

Prevalence and correlates of cognitive impairment among OCD patients

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Abstract

Background: *There is evidence of impairment in the cognitive functioning of patients with obsessive-compulsive disorder (OCD) despite inconsistencies. Although several confounding factors have been investigated to explain the conflicting results, the findings remain mixed. This study aimed to investigate cognitive dysfunction in patients with OCD using a meta-analytic approach. Aim and Objectives:* *The present study aimed to assess the cognition in OCD and its relation with CRP, ESR levels* **Subjects and methods:** *This research was a case-control study one conducted on 120 subjects (60 OCD patients and 60 control subjects) cases were subjected to clinical diagnosis of OCD using Structured Clinical Interview according to DSM-5, and all subjects were submitted to Yale- Brown Obsessive-Compulsive Scale, Beck anxiety inventory, MoCA, ESR (Erythrocyte Sedimentation Rate) and, CRP blood sampling.* **Results:** *No statistical significance differences between cases and control group in demographic data or frequency of smoking. There was a statistical significance increase in frequency of impairment among urban resident and non-working cases. There was no statistical significance relation between Montreal Cognitive Assessment results and Yale Brown OCD Scale, Beck anxiety inventory but there was a statistical significant increase in frequency of sever beck depression inventory among the impaired cognitive cases. There was a statistical significance negative correlation between MOCA score and all ESR 1st, ESR 2nd, CRP, YBOCS and BDI. Conclusion:* *Patients with OCD appear to have cognitive deficits. Cognitive function in OCD patient was correlated with ESR, CRP, YBOCS and BDI scores. ESR CRP can be used in diagnosis of cognitive function in OCD.*

Introduction:

Obsessive-compulsive disorder (OCD) is a mental disorder in which a person feels the need to perform certain routines repeatedly (called "compulsions"), or has certain thoughts repeatedly (called "obsessions"). The person is unable to control either the thoughts or activities

for more than a short period of time. Common compulsions include hand washing, counting of things, and checking to see if a door is locked. Some may have difficulty throwing things out (1).

OCD may be associated with a distinct pattern of neuropsychological deficits. These deficits in OCD consist primarily of executive deficits involving frontal striatal system dysfunction, impairment in visuospatial abilities, and nonverbal memory. Some studies also report deficit in attention set shifting abilities, response inhibition and trial and error learning. However, results of the neuropsychological studies have been inconsistent (2).

Numerous studies have investigated cognitive deficits of patients suffering from OCD, bringing inconsistent results with differential performances on identical or similar tasks, often due to methodological discrepancies. Some studies have even used self-report questionnaires to assess cognitive functioning with an obvious high risk of unreliability (3).

Diagnosis of cognitive dysfunction is important mainly in the early stages as many of its causes are reversible as depression, side effects of medication, thyroid disease, sleep disorders, excess alcohol, and vitamin deficiencies. In addition, even in the case of primary neurodegenerative disorders, early detection allows diminish factors that lead to more rapid progression of the disease (4).

Neuroinflammatory and immunological abnormalities have been documented in patients with psychiatric disorders. In the past decade, accumulating data suggest a connection between inflammation and psychiatric symptoms. Reports of peripheral immune modulators having the ability to induce psychiatric symptoms have been demonstrated in animal models and humans (5).

This study aimed to assess the cognition in OCD and its relation with CRP, ESR levels.

Patient and methods:

The current study is a case-control study performed at outpatient clinic of department of psychiatry in Zagazig university hospitals, Sharkia, Egypt. This sample had been collected during the period from 1 January 2020 till 1 January 2021.

Sample size and sampling frame :

Using Epi info, the sample size was estimated according to confidence interval C.I 95%, Power 80 %. Assuming that mean \pm SD of CRP in healthy versus OCD group was 2.34 ± 2.12 mg/dl versus 4.19 ± 3.66 mg/dl so that the sample size was be 120 (60 for each group) using open epi (6)

Subjects included in this study:

Participants of the present research were selected according to inclusion and exclusion criteria .

