

The Evaluation of Obsessive-Compulsive Disorder and Working Memory Impairment in Patients with Multiple Sclerosis: A Case Study in Iran

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Abstract

Background and aim: One of the most important complications related to Multiple Sclerosis (MS) is mental disorders and memory errors. The main purpose of the study is to evaluate the situation of Obsessive-Compulsive Disorder (OCD) and Working Memory Impairment (WMI) as a case study in Iran.

Materials and methods: To conduct this study, 30 patients with MS (as the case group) and 30 healthy people (as the control group) were selected by available sampling method. The tool for collecting information related to WMI was Prospective/Retrospective Memory Questionnaire (PRMQ). To collect information related to OCD, a semi-structured interview was used, which was based on qualitative questions and focused on MS patients' experiences of having obsessive thoughts. Finally, the results were analyzed using SPSS-Ver.22 software and the application of multivariate Analysis of Variance (ANOVA) at the significance level ($\alpha=0.05$).

Results: The results showed that the average memory errors in patients with MS in short-term and long-term prospective memory, as well as short-term and long-term retrospective memory were significantly higher than healthy subjects ($P<0.05$). In addition, the average memory errors in patients with MS in prospective memory based on peripheral cues, retrospective memory based on individual cues, and retrospective memory based on peripheral cues are significantly higher than healthy individuals. Whereas, prospective memory errors based on individual cues do not differ between patients with MS and healthy individuals ($P>0.05$). In addition, based on the analysis of OCD data, the experience of MS patients was placed in three themes, which are: childhood and family experiences that are the basis of obsessive-compulsive disorder, disturbing thoughts and emotions surrounding the disease and its treatment, and the experience of an ambiguous future and uncertain.

Conclusion: The results showed that MS patients experience complications such as mental pressure, mental conflicts and various memory disorders. Identifying memory disorders and also diagnosing obsessive-compulsive thoughts in these patients helps in the process of evaluation, diagnosis and psychological treatment of obsessive-compulsive disorder and their memory disorders, and finally, this can improve the quality of life in MS patients.

Keywords: Multiple sclerosis • Obsessive-compulsive disorder • Working memory impairment

Introduction

Multiple Sclerosis (MS) is one of the most common non-infectious diseases in which the body's immune system, which is responsible for protecting the body and destroying external damage, mistakenly attacks the body's tissues and causes the body to fail and become paralyzed [1].

Statistics estimate that more than 400,000 MS patients in the United States and more than 5.2 million people worldwide live with this disease [2]. The prevalence of this disease in Iran has been estimated from 5.3 to 74.3 people per 100,000 people, although this rate is different in each region and city [3]. Genetic, environmental and several other factors can be mentioned among the various factors underlying the disease. However, researchers could not find a definitive cure for MS [4,5].

People with MS, after the diagnosis of their disease, experience many changes in their personal, family and social life. Also, due to the unpredictable complications of this disease, the normal life of people with MS is disrupted [5]. These people experience physical pain and painful medical treatments, and excruciating pain is almost common in MS patients. In addition to physical aspects, many psychological problems arise for patients with MS [6]. MS disease affects self-esteem, family relationships and surrounding people, also these patients need the ability to participate, interact with others and maintain social relationships, which requires

strength and energy, which people with MS often lack this feature [7].

Patients with MS, in the way of coping with the disease, have emotional and cognitive problems and their mental health is threatened in various dimensions [8]. Obsessive-compulsive Disorder (OCD) is a debilitating anxiety disorder characterized by obsessions and compulsive actions. Approximately 2.2% of the people in the society are suffering from OCD, which causes severe damage to the performance in psycho-emotional areas for affected people. Obsessive thoughts often have hostile, sexual or religious content and can also be experienced by the sick person as doubts and ruminations. In addition, practical obsessions are overt and overt repetitive behaviors that are performed in response to obsessions [9].

When we talk about OCD both intellectually and practically, it means thoughts, mental images, and repetitive behaviors that, while being disturbing and unwanted, are usually persistent and provoke a person's resistance [8-12]. The results of some past studies show that with the onset of MS, symptoms related to OCD also appear. Therefore, people who suffer from MS and OCD at the same time can hardly adapt to the existing life conditions [13].

Experiencing and living with OCD in MS patients reduces their ability to cope with life's problems. Also, experiencing disturbing thoughts and behaviors in life leads to more psychological distress in them. Therefore,

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experiencing high stress leads to relapse of the disease. In addition, examining the experiences of OCD in MS patients helps to better evaluate, diagnose and treat this disease and manage the symptoms of recurrence in them. Live and profound experiences of patients can not only inform the awareness of doctors, rehabilitation and mental health professionals, but also can help patients who have experienced OCD [8].

