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Comparing cognitive rigidity profile in obsessive compulsive disorder, major depressive disorder, and healthy group

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Abstract

Introduction: Obsessive-compulsive disorder (OCD) and major depression disorder (MDD) are highly debilitating disorders that usually require lifelong treatments. Studies have introduced cognitive rigidity as a common risk factor for both disorders. This study aimed to investigate and compare the cognitive rigidity profile in patients with OCD and MDD.

Materials and Methods: This is a descriptive causal-comparative study. The participants were selected among who referred to Bozorgmehr Clinic in Tabriz city, Iran, in 2019 based on the DSM-5 diagnostic criteria for OCD and MDD by using convenience sampling. A total of forty-five cases were selected and assigned to three equal groups. Research instrument included General Health Questionnaire (GHQ-28), Maudsley Obsessive-Compulsive Inventory (MOCI), Beck Depression Inventory (BDI), and the computer-based task-switching test, working memory test, and the Stroop Color and Word Test (SCWT), which are related to cognitive rigidity. The data were statistically analyzed by using multivariate analysis of variance (MANOVA) in SPSS-16.

Results: The results showed that MDD and OCD patients had more errors in the task-switching test than healthy individuals as the control group (P=0.043). In addition the response time in the task-switching test was longer in MDD and OCD patients than in controls (P=0.007). The control group outperformed both OCD and MDD patients in the working memory test. The results also indicated that MDD and OCD patients had more errors and obtained higher scores on the response time in the SCWT compared to the control group (P=0.003).

Conclusion: The results suggested that patients with MDD and OCD were similar to each other but significantly different from healthy individuals in cognitive rigidity profile.

Keywords: Cognition, Executive functions, Obsessive-compulsive disorder, Major depressive disorder.

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Introduction

Depression is a common illness worldwide, with more than 264 million people affected. Depression is different from usual mood fluctuations and short-lived emotional responses to challenges in everyday life. Especially when long-lasting and with moderate or severe intensity, depression may become a serious health condition (1).

Obsessive-compulsive disorder (OCD) is a serious mental health problem that annually imposes enormous economic and social costs

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on human societies (2). The problems associated with OCD and its debilitating symptoms disrupt patients' interpersonal, occupational, and life functioning (3). It affects one case in forty-five individuals (4). Studies demonstrate that these two disorders have many characteristics. Rigidity is defined as to persevere with and resist adopting new behavioral patterns by insisting upon continuing the same inconsistent functional styles as before (5). Kashdan and Rottenberg stated that rigidity is the predictor of psychological traumas in most cases. Emphasizing the common factors of psychological traumas, they also argued that cognitive rigidity can be traced in many disorders, as one's fluid transactions with the surrounding environment are interrupted and he/she may exhibit stereotyped and invariable responses (6). Dean and Garabedian concluded that a wide range of personality dimensions was associated with cognitive rigidity. Their findings showed that rigid learners exhibit a consistent pattern of social cohesion, restlessness, compulsive states, compulsive hoarding, irritation, and emotional stability. They argued that individuals with cognitive rigidity are more likely to use social cohesion to cope with anxiety caused by problematic situations (7,8). Rigidity is a construct that has been extensively studied in various branches of psychology (9). For example, Schaie and Parham stated that rigidity is a multidimensional factor divided into personality-perceptual, mental-motor, and cognitive-motor subscales. They also developed a self-assessment questionnaire, titled the test of behavioral rigidity, to measure them (5). Dean, Gary, and Seretny employed Luchins and Luchins' Three Jar Test to measure rigidity (10).

Most studies typically distinguish between two types of rigidity: cognitive rigidity and behavioral rigidity (11). Cognitive rigidity, which is the subject matter of this study, is defined as one's failure to mentally adapt to new and changing demands and needs of the surrounding environment (12). Cognitive rigidity refers to forming a mental set and persevering in that set, which indicates beliefs, tendencies, expectations, and schemas. People who insist on inefficient behavior are considered cognitively rigid. Behavioral rigidity also refers to the formation and perseveration of behavioral sets (11).

