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Episodic Memory in Obsessive-Compulsive Disorder: Comparison with Healthy Controls

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Abstract

Background: Obsessive-compulsive disorder is identified by intrusive thoughts and related compulsive behaviors. Memory complaints are controversial among obsessive-compulsive disorder patients.
Objectives: The present study compared verbal, visual, episodic, and semantic memory between obsessive-compulsive disorder patients and healthy controls.
Methods: This is a case-control study. The participants included 31 newly diagnosed obsessive-compulsive disorder outpatients and 30 healthy controls. The patients were selected using targeted sampling from Emam Reza Polyclinic, affiliated with blinded for peer review. They responded to a demographic checklist, structured clinical interview for DSM-IV (SCID-I), verbal and visual episodic memory from the Wechsler Memory Scale-Revised (WMS-R), and autobiographical memory interview (AMI).
Results: The results indicated that patients with obsessive-compulsive disorder compared with the controls had lower scores in visual (P = 0.0001), verbal (P = 0.006), semantic (P = 0.3), and episodic memory (P = 0.001).
Conclusions: All types of memory which were evaluated in the present study were impaired in obsessive-compulsive disorder. Memory impairment might explain the psychiatric symptoms of the disorder.

Keywords: Episodic Memory, Obsessive-Compulsive Disorder, Memory Disorder

1. Background

Obsessive-compulsive disorder (OCD) is a neuropsychiatric disorder involving intrusive thoughts and related compulsive behaviors characterized by an early onset and chronic course (1-3). Obsessive-compulsive disorder represents itself as two separate parts related to each other (4, 5). Obsessive-compulsive disorder is associated with neurobiological abnormalities distinct from those associated with other anxiety disorders (3, 6). This biological aspect of OCD was also confirmed via neuroimaging studies and acquired brain injury (7). These studies revealed that orbitofrontal-subcortical circuitry dysfunction was observed in OCD (8). On the other hand, evaluating patients with a history of acquired brain injury, especially in the orbito frontal cortex (OFC) and anterior cingulate cortex (ACC), showed OCD symptoms in the follow-up (9, 10).

Patients with OCD may be involved in compulsion because of their memory impairment (5). Memory dysfunction appears to be due to a disruption in information organization in the encoding phase (11, 12). There was a significant difference between OCD patients and the healthy control group in different areas, such as visual and delayed visual memory (13). Neurocognitive studies which consider memory processes and their biological relationships have demonstrated that frontal association cortex lesions could be the cause of disruption in various aspects of encoding and retrieval in episodic memory (14). Therefore, memory defects have been attributed to neurocognitive impairment in patients with OCD (4, 5, 12, 15-18).

Some studies evaluated the neuropsychological performance of OCD patients and related these findings to cortical functions. These studies are controversial in their findings and methodology. For example, in one study, neuropsychological performance was compared among OCD, bipolar disorder, and healthy controls, revealing that there were no significant differences among the 3 groups in memory, evaluated by the Rey Auditory Verbal Learning Test (RAVLT) and the Wechsler Memory Scale-Revised (WMS-R) visual-reproduction subscale (19).

On the other hand, some studies claim that deficits are inherent because impairments are seen before the onset of symptoms and even after recovery from clinical symptoms

(20, 21).

Memory complaints are common among OCD patients. Besides, it is much better than the psychological finding being re-evaluated in the context and culture used because they are culture-bound. We didn't observe a study on the visual, logical, semantic, and episodic memory between OCD and healthy normal subjects in Iranian culture. Also, the distinction between different types in OCD patients compared with the general population is significant because it may help identify and comprehend processes that contribute to the persistence of this disorder.

2. Objectives

This study was designed to investigate the difference in these items between OCD and matched healthy control subjects.