As mentioned above, common symptoms of MS include fatigue, weakness of arms and legs, numbness, incoordination, imbalance, vision problems, bladder and bowel dysfunction, sexual dysfunction, depression, difficulty speaking or swallowing, movement limitations, skill limitations as well as limitations in social communication and cognitive problems [14-18]. Common cognitive disorders in MS patients can significantly limit the daily activities of these patients. Two very prominent areas regarding cognitive disorders include two issues [19]. The first topic: Processing speed, which is the main cognitive defect of MS disease, and the second topic: working memory, which affects the functioning of various areas of MS patients [20].

Considering the importance of assessing the condition of MS patients and trying to reduce and treat their limitations, the main purpose of the study is to evaluate the situation of Obsessive-compulsive Disorder (OCD) and Working Memory Impairment (WMI) as a case study in Iran.

Materials and Methods

Sampling

To conduct this study, 30 patients with MS (as the case group) and 30 healthy people (as the control group) were selected by available sampling method. The control group was without history of chronic physical and neurological, psychiatric or psychological diseases, which were selected after age matching. The criteria for selecting participants in the research included the following:

1) Definitive diagnosis of a person's disease by a neurologist 2) At least having a certain disease in the last two years 3) Absence of physical illness or other disability as determined by the doctor. Exclusion criteria included less than fifth grade education, having any neurological disorder other than MS such as epilepsy, mental retardation, and addiction.

Evaluation of prospective/ retrospective memory

The tool for collecting information about people's memory was Prospective/Retrospective Memory Questionnaire (PRMQ). Since the symptoms of MS are different from one person to another and there are periods of improvement and relapse. So, this tool which measures memory error in the form of self-reporting is different from other tests that measure memory performance instantly is preferable. This questionnaire has 16 questions and the respondent answers each question based on a five-point scale (never=1; rarely=2; sometimes=3; often=4; always=5). This tool has a main subscale called retrospective/prospective memory and two subscales including short-term/long-term memory and person-centered/environment-centered memory. Finally, it has a scale called general memory, which is obtained from the sum of the scales.

This test basically shows the overall memory error rate and its subscales. Crawford et al. have reported the reliability of the test with internal consistency (Cronbach's alpha) in the prospective, retrospective and general scales (general memory) as 0.8, 0.84 and 0.89, respectively [21]. The scores obtained from this questionnaire are not affected by age [22,23] and gender [22]. This questionnaire has been standardized in Iran by Zare et al. and its validity and reliability have been confirmed [24]. Cronbach's alpha values for this tool based on the study of Zare and Mohammadi Garegozlo are 0.72 for short-term prospective memory, 0.65 for long-term prospective, 0.61 for short-term retrospective, and 0.64 for long-term retrospective, 0.58 for the prospective based on individual cues, 0.64 for the prospective based on peripheral cues, 0.66 for the retrospective based on individual cues, and 0.64 for the retrospective based on peripheral cues, respectively [19].

Evaluation of obsessive-compulsive disorder

To collect information for this part of the study, a semi-structured interview was used, which was based on qualitative questions and focused on MS patients' experiences of having obsessive thoughts. Before starting the interview, explanations about the research and the implementation method were given to the patients. Then the demographic characteristics of the patients were obtained from them. The questions that were asked to the patients during the interview included the following:

1) What has been your experience with intrusive or repetitive thoughts? 2) What are your feelings about these thoughts? 3) What has been your experience and way of living with the worry and uncertainty in the future of MS disease for you?

At the beginning of the interview, demographic information including age, education, and marital status, number of children, current job, and job before the disease, level of education, duration of the disease and type of MS disease were recorded. Then the main interview questions were asked. After the end of each interview, the recorded interview was recorded, coded and analyzed.

In order to analyze the obtained findings, Colaizzi's seven-stage analysis method was used [25]. The first step: after the completion of each interview, its content was recorded and then by reviewing the recorded statements, it was recorded on paper. Second step: Meaningful information in the text was identified and highlighted to make it more obvious. The third step: Concepts were extracted and then formulated. The fourth step: after extracting the primary codes or the primary themes, the concepts written and edited by the researchers were carefully studied and then classified based on similarity, concepts and themes. Fifth step: The researchers organized the results obtained from the interview and used the expression of lived experience and description of the phenomenon to better understand and describe the participants' society. The sixth stage: the participants' description of the experienced phenomenon was presented with a clearer and more unambiguous language and expression. Seventh step: The raw results were prepared and analyzed.