Many mental disorders, including OCD and unipolar depression, are phenomenologically characterized by some forms of cognitive rigidity (12). In a study on cognitive rigidity, Nolen-Hoeksema et al. introduced rumination as causing vulnerability to depression. They defined rumination as a stereotypical way of thinking about causes of negative emotions, symptoms, and consequences (13). Davis and Hoeksema stated that rumination is the main feature of cognitive rigidity and showed that those prone to rumination significantly performed worse than normal individuals in cognitive rigidity measurement tests (14). Miran et al. stated that obsession is another form of cognitive rigidity in OCD patients. These thoughts are repetitive, resistant, and annoying impulses or images that unintentionally enter one's mind and are difficult to resolve or suppress (12). Some researchers believe that the task-switching paradigm is the most accurate tool for measuring cognitive rigidity because of its advantages over traditional neuropsychological tests, including the Wisconsin Card Sorting Test (WCST). To test the various dimensions of cognitive rigidity, they measured three basic executive functions of the brain: set-shifting (task switching), inhibition, and working memory (12,15). Executive functions are a set of complicated cognitive processes necessary for doing though or new goal-directed tasks (16). These processes include task switching, delayed or inhibited response, planning for action sequences, and maintaining the mental representation of tasks by working memory (17,18). Task switching means getting rid of the shackles of a series of irrelevant tasks and actively engage in a series of relevant tasks. Inhibition refers to the intentional, deliberate, and controlled suppression of dominant responses at the request of the surrounding environment. Working memory involves devising and manipulating task-related information in working memory instead of passively storing it in memory. Understanding the nature of these two forms of rigid thinking can provide us with important insights into OCD and MDD and cause the rapid growth of information about the cognitive and neurological foundations of cognitive rigidity. The first question this study seeks to answer is about the characteristics of cognitive rigidity in OCD and MDD. Another research question is whether OCD and MDD are different in terms

of the type or nature of cognitive rigidity. Identifying cognitive rigidity as the underlying factor of OCD and MDD is essential in expanding the knowledge boundaries in theories related to these two disorders. Miran et al. stated a few contradictory studies about cognitive rigidity measurement in patients with OCD and MDD, and few coherent studies had compared such patients based on cognitive rigidity. Although, they expected to achieve different rigidity profiles for OCD and MDD patients (according to the results of three previous studies that had examined the task-switching paradigm in OCD and MDD patients), their findings indicated that the rigidity profiles of both groups of patients were similar to each other but different from normal individuals (12).

Since there are limited available studies on this subject, this study intends to take a step towards shedding light on the existing conflicts in this field. Furthermore, this approach allows us to determine different or similar indicators of rigidity profile in patients with these two disorders compared to the average population. The practical significance of this study also lies in the development of tools to improve individuals who suffer from cognitive rigidity. If cognitive rigidity is identified as the common ground of OCD and MDD, it will then be possible to reduce symptoms of these disorders and take new steps towards the treatment of such patients by improving cognitive rigidity.

Materials and Methods

This descriptive causal-comparative study aimed to describe and compare the performance of patients with OCD and MDD and control group in the task-switching test, working memory test, and the SCWT, which measure executive functions and cognitive rigidity. The statistical population consisted of all patients with OCD and MDD and the control group in Tabriz, East Azarbaijan Province, Iran, in 2019. The participants were selected from those who referred to Bozorgmehr Clinic based on the DSM-5 diagnostic criteria for OCD and MDD using the convenience sampling. A total of forty-five individuals were selected and assigned to three fifteen-member groups. The selected cases fulfilled the questionnaires after they diagnosed with OCD or MDD disorders by a psychiatrist and attended structured clinical interviews based on the DSM-5 diagnostic criteria by a psychologist. The controls were selected from among the students and staff of the University of Tabriz and other people who were matched with the selected OCD and MDD patients in terms of age, gender, educational level, and marital status. The inclusion criteria for OCD and MDD patients were intermediate or higher levels of educational attainment and non-affliction with homogenous disorders, especially OCD-MDD comorbidity, as diagnosed by the psychologist and the psychiatrist. The inclusion criteria for the control group included having no history of past or current psychiatric disorders, which was confirmed through a clinical interview and a general health questionnaire. The authors briefed the participants on the research objective, obtained their informed consent, and interviewed them to register their general information. Those who agreed to participate in the study were also briefed on each of the computer-based tests. After ensuring that the participant has learned the logic and procedure of all tests, the tests were performed one after the other. Furthermore, those who did not consent to participate were excluded.

Research instrument

A) General Health Questionnaire (GHQ-28): It was developed by Goldberg and Williams in 1988, was employed in this study to screen and confirm the general health of normal participants. The GHQ-28 requests participants to indicate how their health, in general, has been over the past few weeks, using behavioral items with a 4-point scale indicating the following frequencies of experience: "not at all," "no more than usual", "rather more than usual" and "much more than usual". The scoring system applied in this study was the same as the original scoring system, the Likert scale 0, 1, 2, 3. The minimum score for the 28 version is 0, and the maximum is 84. The higher scores of GHQ-28 indicate the higher levels of distress (19). Taghavi reported that the total validity of this questionnaire was equal to 0.70 (20).