Case group: we included all patients meeting the diagnostic criteria of obsessive compulsive disorder by using the Structured Clinical Interview for DSM-5, OCD patients complicated with depression or general anxiety disorders, Patients of either sex, aged between 18 and 60 years and

all socioeconomic classes was included. And we excluded patients whose age was less than 18 or more than 60 years old, patients with current major psychiatric disorders (schizophrenia or other psychotic disorders, bipolar disorder, intellectual disability, primary depressive disorder, substance use disorder 6 months prior to the study), cognitive deterioration or dementia according to DSM-5 criteria, recent infection, surgery or inflammatory disease (arthritis, asthma, allergy, autoimmune diseases) in the last 1 month before starting the study, patients with unstable medical disorder (cardiac, pulmonary, gastrointestinal, hepatic, renal, immunological or hematological disease), neurological disorder (epilepsy, organic brain disease, traumatic head injury), cancer (lymphoma, carcinoma and sarcoma), CRP level ≥ 11 , to lower the possibility of a severe physical illness caused by an undiagnosed disease, patients who are on any other medication which affect CRP, ESR levels (anti-inflammatory, antibiotics, steroid and other immunosuppressive drugs) and pregnancy, peripartum period and oral contraceptive tablets within 6 months before the onset of the study.

Control Group: Healthy subjects with matching socio-demographic factors. The exclusion and inclusion criteria of the control group were the same as that of the study group.

Operational Design:

Participants were subjected to the following: Enrollment of participants was on voluntary basis. An informed written consent was presented to all patients and controls participating in the study with explanation of the purpose of the study. All subjects in the present study were apprised of the following broad principles: Participation is completely voluntary; nevertheless, participation does not indicate that the participant will receive a direct benefit, decision to leave the study at any time without any justification is accepted and doesn't affect the treatment plan and the findings of this study may be published in a scientific journal, but the participants' identities will be kept strictly confidential.

Steps of performance and tools used Clinical assessment, psychometric assessment and serological assessment.

I. **Clinical assessment:** included the following: obsessive compulsive disorder was diagnosed based on Structured Clinical Interview for DSM-5 criteria (SCID-I). Socio-demographic data: Age and gender, socio-economic state, occupational state, educational degree, residence (rural or urban) and smoking status (smoker or non-smoker).

II. **Psychometric assessment:** includes the following:

- 1) **Yale Brown OCD Scale YBOCS(7)** and its Arabic version by Abdel-Khalek (8): was designed to rate the severity of OCD symptoms. This scale, which measures obsessions separately from compulsions, specifically measures the severity of symptoms of obsessive-compulsive disorder without being biased towards the type of content of obsessions or compulsions present. It includes two items (obsessions and compulsions), each item assessed by five questions which scored from (0= none to 4= severe). If patients

have both obsessions and compulsions, and the total score is; 8-15 = Mild OCD; 16-23 = Moderate OCD; 24-31= Severe OCD; 32-40 = Extreme OCD.

- 2) **Beck anxiety inventory: (9)** is a self-report inventory that consists of 21-question multiple-choice self-report inventory that is used for measuring the severity of anxiety in children and adults of 5 to 10 minutes applying duration. The total score is calculated by finding the sum of the 21 items: Score of 0-21 = low anxiety; Score of 22-35 = moderate anxiety; Score of 36 and above = potentially concerning levels of anxiety.
- 3) **The beck depressive inventory and its Arabic version which is translated by Dr. Abdel Satar Ibrahim, professor in King Fasil University:** BDI is the most common used scale for depression. The BDI is a self-report subjective scale consisted of 21 items that cover emotional, somatic and behavioral symptoms in depressive cases. These items are: self-hate, sense of failure, guilt feeling, self-accusation, and sense of punishment, suicidal idea, pessimism, body image, and sadness, lack of satisfaction, crying spells, fatigue, difficulty working, social withdrawal, irritability, somatic concern, libido loss, indecisiveness, appetite change, weight loss and insomnia (10). BDI cut-off (≥ 13) was used to identify the disorder. Scores of 10-18 indicated mild to moderate depression, 19-29 indicated moderate to severe depression, and 30 and above indicated severe depression (11). In this study, a validated Arabic version of the scale was used (8).