3. Methods

This is a case-control study. The participants included 31 newly diagnosed OCD outpatients and 31 healthy control who were matched according to age (P = 0.9) and selected using targeted sampling from Emam Reza Polyclinic affiliated to blinded for peer reviewer. The sample size was calculated based on the iteration method and research conducted. Data were collected from 2016 to 2017. This study was conducted by a trained psychiatrist and psychologist that was blinded to the groups.

$$n = \frac{\left(z_{1-\alpha/2} + z_{1-\beta}\right)^2 \left(\sigma_1^2 + \sigma_2^2\right)}{\left(\mu_1 - \mu_2\right)^2} \quad (1)$$

The patients were selected from a psychiatric clinic; the inclusion criteria were: (1) newly diagnosed OCD; (2) no previous history of any psychiatric or psychological intervention; (3) age between 18 - 60 years; (4) no comorbid psychiatric or neurologic impression, and the healthy control group were selected from the normal persons who accompanied the patients and had the inclusion criteria such as a (1) no history of psychiatric and neurological problems; and (2) age between 18 - 60 years.

The psychiatrists and clinical psychologists engaged in the study evaluated the new cases using structured clinical interview for DSM-IV axis I disorders structured clinical interview for DSM-IV (SCID-I), Persian version 26, to confirm the impression based on DSM.

The present study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1393.6360). All individuals to participate in the study expressed their satisfaction by signing written informed consent, and they were allowed to withdraw at any time and also were ensured of the confidentiality of the data.

The tools used in the study included:

Demographic checklist collected information on the age and job of the participants.

Structured clinical interview for DSM-IV: It is a semi-structured interview for the classification of DSM-IV disorders used for diagnosing mental disorders and can be administered by a clinician or a trained mental health professional to get valuable information. This is a highly reliable diagnostic tool for most psychiatric disorders. Performing this task takes about 45 to 90 minutes and is done in one session. It is reported that its reliability was fair to good for most diagnostic categories using the test and retest method for SCID-I administration; besides, weighted kappa was 0.52 for the current diagnoses and 0.55 for lifetime diagnoses (22, 23).

Verbal and visual episodic memory from the WMS-R: This task was used to evaluate episodic memory; two subscales of the WMS-R, Persian form, were used in this research. Based on a previous study, two subscales were selected to estimate verbal and visual episodic memory. Subtests of logical memory I and II from the Persian version of the WMS-R 28 were used for assessing verbal episodic memory. In these tasks, participants were asked to recall two short stories immediately after the oral presentation and after a 30-min delay. Visual reproduction I and II (WMS-R) assessed visual episodic memory performance. In this task, participants copied from memory four figures presented visually immediately after the presentation and after a 30-min delay. The test-retest reliability estimated coefficients were appropriate for the subtests and the composite tests in the original test and the Iranian sample (0.28 to 0.98). Moreover, the validity was estimated according to clinical evaluation; it can differentiate between subjects with and without memory problems (24).

Autobiographical memory interview (AMI): A semi-structured interview designed to assess the memory for autobiographical information. The AMI inquires about specific, personally experienced events from childhood, early adult life, and the recent past, and a personal semantic memory schedule inquires about generic or semantic facts about the self, divided into childhood, early adult life, and recent information. A maximum of 21 points could be obtained for each of the three life periods, resulting in a total score of 63. The mean reliability of two professional raters on the scoring examples from the training was 0.84. Therefore, reliability and validity estimated coefficients were appropriate for AMI in the original test and the Iranian sample (25).

This study analyzed data using SPSS software (IBM, Armonk, NY, USA, version 19). For the analysis of data, descrip-

tive statistical methods (mean, standard deviation, *t*-test) and inferential statistics (variance analysis) were used. In addition, the significance level was considered less than 0.05 in the present study.

4. Results

The participants' age ranged from 17 to 53 years, with a mean of 32.64 ± 9.12, in OCD outpatients and 32.45 ± 9.04 in healthy controls. Investigating the significance of age revealed that the difference between OCD outpatients and healthy controls was not significant (P = 0.9).

Demographic characteristics (occupation and education levels in participants) of the study sample are presented in Table 1. The means and standard deviation of the participants in the two groups were compared in terms of occupational and educational levels. The difference among the groups was significant.