B) The Structured Clinical Interview for DSM-5® Disorders-Clinician Version: It guides the clinician step-by-step through the DSM-5 diagnostic process. Interview questions are provided conveniently alongside each corresponding DSM-5 criterion to aid in rating each criterion as either present or absent. A unique and valuable tool, the SCID-5-CV covers the DSM-5 diagnoses most commonly

seen in clinical settings. The user's guide for the SC/D-5-CV provides comprehensive instructions on using the SCID-5-CV effectively and accurately. It describes the rationale, structure, conventions, and usage of the SCID-5-CV and discusses in detail how to interpret and apply the specific DSM-5 criteria for each of the disorders included in the SCID-5-CV. Some sample role-play and homework cases are also included to help clinicians learn how to use the SCID-5-CV. Together with the SCID-5-CV, the user's guide for the SCID-5-CV will prove invaluable to clinicians, researchers, interviewers, and students in the mental health professions who seek to integrate time-tested interview questions corresponding to the DSM-5 criteria into their DSM-5 diagnostic assessment process (21). SCID psychometric properties indicated an acceptable range for internal consistency (0.95-0.99), test-retest reliability (0.60-0.79), and Kappa reliability (0.57-0.72) (22).

C) Maudsley Obsessive-Compulsive Inventory (MOCI): This tool consists of 30 two-choice (yes/no) closed items. In addition to an overall score, the MOCI provides separate scales: checking, washing, slowness, repetition, and doubting. Since this scale mainly focuses on OCD symptoms, it can be employed to evaluate the effects of treatments on these symptoms. The validity and reliability of this questionnaire have been reported acceptable in various communities. The reliability of this tool using test-retest and total reliability coefficient were reported 0.85 and 0.84, respectively. Moreover, its convergent validity using the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) was obtained at 0.87 (23,24).

D) Beck Depression Inventory (BDI): Developed by Aron Beck in 1961, the BDI consists of 21 groups of items related to depression symptoms, including mood, pessimism, feelings of failure, dissatisfaction, feelings of guilt, feelings of punishment, self-loathing, self-blame, self-punishment desires, periods of crying, irritability, social withdrawal, indecision, body image, interruption, sleep disorders, fatigue, appetite, weight loss, and preoccupation with physical conditions and sexual desire. Its reliability, validity, and internal consistency in a sample of adults were obtained 0.78, 0.84, and 0.83, respectively. Its reliability coefficient for a sample of Iranian adolescents was reported as 0.80. The reliability of this tool was estimated at 0.73 and 0.92 based on internal consistency and test-retest reliability, respectively (25).

E) Updating Working Memory: The test stimuli include one, two, or three square frames sized 2°×2° that appear at the center of the screen. A number and then a + or – appear inside each frame. Each attempt begins with displaying one, two, or three blue frames containing a black number (between 1 and 9) in a row at the center of the screen with a white background. Participants are asked to memorize these numbers and press the long key whenever they are ready. Then the numbers disappear, and some test steps begin. An arithmetic operation appears inside one of the squares. The frames are selected quasi-randomly with equal probability. Arithmetic operations (e.g., +4, -2, -5) are also selected quasi-randomly, provided that the result of arithmetic operations should range between 1 and 9, not more. Participants are expected to perform the intended arithmetic operation in their mind, memorize the results, and then press the long key to go to the next step. Each stage consists of 6 one- or two-frame steps and nine thee-frame steps. After these steps, a question mark appears in each frame that rotates from left to right, and participants should type the final result of each frame. Finally, the number of successful steps is recorded for each participant to be compared with the results of other participants (26). Updating the working memory test is a reliable and valid instrument for assessing working memory in Iranian society (27).

F) Stroop Color-Word Test (SCWT): The stimuli of this test are the words "blue, red, yellow, and green" written in "blue, red, yellow, and green" (16 stimuli, 4 classes). The test begins with a set of 8 for preparation and continues with four sets of 32. Each step begins with a + sign displayed on the screen for 500 milliseconds and continues with colored words. In the first stage (4 sets of 32), the participant chooses only the color he/she observes, regardless of the written word. In the next stage (4 sets of 32), the participant is expected to press the key corresponding to the written word, regardless of the color of the word displayed (28). Correlation coefficients by test-retest in Stroop test for reaction times of three cards and reaction time interference were 0.86, 0.86, 0.93, and 0.64; and for errors of three cards and error interference were 0.67, 0.37, 0.81, and 0.75 in Iranian society (29).