In order to achieve the accuracy and reliability of the study, credibility and trustworthiness criteria were used with the Lincoln and Guba method [8,25,26]. Emphasizing the selection of the appropriate platform to align (triangulation) the data obtained from the interview results with the results of previous researches about MS and OCD, the raw data related to the present study were initially evaluated by three experts in neurology, psychiatric nursing and psychology. In order to comply with the ethical principles in the research, measures were taken such as obtaining written consent to conduct the interview and recording the voice of the interviewees, voluntary participation in the survey, keeping the names and phone numbers of the participants confidential.

Statistical analysis

At first, the results were recorded in Excel software, and then the results were analyzed using SPSS-Ver.22 software and the application of multivariate Analysis of Variance (ANOVA) at the significance level ($\alpha=0.05$).

Results

The results showed that 70% of the study participants were women and the rest were men. In addition, 80% were married and the rest were single. The percentage of participants with $\leq 1, 2, 3$ children and without children was 30%, 33.3%, 10% and 26.7%, respectively. The level of education of the participants in the study was equal to 46.7%, 40% and 13.3% for Elementary to high school, Diploma to Bachelor and Masters and Ph.D. degree, respectively. Out of 15 patients examined, 8 people had Progressive-MS, 5 person had Relapsing-MS and 2 people had Benign-MS (Table 1). Three main concepts and 12 primary sub-concepts extracted from interviews with MS patients about OCD were presented in Table 2.

Table 1. Demographic characteristics of the participants in the present study.

Variables	Frequency		
	Category	Number	Percent
Sex	Male	9	30.0
	Female	21	70.0
Marital status	Single	6	20.0
	Married	24	80.0
Number of children	0	8	26.7
	1	9	30.0
	2	10	33.3
	3 ≤	3	10.0
Current job	Unemployed	12	40.0
	Housekeeper	9	30.0
	Office worker	2	6.7
	freelance job	7	23.3
Job before illness	Unemployed	7	23.3
	Housekeeper	15	50.0
	Office worker	1	3.3
	Others	7	23.3
Level of Education	illiterate	0	0.0
	Elementary to high school	14	46.7
	Diploma to Bachelor	12	40.0
Duration of illness (years)	Masters and Ph.D.	4	13.3
	1-5	8	26.7
	6-10	14	46.7
	11-15	5	16.7
Type of MS for patients group	16-20	3	10.0
	Progressive	8	53.3
	Relapsing	5	33.3
	Benign	2	13.3

Table 2. Main concepts and primary sub-concepts extracted from interviews with MS patients related to OCD.

Variables	Category
Name	Childhood and family experiences underlying OCD
	Obsession with hoarding
	Washing obsession
Disturbing thoughts and emotions about the disease and its treatment	Skin obsession
	Feeling depressed
	Feeling tired
	Constant tiredness and numbness
	Sense of emptiness
	Severe stress
The experience of vague and uncertain future	Constant mental engagement with patients
	Despair of the future
	Uncertainty of treatment and full recovery
	Worrying about the worsening of the disease

Based on the results presented in Table 3, the average memory errors in patients with MS in short-term prospective memory ($P < 0.05$, $F = 6.79$), long-term future ($P < 0.05$, $F = 8.34$), short-term retrospective memory ($P < 0.05$, $F = 8.39$) and long-term retrospective ($P < 0.05$, $F = 9.72$) was significantly higher than healthy people. According to Table 4, the average memory errors in patients with MS in prospective memory based on peripheral cues ($P < 0.05$, $F = 16.43$), retrospective memory based on individual cues ($P < 0.05$, $F = 13.07$) and retrospective based on peripheral cues ($P < 0.05$, $F = 5.58$), it was significantly higher than healthy people. While, prospective

memory errors based on individual cues was not different between patients with MS and healthy people ($P > 0.05$, $F = 3.21$).

Table 3. The scores of memory types in patients with MS and healthy people.

Types of memory	MS patients	Healthy people
	Mean ± SD	Mean ± SD
Short-term perspective	11.75 ± 2.54	9.89 ± 2.88
Long-term perspective	10.55 ± 2.31	8.75 ± 2.53
Short-term retrospective	10.42 ± 2.17	8.95 ± 2.54
Long-term retrospective	10.85 ± 2.44	8.39 ± 2.64
Prospective based on individual references	11.85 ± 3.02	9.92 ± 2.72
Prospective based on peripheral cues	11.65 ± 2.39	8.57 ± 2.69
Retrospective based on individual references	10.49 ± 2.73	8.95 ± 2.38
Retrospective based on peripheral cues	10.35 ± 2.61	8.86 ± 2.53

Table 4. The results of multivariate analysis of variance to compare the average scores of groups to separate types of memory.