4) Montreal Cognitive Assessment (MoCA) (12) and its Arabic version (13):

The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention, concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. Time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

Socioeconomic status: According to the family income in Egypt, the socio-economic status was categorized into three categories: Low Socio-economic status (less than 2400 EGP), moderate socio-economic status (2400 EGP to 8000 EGP) and high socio-economic status (more than 8000 EGP).

III. Serological assessment: Blood tests were performed on outpatient clinic patients and healthy groups at 12 month intervals, including CRP and ESR using ELISA, are reported in milli-grammes/liter. All CRP levels should be below 11 mg/l, to lower the possibility of a severe physical illness caused by an undiagnosed disease being the reason for the inflammatory state because psychiatric disorders cause low-grade inflammation, not high-grade inflammation. Blood Samples were centrifuged at 1800g for 10 min to obtain plasma and serum for measuring CRP, ESR.

IV. Administrative design: Approval was obtained from Zagazig University Institutional Review Board (IRB) and an informed written consent was obtained from all participants enrolled in this study and their first degree relative.

Statistical analysis: The collected data were computerized and statistically analyzed using SPSS program (Statistical Package for Social Science) version 27 (IBM, 2020) Data was

presented in tables and figures. Quantitative data was presented as mean, median and range. Qualitative data was presented as frequencies and relative percentages. Qualitative data were represented as frequencies and Pearson's chi square (χ^2) test was used to calculate difference between qualitative variables.

Results:

No statistical significance differences between cases and control group in demographic data or frequency of smoking (**table 1**).

The duration of disease among the studied cases ranged from 2 months to 30 years with mean 8.89 years and age of onset it ranged from 8 to 44 years with mean 24.27 years. Positive family history of psychiatric illness founded in 48.3% of the studied cases. Regarding type of obsession 45% of the cases had reactive, 28.3% was autogenic and 26.7% was combined. Religious type was most frequent single type (16.7%) followed by doubt (13.3%) while Contamination & doubt was the most common mixed type (**table 2**).

There was a statistical significance increase in frequency of impairment among urban resident and non-working cases (**table 3**).

There was no statistical significance relation between Montreal Cognitive Assessment results and Yale Brown OCD Scale, Beck anxiety inventory but there was a statistical significant increase in frequency of sever beck depression inventory among the impaired cognitive cases (**table 4**).

There was a statistical significance negative correlation between MOCA score and all ESR 1st, ESR 2nd, CRP, YBOCS and BDI.this suggested that the presence of MCI in these depressed subjects have additive effect on inflammation (**table 5**).

Table (1): Demographic Characteristics of the studied groups:

Variable		Cases (n=60)		Control (n=60)		t	P
<i>Age:</i>	Mean \pm SD	33.02 \pm 8.66		34.52 \pm 8.27		0.97	0.33
	Range	18 - 60		20 - 55			
	Variable	No	%	No	%	χ^2	P
<i>Sex:</i>	Female	38	63.3	32	53.3	1.23	0.27
	Male	22	36.7	28	46.7		
<i>Residence:</i>	Rural	26	43.3	36	60	3.34	0.07
	Urban	34	56.7	24	40		
<i>Marital status:</i>	Single	25	41.7	14	23.3	6.28	0.10
	Married	34	56.7	42	70		
	Divorced	1	1.7	2	3.3		
	Widow	0	0	2	3.3		
<i>Education:</i>	Illiterate	2	3.3	0	0	6.92	0.08
	Basic	6	10	4	6.7		

	High school	29	48.3	20	33.3		NS
	College	23	38.3	36	60		
Occupation:	Not working	26	43.3	16	26.7	3.66	0.06
	Working	34	56.7	44	73.3		NS
Social class:	Low	16	26.7	7	11.7		
	Middle	37	61.7	40	66.7	5.44	0.07
	High	7	11.7	13	21.7		NS
Smoking:	No	55	91.7	52	86.7	0.78	0.38
	Yes	5	8.3	8	13.3		NS