G) Task Switching: This test involves switching between two spatial position tasks: vertical (up vs. bottom) and horizontal (right vs. left), as the target index is located inside a 2×2 grid and its position within the grid changes after each response. The target index is a white rectangular square, and there are some navigation arrows at the end of each grid to determine the participant's task for determining the position of the target index. The participant is expected to determine the location of the target index, which is changing in four positions, by pressing 1 and 9 or 3 and 7 on the keyboard. According to the navigation arrows in each attempt, the participant should deviate from one aspect to identify the position of index correctly. For example, when the target index is at the top and left, the participant should determine whether it is up or left, according to the navigation arrow. Given that he/she can press only 1 or 9, his/her response may be the opposite of the direction of the keys. The computer beeps after each error to give feedback. A blank grid appears on the screen for half a second at each stage, followed by navigation arrows to determine which one is intended: horizontality or verticality.

The interval between the display of the target index and registration of the response is measured by the software as the participant's response time. The final result of each participant includes two scores, the number of errors, and the mean response time during the test. The test begins with a decimal frame of a task (vertical or horizontal), a warm-up, and continues with a frame of forty of the same task. Then a warm-up decimal frame of another task is displayed, followed by a frame of forty of the same task.Under single-task frames, the tasks are assigned to participants in a balanced way. After these single-task frames, a frame of twenty of a composite task is displayed as a warm-up, followed by eight frames of composite tasks, each containing twenty tasks, and then two single-task frames of forty. The order of these tasks is the opposite of their order at the beginning of the test (30,31).The data were statistically analyzed by using multivariate analysis of variance (MANOVA) in SPSS-16.

Results

The descriptive findings related to the demographic data of each group are presented in Table 1.

Table 1. Demographic data of the participants

Variable	OCD Number (Percentage)	MDD Number (Percentage)	Controls Number (Percentage)
Gender			
Male	7 (46.7)	8 (53.3)	9 (60)
Female	8 (53.3)	7 (46.7)	6 (40)
Age (Year)			
20-30	6 (40)	7 (46.7)	7 (46.7)
30-40	6 (40)	5 (33.3)	6 (40)
40-50	3 (20)	3 (20)	2 (13.3)
Education			
Diploma	5 (33.3)	6 (40)	4 (26.7)
Bachelor	7 (46.7)	6 (40)	6 (40)
Master	3 (20)	3 (20)	5 (33.3)
Marital status			
Single	7 (46.7)	8 (53.3)	8 (53.3)
Married	8 (53.3)	7 (46.7)	7 (46.7)

Table 2 presents the descriptive results (mean and standard deviation) of the task switching test, the working memory test, the SCWT, and their corresponding dimension in the groups.

Table 2. Mean and standard deviation of participating groups

Variable	OCD		MDD		Control group	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Errors in the task switching test	18.5	15.47	24.26	27.24	7.26	2.60
Response time in the task switching test	0.836	0.308	0.990	0.504	0.570	0.106
Working memory	12.26	9.55	9.46	3.48	19.33	6.12
Errors in the SCWT	8.06	5.89	10	8.32	4.26	1.53
Response time in the SCWT	1.33	0.29	1.42	0.37	1.03	0.22

Before analyzing variance, the Ljung-Box test was performed to examine the variance equality of variables. Unfortunately, the results rejected the variance equality of variables. Nevertheless, considering the equal sample size of the experimental groups, MANOVA could be used.The Wilks' Lambda test (Table 3) showed that the obtained F-distribution was statistically significant at the 0.013 level of significance, confirming the difference between the groups in the research variables. In other words, there was a significant difference between the three groups in at least one of the research variables. Accordingly, MANOVA was performed to determine the general effects on groups and variables (Table 4).

Table 3. Wilks' Lambda test

Test	Value	Degree of freedom	F-distribution	P
Wilks' Lambda	0.569	10	2.47	0.013

Table 4. MANOVA results

	Dependent variable	SS	df	MS	F-distribution	P
Group	Errors in the task switching test	2244.044	2	1122.022	3.405	0.043
	Response time in the task switching test	1.351	2	0.675	5.639	0.007
	Working memory	775.644	2	387.822	8.260	0.001
	Errors in the SCWT	255.244	2	127.622	3.598	0.036
	Response time in the SCWT	1.288	2	0.644	6.921	0.003

The results of MANOVA (Table 4) indicated a significant difference between the groups in all variables. Therefore, the Least Significant Difference (LSD) test was employed to determine the exact direction of differences (Table 5).

