. *Curr Opin Neurobiol.* 2015;30:59-65.
- Hollander E, Cohen L, Richards M, Mullen L, DeCaria C, Stern Y. A pilot study of the neuropsychology of obsessive-compulsive disorder and Parkinson's disease: Basal ganglia disorders. *J Neuropsychiatr Clin Neurosci.* 1993;5:104-7.
- Christensen KJ, Kim SW, Dysken MW, Hoover KM. Neuropsychological performance in obsessive compulsive disorder. *Biol Psychiatr.* 1992;31:4-18.
- Kumar P, Chaudhry R, Mishra BP. Cognitive impairment in OCD patients—an exploratory study. *Indian J Mental Health.* 2019;6(1).
- Rubin RT, Villanueva-Meyer J, Ananth J, Trajmer PG, Mena I. Regional 133Xe cerebral blood flow and cerebral HMPAO uptake in unmedicated OCD patients and matched normal control subjects: determination by high resolution single photon emission CT. *Arch Gen Psychiatr.* 1992;49:695-702.
- Goodman WK, Price LH, Rasmussen SA, Mazure C, Fleischmann RL, Hill CL, et al. The Yale-Brown obsessive compulsive scale: I. Development, use, and reliability. *Arch Gen Psychiatr.* 1989;46(11):1006-11.

7. Hsieh S, Schubert S, Hoon C, Mioshi E, Hodges JR. Validation of the Addenbrooke's cognitive examination III in frontotemporal dementia and Alzheimer's disease. *Dement Geriatr Cognit Disord.* 2013;36(3-4):242.
8. Girishchandra BG, Khanna S. Phenomenology of obsessive-compulsive disorder: a factor analytic approach. *Indian J Psychiatr.* 2001;43(4):306.
9. Math SB, Thoduguli J, Janardhan Reddy YC, Manoj PN, Zutshi A, Rajkumar RP, et al. A 5-year course of predominantly obsessive vs. mixed subtypes of obsessive-compulsive disorder. *Indian J Psychiatr.* 2007;49:250-5.
10. Sethi BB, Manchanda R. Socio-economic, demographic and cultural correlates of Psychiatric disorders with special reference to India. *Indian J Psychiatr.* 1978;20(3):199-211.
11. Chakraborty A, Banerji G. Ritual, a culture specific neurosis, and obsessional states in Bengali culture. *Indian J Psychiatr.* 1975;17(3):211-6.
12. Bobes J, González MP, Bascarán MT, Arango C, Sáiz PA, Bousoño M. Quality of life and disability in patients with obsessive-compulsive disorder. *Eur Psychiatr.* 2001;16(4):239-45.
13. Steketee G, Eisen J, Dyck I, Warshaw M, Rasmussen S. Predictors of course in obsessive compulsive disorder. *Psychiatr Res.* 1999;89(3):229-38.
14. Black DW, Gaffney G, Schlosser S, Gabel J. The impact of obsessive-compulsive disorder on the family: preliminary findings. *J Nerv Ment Dis.* 1998;186(7):440-2.
15. Dhyani M, Trivedi JK, Nischal A, Sinha PK, Verma S. Suicidal behaviour of Indian patients with obsessive compulsive disorder. *Indian J Psychiatr.* 2013;55(2):161.
16. Kumar A, Kumar P, Pareek V, Faiq MA, Raza K, Prasoon P, et al. Nerve growth factor(s) mediated hypothalamic pituitary axis activation model in stress induced genesis of psychiatric disorders. Preprints. 2017;2017100047.
17. Shin NY, Lee TY, Kim E, Kwon JS. Cognitive functioning in obsessive-compulsive disorder: a meta-analysis. *Psychol Med.* 2014;44 (6):1121-30.
18. Savage CR, Baer L, Keuthen NJ, Brown HD, Rauch SL, Jenike MA. Organizational strategies mediate nonverbal memory impairment in obsessive-compulsive disorder. *Biol Psychiatr.* 1999;45(7):905-16.
19. Melloni M, Urbistondo C, Sedeño L, Gelormini C, Kichic R, Ibanez A. The extended fronto-striatal model of obsessive-compulsive disorder: convergence from event-related potentials, neuropsychology and neuroimaging. *Front Hum Neurosci.* 2012;6:259.

Cite this article as: Gupta JK, Yadav JS, Singh SK, Kumar S, Kumar P. Assessment of various cognitive domains in patient with obsessive-compulsive disorder. *Int J Res Med Sci* 2023;11:1180-5.