SD: Stander deviation, t: independent t test, χ^2 :Chi square test NS: Non significant (P>0.05)

Table (2): Clinical Characteristic of OCD Patients:

Variable		Cases (n=60)	
<i>Duration (years)</i>	Mean \pm SD	8.89 \pm 6.47	
	Median (Range)	8 (2 m – 30)	
<i>Age of onset of ocd</i>	Mean \pm SD	24.27 \pm 7.33	
	Median (Range)	23 (8 – 44)	
Variable		No	%
<i>familyHistory of psychiatric illness</i>	-ve	31	51.7
	+ve	29	48.3
<i>Types of Obsession</i>	Autogenic	17	28.3
	Reactive	27	45
	Combined	16	26.7
<i>Number of Obsession:</i>	Single type:	31	51.7
	Aggression	2	3.3
	Contamination	4	6.7
	Doubt	8	13.3
	Hoarding	3	5
	Religious	10	16.7
	Sexual	2	3.3
	Symmetry	2	3.3
	Two types:	21	35
	Aggression & contamination	1	1.6
	Contamination & doubt	6	10
	Contamination & religious	1	1.6
	Contamination & sexual	1	1.6
	Contamination symmetry	1	1.6
Doubt religious	4	6.7	

	Doubt sexual	2	3.3
	Doubt symmetry	2	3.3
	Religious sexual	3	5
	Three types:	8	13.3
	Contamination, doubt & hoarding	1	1.6
	Contamination, doubt & religious	3	5
	Contamination, religious & sexual	2	3.3
	Doubt, religious & sexual	2	3.3

SD: Standard deviation

Table (3): Relation between cognitive function and Demographic Characteristics of the studied groups:

Variable		Impaired (n=45)		Normal (n=15)		t	P	
Age:	Mean ± SD	33.98 ± 9.07		30.13 ± 6.79		1.50	0.14	
	Range	18 - 60		18 - 44			NS	
Variable	N	No	%	No	%	χ^2	P	
Sex:	Female	38	30	78.9	8	21.1	0.86	0.35
	Male	22	15	68.2	7	31.8		
Residence:	Rural	26	16	61.5	10	38.5	4.43	0.04*
	Urban	34	29	85.3	5	14.7		
Marital status:	Single	25	19	76	6	24	0.39	0.83
	Married	34	25	73.5	9	265		
	Divorced	1	1	100	0	0		
Education:	Illiterate	2	1	50	1	50	2.99	0.39
	Basic	6	5	83.3	1	16.7		
	High school	29	24	82.8	5	17.2		
	College	23	15	65.2	8	34.8		
Occupation:	Not working	26	23	88.5	3	11.5	4.43	0.04*
	Working	34	22	64.7	12	35.3		
Social class:	Low	16	12	75	4	25	1.42	0.49
	Middle	37	29	78.4	8	21.6		
	High	7	4	57.1	3	42.9		
Smoking:	No	55	40	72.7	15	27.3	1.82	0.18
	Yes	5	5	100	0	0		

SD: Stander deviation, t: independent t test, χ^2 :Chi square test

NS: Non significant (P>0.05) *: Significant (P<0.05)

Table (4): Relation between Montreal Cognitive Assessment results and Yale Brown OCD Scale, Beck anxiety inventory & Beck depression inventory among the studied groups:

Variable		N	Impaired (n=45)		Normal (n=15)		χ^2	P
			N	%	N	%		
History of psychiatric illness	No	31	21	67.7	10	32.3	1.8	0.18 NS
	Yes	29	24	82.8	5	17.2		
YBOCS:	Mild	13	7	53.8	6	46.2	6.86	0.08 NS
	Moderate	24	17	70.8	7	29.2		
	Sever	17	16	94.1	1	5.9		
	Extreme	6	5	83.3	1	16.7		
BAI:	Low	6	3	50	3	50	2.86	0.24 NS
	Moderate	40	30	75	10	25		
	Sever	14	12	85.7	2	14.3		
BDI:	No	1	1	100	0	0	8.87	0.04*
	Mild to moderate	17	9	52.9	8	47.1		
	Moderate to sever	17	12	70.6	5	29.4		
	Sever	25	23	92	2	8		