Table 5. Results of the LSD test

Dependent variables	Group 1	Group 2	Mean difference	Standard error	P
Errors in the task-switching test	OCD	MDD	-5.73	6.62	0.392
		Normal	11.26	6.62	0.047
	MDD	Normal	17.00	6.62	0.014
Response time in the task-switching test	OCD	MDD	-0.153	0.126	0.232
		Normal	0.266	0.126	0.041
	MDD	Normal	0.419	0.126	0.002
Working memory	OCD	MDD	2.80	2.502	0.269
		Normal	-7.06	2.502	0.007
	MDD	Normal	-9.86	2.502	0.000
Errors in the SCWT	OCD	MDD	-1.93	2.174	0.379
		Normal	3.80	2.174	0.048
	MDD	Normal	5.73	2.174	0.012
Response time in the SCWT	OCD	MDD	-0.092	0.111	0.414
		Normal	0.30	0.111	0.009
	MDD	Normal	0.39	0.111	0.001

Obsessive-Compulsive Disorder (OCD), Major Depressive Disorder (MDD)

The LDS test results (Table 5) showed that MDD and OCD patients had more errors in the task-switching test than the control group. In addition, the response time in the task-switching test was longer in MDD and OCD patients than in the control group ($P<0.05$). The results also indicated that the control group outperformed both OCD and MDD patients in the working memory test ($P<0.05$). MDD and OCD patients had more errors and obtained higher scores on the response time in the SCWT compared to the control group. Hence, it can be concluded that patients with MDD and OCD spent more time taking the SCWT than the control group ($P<0.05$). However, there was no significant difference between MDD and OCD patients in any research variables ($P>0.05$).

Discussion

This study aimed to compare OCD and MDD patients with the control group in cognitive rigidity profile. The data analysis showed that the control group outperformed both OCD and MDD patients in the task-switching test. This is consistent with the findings of Miran et al. and Cavedini et al. (12,24). Another study showed that the patients with OCD had a poor performance in the task-switching test and their perseveration errors were higher than those of the control group (32). The same results have also been reported in a study on the executive functions of patients with MDD (33). When OCD and MDD patients are compared with each other, it can be stated that there was no significant difference between the two groups in terms of task switching. Defects in the executive function of task switching is often referred to as mental perseveration, defined as one's inability to change or replace cognitive problem-solving strategies to achieve the goal. Such individuals often use the same response pattern that has been fruitful one or more times in other situations and are less likely to change or replace it to deal with new conditions, despite receiving negative feedback from the environment. This repetitive pattern is observed in many psychological disorders, including MDD and OCD. Patients with MDD have rumination, and those with OCD are preoccupied with obsessive thoughts. Both are grouped under mental perseveration. These are repetitive thoughts that one is preoccupied with and cannot change or suppress, although they are inefficient and agonizing in dealing with the environment. In the task-switching test, such individuals make more errors than healthy ones because of the inability to change cognitive strategies and spend more time answering the test stages due to their preoccupations following any error. Such preoccupations, such as rumination in MDD patients and obsessive thoughts in OCD patients, lead to individuals' failure and poor performance in task switching tests. In addition, such individuals have difficulty with the task switching process, which includes shifting from the irrelevant part to the relevant and more appropriate part. By contrast, the control group can change their strategies in each step and take advantage of the received feedback after each error to come up with a new strategy for the next steps. Also, the control group quickly recognizes that a specific behavior that led to the proper response is no longer appropriate and does not work in all situations, and tries to adapt to new situations (12). The results demonstrated that the control group outperformed both OCD and MDD patients in the working memory test. However, there was no significant difference between OCD and MDD patients in this regard, revealing the similarity between these two disorders in terms of cognitive nature and other elements. This finding is consistent with the results of previous studies regarding working memory deficits in patients with OCD and MDD (12).

Working memory refers to those brain processes used for the short-term storage and manipulation of information. Therefore, deficits in these brain processes cause the preservation and non-change of materials that our working memory receives. As a result, we always experience and process a repetitive and stereotypical form of information in our mind, a problem that OCD and MDD patients usually face. Such patients' delusions and obsession are the same as the repetitive and constant information and cognitive material that immutably circulate in their minds. Since the working memory of such patients is weak or damaged, they cannot manipulate or replace these materials and think about whether they are right or wrong. In other words, they cannot update their working memory because they need to gather various information and data from the sources of working memory, i.e., the external environment, on the one hand, and long-term memory, on the other hand, and then manipulate and process them by using mental operations.