Table 1. Demographic Characteristics of the Participants [a]

	OCD Patients	Normal Individual	P
Gender			-
Male	9 (29)	9 (29)	
Female	22 (71)	22 (71)	
Marital status			0.05
Single	18 (58.1)	16 (51.61)	
Married	13 (41.9)	15 (48.38)	
Occupation			0.04
Unemployed	20 (64.5)	4 (12.9)	
Employed	4 (12.9)	11 (35.5)	
Self-employment	1 (3.2)	7 (22.6)	
Student	6 (19.4)	9 (29)	
Education			0.05
Diploma	11 (35.48)	8 (25.80)	
BM	2 (6.45)	5 (16.12)	
MA	18 (58.06)	17 (54.83)	
PhD	0 (0)	1 (3.22)	

Abbreviation: OCD, Obsessive-compulsive disorder.
[a] Values are expressed as No. (%).

To investigate the significance of the difference among the groups in terms of visual and delayed visual memory, logical and delayed logical memory, and semantic and episodic memory, we employed an independent *t*-test.

The patients with OCD, compared with the controls, had lower scores in verbal and delayed verbal episodic memory, visual and delayed visual episodic memory, and episodic memory, which was statistically significant. Also, in childhood, semantic memory and childhood and adult episodic memory and function of patients were lower than the controls. However, the two groups in adults and total and recent semantic memory and recent episodic memory showed similar functions (Table 2).

5. Discussion

The key finding of the present study revealed that patients suffering from OCD, compared to the normal group, had less reliable memory in episodic and childhood semantic memory. In the present study, a strength of the study is that the researcher evaluated episodic memory via both verbal and visual modalities; this study helps to propose new interventions based on the neurocognitive problems of patients.

The results of many studies have confirmed the impairment of visual (18, 26), verbal memory (27), and executive function (28-30) in OCD patients compared to healthy controls.

Obsessive-compulsive disorder patients perform certain routines repeatedly (compulsion) to remove certain unwanted thoughts repeatedly. Obsessive-compulsive disorder patients tolerate stress about obsessions; that way, they can remember and report in detail what they have done to rid themselves of these thoughts. Clinical evidence confirms that OCD patients have sufficient memory for specific events. On the other hand, it seems episodic memory is impaired in these patients, which leads to repeating compulsion behaviors (31). There are several reasons why obsessional thoughts and the repetitive nature of compulsions in OCD could be related to memory problems (32). Doubt about one's memory may play a significant role in compulsions. Thus, this doubt can be the reason for poor performance on formal neuropsychological and memory testing. There are several reasons for the deficit in episodic memory (33).

Studies revealed that OCD patients had impaired executive function, processing speed, sustained attention, nonverbal memory, response inhibition, planning, decision-making, and encoding of nonverbal memory. However, this defect is not due to the effect of impaired processing speed in the performance of IQ tests (5).

Obsessive-compulsive disorder rituals such as washing and checking occur because patients feel they have not carried them out properly. The OCD memory model proposes that OCD patients distrust their memory despite repetitive checking. Also, decreased memory confidence may be triggered under conditions of high responsibility for the outcome of a check. Obsessive doubt, due to a lack of correct and careful checking and possibly because of anxiety, could also account for repetitive, compulsive actions

Table 2. *t*-test of Memory Variables Between the Groups

Variables and Groups	Mean ± SD	P
Visual episodic memory		0.0001
OCD	29.88 ± 9.08	
Healthy control	39.50 ± 1.75	
Delayed visual episodic memory		0.0001
OCD	25.40 ± 10.87	
Healthy control	38.74 ± 2.63	
Verbal episodic memory		0.006
OCD	20.20 ± 1.57	
Healthy control	30.45 ± 5.30	
Delayed verbal episodic memory		0.0001
OCD	17.06 ± 9.77	
Healthy control	29.61 ± 5.87	
Childhood semantic memory		0.001
OCD	16.67 ± 3.20	
Healthy control	19.19 ± 1.91	
Adult semantic memory		0.8
OCD	15.16 ± 3.20	
Healthy control	15.27 ± 3.45	
Recent semantic memory		0.2
OCD	14.93 ± 4.35	
Healthy control	13.77 ± 3.07	
Total semantic memory		0.3
OCD	46.77 ± 7.92	
Healthy control	48.24 ± 5.17	
Childhood episodic memory		0.001
OCD	4.80 ± 1.44	
Healthy control	5.80 ± 0.79	
Adult episodic memory		0.0001
OCD	4.51 ± 1.77	
Healthy control	6.22 ± 1.66	
Recent episodic memory		0.9
OCD	4.56 ± 1.89	
Healthy control	4.61 ± 0.98	
Total episodic memory		0.001
OCD	13.88 ± 3.52	
Healthy control	16.64 ± 2.70	

Abbreviation: OCD, Obsessive-compulsive disorder.