NS: Non significant (P>0.05) *: Significant (P<0.05)

Table (5): Correlation between MOCA score and serum inflammatory markers and different scales among the cases groups:

Variable	MOCA (n=60)	
	r	P
ESR 1 st	- 0.28	0.04*
ESR 2 nd	- 0.32	0.01*
CRP	- 0.39	0.002*
YBOCS	- 0.26	0.04*
BAI	- 0.	0.57 NS

	08	
BDI	- 0. 27	0.04*

r: Spearman's correlation coefficient. NS: Non significant ($P > 0.05$)

*: Significant ($P < 0.05$)

Discussion:

According to DSM-5 criteria, OCD is a severe and burdensome mental illness defined by the presence of repeated obsessions and/or compulsions that generate clinically significant suffering and deterioration of function. Approximately 2% of the overall population suffers from OCD. Both men and women are affected equally, with bimodal onset. The exact etiology bases of OCD is unknown, however it is assumed to be caused by complex, temporally governed interplay between heredity and environment (14).

Impairment in multiple cognitive functions has been consistently reported among patients with OCD. Underperformance in the intelligence quotient (IQ) has been demonstrated in adult OCD (15). Moreover, deficits in visuospatial abilities, executive functions, verbal memory, verbal fluency, and attention have been reported in adults with OCD (16). Consistently, deficits in inhibitory control, decision making long-term verbal and visual memories, planning, working memory, verbal fluency and motor speed have been found in adult FDRs of individuals with OCD (17).

As a result, the present study aimed to assess the cognition in OCD and its relation with CRP, ESR levels.

Our study included 120 person divided into 60 patients with OCD and 60 healthy control matched with each other's in socio-demographic data. We assessed the cognition in OCD and its relation with CRP, ESR levels. Both groups of the study were matched in socio-demographic data.

Regarding type of obsession; in our study 45% of the cases had reactive, 28.3% was autogenic and 26.7% was combined. Religious type was most frequent single type (16.7%) followed by doubt (13.3%) while Contamination & doubt was the most common mixed type. According to **Ekinci and Ekinci (18)**, the most common obsessions and compulsions were 'contamination' (36.7 percent) and 'washing/cleaning' (36.7 percent).

As regard correlation between cognitive function and Demographic Characteristics of the studied groups we found that there was a statistical significance increase in frequency of impairment among urban resident and non working cases. In agreement with our results **Xu et al (19)** found that rural residents had a higher level of cognition than urban residents at baseline. Also, (**Chung, et al (20)** and **Van der Elst., et al (21)**) found that the risk of cognitive impairment differed significantly across occupation categories.

Furthermore, our study revealed that there was no statistical significance relation between Montreal Cognitive Assessment results and Yale Brown OCD Scale, Beck anxiety inventory but

there was a statistical significant increase in frequency of sever beck depression inventory among the impaired cognitive cases. **Olchik, et al(22)** found a significant correlation was observed between cognitive tests and depression. Also, **Rock et al (23)** revealed significant moderate cognitive deficits in executive function, memory and attention in patients with depression relative to controls.

As regard Correlation between MOCA score and serum inflammatory markers and different scales among the cases groups there was a statistical significance negative correlation between MOCA score and all ESR 1st, ESR 2nd, CRP, YBOCS and BDI. This suggested that the presence of MCI in these depressed subjects have additive effect on inflammation. In agreement with our results, **(Gorska-Ciebiada et al (24) and Olchik, et al(22)**found that MoCA score was negatively correlated with CRP and TNF- α levels. CRP has been found in and around amyloid plaques and around small-vessel damages in MCI patients **(25)**.

Conclusion:

Patients with OCD appear to have cognitive deficits. Cognitive function in OCD patient was correlated with ESR,CRP, YBOCS and BDI scores. ESR CRP can be used in diagnosis of cognitive function in OCD.

LIMITATION:

- 1- The sample size was relatively small.
- 2- All the patients were taken from psychiatry department in Zagazig university hospitals which limits the generalization of our results.

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