Apart from the fact that the weakness of working memory may lead to rumination or obsession in these patients, it can also be argued that mental rumination and obsession may lead to the weakness and dysfunction of working memory. Accordingly, severe mental preoccupation with rumination or obsessive thoughts occupies most of the active and available memory, and, since this memory has a limited capacity, one loses the ability to successfully do the tasks, process new information, and manipulate or correct the repetitive thoughts in dealing with the surrounding environment.

Since working memory is related to one's ability to do relevant tasks when confronted with irrelevant information on the same tasks, it is closely associated with task switching. This means that one should first be able to keep in mind the various pieces of information needed to do a task and then choose the most appropriate one based on the conditions and requirements of the task. However, MDD and OCD patients not only have a poor working memory, which leads to the loss of a range of information and data needed for the current situation but also cannot change previous strategies or use new ones even when they receive negative feedback from the environment, mainly due to deficits in task switching. The results also indicated that patients with OCD and MDD performed poorly in the inhibition test and exhibited weaker inhibitory power than the control group. This result is consistent with the findings of Miran et al. and Chamberlain et al. on OCD patients and Smith and Jones on MDD patients (12,34,35). However, there was no significant difference between OCD and MDD patients in this regard, suggesting the poor performance and weakness of both groups of patients in cognitive inhibition.

The literature on selective attention introduces inhibition as an element without which our consciousness will be drowned in a sea of irrelevant information, and we can never resist the onslaught of disproportionate stimuli. Rumination and obsession in OCD and MDD patients are precisely related to this irrelevant information that one cannot inhibit or suppress, despite being aware of their uselessness and the suffering caused by its unwanted attack. The term "impaired inhibition" has been widely used and investigated to explain cognitive impulsivity, perseveration, obsession, attention deficit, decision-making deficit, and problem-solving deficit. Compared to the control group, the weakness and dismal failure of psychiatric patients in tests related to this construct can explain the significance of this ability to end repetitive cycles of useless and painful thoughts and ideas, especially in MDD and OCD patients. Since inhibition refers to the voluntary and controlled suppression of dominant and pre-learned responses, poor inhibition leads to the repetition of the same previous patterns of response and problem-solving that cannot help one deal with issues effectively. This highlights the conceptual relationship and correlation of inhibition with task switching and working memory, emphasizing the importance of avoiding dominant but irrelevant responses in the face of new stimuli, putting an end to solutions that are no longer effective, reviving various information and data related to the issue ahead, and, ultimately, changing previous strategies very quickly concerning the new situation (36).

This study aims to determine whether or not OCD and MDD are similar in terms of cognitive rigidity profile. To this end, some tests that measure the three main executive functions related to rigidity were selected and performed on some patients with these two disorders. Considering the high prevalence of OCD-MDD comorbidity, the participants were carefully examined in this regard to exclude those with the comorbidity of other disorders. The final findings suggested that both OCD and MDD patients were significantly different from the control group in all research variables, but no significant difference was found between OCD and MDD in any of the variables. The results showed that the cognitive rigidity profiles of OCD and MDD patients were almost the same. The similarity of the cognitive rigidity profile of these two disorders is of great importance both theoretically and clinically. For instance, if the cognitive rigidity profiles of OCD and MDD are the same, it can be argued that rigidity and its underlying causes are a common risk factor for both disorders. In clinical viewpoint, the formulation of protocols that improve flexibility may partially contribute to treating patients with OCD and MDD. Since one of the research limitations was the small sample size, so the findings should be generalized cautiously to other populations.

Moreover, since it was impossible to use random sampling in this study, the participants were selected based on the convenience sampling method. Future studies are

recommended to employ tests that measure other executive functions to obtain more extensive and accurate results on the nature of OCD and MDD. It is also recommended that similar studies should be conducted on patients with other psychological disorders, such as schizophrenia or generalized anxiety disorder (GAD), who seem to be somewhat affected by cognitive rigidity.

The development and execution of tools and strategies to treat rigidity in patients with psychological disorders can be another intriguing area of research for future studies.

Conclusion

Based on the results, it seems that patients with major depressive disorder and obsessive-compulsive disorder were similar but significantly different from healthy individuals in cognitive rigidity profile.

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