Types of memory	F	Significant level	Effective size
Short-term perspective	6.79	0.014	0.132
Long-term perspective	8.34	0.007	0.154
Short-term retrospective	8.39	0.008	0.155
Long-term retrospective	9.72	0.002	0.168
Prospective based on individual references	3.21	0.070	0.065
Prospective based on peripheral cues	16.43	<0.001	0.256
Retrospective based on individual references	13.12	0.001	0.245
Retrospective based on peripheral cues	5.58	0.029	0.104

Discussion

Considering that this study pursues two goals, therefore, the discussion section of the study was presented in two separate sections;

- First objective: evaluation of Obsessive-compulsive Disorder (OCD) in MS patients.
- Second objective: evaluation of Working Memory Impairment (WMI) in MS patients.

Evaluation of obsessive-compulsive disorder

The results showed that based on the analysis of the data obtained from the interviews with MS patients, the initial codes were placed in three themes, which are: 1) childhood and family experiences underlying OCD, 2) disturbing thoughts and emotions surrounding the disease and its treatment and, 3) experiencing a vague and uncertain future. The results of this study in terms of the above-mentioned topic, with the results of Sá et al. [27] and Soureshgani A, Khodabakhshi-Koolaei [8] were consistent. A significant prevalence of psychological disorders in MS has been reported by experts and researchers. Sá et al. reported that depression with a prevalence of about 50% in MS patients is lifelong. In his research, he evaluated the psychological aspects of MS and reported that mental fatigue, cognitive dysfunction, anxiety, obsessive compulsive disorder, and suicidal thoughts were common in these patients. And also, all the aforementioned mental disorders decrease the patient's quality of life increasingly [27]. In addition, Sparaco et al. evaluated mental disorders in MS from 1959 to 2019 in their review. The results of their study showed that MS patients have disorders such as depression, anxiety and OCD during the past seven decades [28].

In general, MS patients constantly report complications such as intrusive

thoughts and emotions related to the disease and its treatment, depression, confusion, fatigue, emptiness, severe stress, and mental involvement [27]. Al-Sharaman et al. reported the life experiences of 16 MS patients in Jordan [28]. The main concepts derived from their study include: 1) experiences related to the disease itself; 2) experiences related to the health care system and 3) experiences related to MS disease. Based on the results of the aforementioned study, it was found that the experiences related to the disease included: reduction of physical activities, psycho-social withdrawal and fear of the future. Also, participants' experiences about health care systems included difficulty in diagnosis, poor communication with the patient and inappropriate communication with health service providers, and lack of knowledge about MS and its rehabilitation [28]. Finally, the findings of the mentioned study showed that special attention should be paid to the problems of people with MS in Jordan. In addition, the study emphasized the need for increased awareness of MS among health care providers. Also, rehabilitation services should be emphasized during MS disease management [28].

The nature of MS is unpredictable and potentially persistent and unpleasant. A person's uncertainties about the disease, as well as the complications of the disease, especially depression and feelings of emptiness, have a great negative impact on daily activities. Stress and disruption in the ability to cope with life issues can bring many social psychological results and this leads to a feeling of hopelessness in a person. Especially, the disorder of the senses and the lack of control of the person in controlling and managing it increase the feeling of lack of control and inability of the person and causes despair and sense of emptiness in the person. Based on the results of previous studies, depression is the dominant disorder in MS patients and there are also symptoms of anxiety and stress in affected people [8,27,28]. Thus, it is consistent with the results of the present study in terms of feelings of depression and severe stress. Disappointment about the future, uncertainty about treatment and full recovery, as well as feeling worried about the disease worsening were some of the experiences that MS patients reported about the feelings and emotions related to their obsessive thoughts [29,30].

Cowan et al. reported a qualitative study on individual experience and living with MS. The findings of their research showed that the main concepts obtained from interviews with MS patients included fatigue, independence and dependence, sense of loss, provision of care and perception of care [31]. Jelle et al. evaluated the importance of the impact of work and independent life on MS patients in a qualitative research. The results of their research showed that the main concepts obtained from the interviews with MS patients include: 1) understanding the symptoms and management of the disease in the workplace; 2) eliminating my anxieties; 3) mutual understanding of the employer and 4) management of loss of self-confidence. Finally, patients who were able to participate in vocational rehabilitation and independent living programs reported better psychological health compared to pre-intervention [32].

Changes in lifestyle and worry about the future in neurological patients increase rapidly after the onset of the disease. The findings of Khodabakhshi-Koolae and Pourebrahimi's study on the quality of life with Myasthenia Gravis (MG) concluded that three interconnected concepts of the patient's perception of the surrounding world included physical weakness, uncertainty in the future and hopelessness [33].