(32). Therefore, people with OCD have a memory bias toward threatening stimuli, which can interfere with memory function and lead to compulsions. However, some studies have not completely accepted this argument (34, 35).

Besides these findings, the neurobiological base of memory impairment is described as memory deficits via abnormalities in the frontostriatal circuits and parietal cortex (5, 36); and executive dysfunctions. Obsessive-compulsive disorder patients have deficits in executive functions which affect memory task performance, so they have a problem during encoding and retrieval (29); these problems might lead to a deficit in meta memory (5).

Cognitive deficits associated with OCD are restricted to executive function, and meta-analytic studies express similar deficits in processing speed, episodic memory, and attention (4, 37). Some deficits may be independent; some have argued that general motor slowing may be relevant to impairment in premotor-striatal loops in executive function (12, 38).

The results of previous studies on semantic memory in OCD are contradictory. Some studies have shown that individuals with OCD performed similarly to healthy controls in semantic memory (39). Some others have shown poor performance in semantic memory in OCD patients compared with healthy controls (40). Moreover, researchers found that patients with OCD did not have difficulty accessing parts of their autobiographic memory unless their illness was comorbid with depressive disorder (39).

In the case of semantic memory defects, it has been argued that a memory deficit and/or a lack of confidence in one's memory can possibly account for checking behavior. In other words, in OCD patients, impaired organization strategies at the stage of encoding are primary and poor memory recall it's considered a consequence. These patients may have both retrieval inhibition and inefficient encoding strategies deficits. The research evidence obtained in the field of this disorder supports frontal-subcortical system dysfunction presented in neurobiological models. Such defects in OCD cause the continuity of a recurring cycle of chronic doubt, recurrent thoughts, and compulsion (26). Neurobiological models of OCD propose that cognitive characteristics may be related to the impairment of the frontal-subcortical system (31).

The findings of several studies on semantic memory in OCD patients have highlighted the right prefrontal cortical regions involved in memory inhibition mechanisms in OCD patients. Patients with OCD use a sequential rather than a comprehensive approach to organizing, even for performing simple memory tasks. In a study, OCD patients indicated difficulties with selective encoding and reduced retrieval inhibition. Probably, frontal dysfunction impairment led to selective encoding (31).

Our study had some limitations, such as a small sample size. In addition, memory evaluation presents difficulties

because no single, standardized instrument can evaluate all domains exactly.

Future empirical research is recommended to test the relationship among performance in different domains of memory, for example investigating executive function impairments to what extent and in what aspects of memory are affected. Also, it is suggested that future studies should evaluate memory before and after drug treatment and psychotherapy. This helps to clarify the origin of memory deficits in obsessive-compulsive patients.

5.1. Conclusions

Memory complaints are reported by OCD patients. The distinction between different types in OCD patients compared with the general population is significant because it may help identify and comprehend processes that contribute to the persistence of this disorder. Therefore, this study was designed to investigate the difference between these items between OCD and matched healthy control subjects in Iranian culture. The patients with OCD, compared with the controls, had lower scores in verbal and delayed verbal episodic memory, visual and delayed visual episodic memory, and episodic memory, which was statistically significant. Also, in childhood, semantic memory and childhood and adult episodic memory and function of patients were lower than controls.

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Footnotes

Authors' Contribution: Study concept and design: Arash Mani and Ali Sahraian; collection of the data: Saeed Kordiyan, Leila Khabir and Ali Sahraian; analysis and interpretation of the data: Arash Mani and Leila Khabir; drafting the manuscript: All authors; critical revision of the manuscript for important intellectual content: Arash Mani and Leila Khabir; statistical analysis: Leila Khabir and Arash Mani.

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