The findings of the present study showed that, based on the life experiences of MS patients, some of them considered obsession to be the cause of MS and others believed that obsessive-compulsive disorder would develop in them after contracting MS. It is a fact that obsessive-compulsive disorder develops following the onset of this physical illness in some of these patients, or at least, if it is already present, is exacerbated. In general, the physical and psychological fatigue, depression, and obsessive-compulsive disorder of MS patients are important for understanding their experience of the disease. Because this disease has many negative effects on most aspects of a person's life and can be significantly debilitating. For those with MS, achieving and maintaining individual independence in activities of daily living and daily personal care is very important.

Evaluation of prospective/ retrospective memory

Studies conducted on memory in multiple sclerosis confirm the deficiency of this cognitive ability in patients with MS. In the current study, these patients significantly more errors in memory types (short-term prospective, long-term prospective, short-term retrospective, long-term retrospective, prospective based on peripheral cues, retrospective based on individual cues, past based on peripheral cues) reported. Regarding other types of memory, in line with the current research, several other studies have proposed one of the cognitive abilities that deteriorate in this disease as memory disorders [19,34-37]. Working memory has been assumed to be one of the most prominent areas in the field of cognitive disorders in MS [38,39]. Patti et al. reported that patients with MS have problems in temporal memory and active retrieval of memories [40].

Short-term and individual cue-based memory errors occur more than long-term and peripheral errors for both types of memory (prospective and retrospective), which can be referred to as retrieval failure or "momentary error of intention" in memory be explained in the future. While for retrospective memory, this failure can be considered as a failure in encoding. Errors in peripheral activity can be attributed to the individual's failure to recognize the cue or the possibility that the cue is insufficient to initiate the action [41].

Neurophysiological and psychological changes in MS have neuropsychological, individual, family and social consequences. Therefore, people's ability to remember prescriptions and treatment regimens and other cases of self-protection or protection of others (for example, in driving and turning off the gas and taking care of children) is very sensitive and important. Cognitive performance disorders of these patients, especially memory, can affect their ability to complete their functional activities [35], therefore, cognitive training and rehabilitation of these patients is necessary and essential.

Hancock stated that cognitive training is a process that strengthens cognitive skills such as attention, memory, problem solving and other executive functions. The plasticity, functionality, and connections between nerves make it possible to improve and strengthen these skills, but unfortunately, executive cognitive training programs for patients with MS have shown contradictory results that require further research [38]. The results of Hancock's study showed that home computer cognitive training focused on information processing speed and working memory in patients with MS can lead to a successful improvement in cognitive skills measured in neuropsychological tests. Specifically, in his study, improvement in attention and processing speed, executive functioning, active memory and visio spatial memory were obtained [38]. Due to the progressive nature of MS, people's cognitive abilities are likely to decline further over time. Therefore, teaching people to use contextual compensatory strategies when faced with different activities may enable people with this disease to change their strategies according to their needs and basic cognitive abilities [42].

It is very important to develop and recommend the use of compensatory strategies and appropriate cognitive training to improve the level of well-being of patients with MS and their families, especially for the improvement of the level of well-being of women who are affected by this disease two to three times more than men [43,44]. Also, previous researches show that memory error and the ability to remember the prescriptions and treatment regimens recommended by the doctor are related to the adherence to the treatment and affect it [44]. Therefore, it is suggested that along with drug treatments such as the administration of corticosteroids that limit MS activity in the brain and delay the progression of disability [43], non-drug treatments such as psychotherapy and cognitive rehabilitation are available to these patients be done.

Conclusion

Based on the findings of the current research, it can be concluded that the experiences of MS patients from OCD include: 1) childhood and family

experiences that lead to obsession, 2) disturbing thoughts and emotions surrounding the disease and its treatment, and 3) finally, the experience of the future was vague and uncertain. In general, MS is a progressive and chronic disease that can cause many psychological and physical problems for the patient. Mental preoccupation and rumination are symptoms of OCD that can lead to low quality of life and decrease self-care behaviors in these people. Finally, it can be said that identifying the psychological disorders experienced by these patients helps in maintaining individual independence in daily life and personal care of MS patients. Also, the identification of the aforementioned disorders helps doctors, psychiatric nurses, and mental health professionals to carry out appropriate intervention and psychological planning for the rehabilitation of MS patients. It is very important to use compensatory strategies and appropriate cognitive training to improve the level of well-being of MS patients and their families. In addition, it is suggested to use non-pharmacological treatment methods such as psychotherapy and cognitive rehabilitation for these patients in order to reduce memory errors in MS patients.

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