

Speed of word retrieval in multiple sclerosis

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Background: Multiple sclerosis (MS) is a common inflammatory - degenerative disease of myelin sheet of central nervous system that affects more young people. These patients show some degrees of cognition problems such as memory and processing disorders. The aim of this study was to evaluate the speed processing ability by word finding assessment in three categories include fruits, animals and objects in MS patients. **Materials and Methods:** This study carried out as case-control and descriptive-analytic on 47 MS patients and 29 healthy controls. We measured the reaction time (RT) in three stages. Each stage includes 25 words (animals, fruits and objects words with high familiarity) that were presented randomly. In each stage, the subject should press a key when recognized the target category. Collected data analyzed with repeated measure ANOVA, two-way ANOVA test, and independent-samples *t*-test. **Results:** MS patients in comparison to normal healthy subjects show delay in speed of processing in which there was significant difference between MS patients and control subjects in mean reaction time in all three categories ($P < 0.001$). **Conclusion:** The speed of processing is impaired in MS patients. Consequently, more evaluation and planning treatment programs based of speed processing for memory in these patients are necessary for them because of the role of memory in daily activities of life.

Key words: Multiple sclerosis, speed of processing, word retrieval

INTRODUCTION

Multiple sclerosis (MS) is a common inflammatory - degenerative disease of myelin sheet of CNS and is one of the most common disabling diseases among young adults. According to the existing statistics, MS is one of the most costly diseases in the United States. Studies show that patients who suffer from MS has some levels of cognitive disorder (45-65%), including memory disorder, speaking problems, information process delay, lack of reasoning ability, abstract thinking, attention and functioning. One of the factors that faces problem in MS patients is memory and especially concept memory, which has a bad effect on patients' lives. Although there are several studies on memory of these patients, there is no agreement in the existing ideas.^[1-9]

Elsass and Zeeberg (1983), Rao *et al.*, (1989) and Kujala *et al.*, (1994) studied concept memory of MS patients and reported slow speed of information process.^[6-10] Other studies on the speed of information processing have reported deficiency in concept memory as one of the most significant cognitive disorder in these patients.^[11-13]

In general, the results of many studies prove the existence of a range of concept memory problems and concept categorization in MS patients.^[11-13] High prevalence of MS in IRAN and impairment of memory in MS patients, and with regard to the role of memory in relation with daily functioning, the present study

aimed to investigate the ability of word retrieval using speed processing assessment in three conceptual areas in MS patients. These areas included fruits, animals and objects.

MATERIALS AND METHODS

This is a case-control study analyzing 47 MS patients who had a mild (3 or less) disability according to the Expanded Disability Status Scale (EDSS). MS patients who were selected had relapsing remitting MS and had an age range of 20 to 50 years. Patients' conditions included no relapse at least one month before entering the study, having no psychological and neurologic disease apart from MS, lack of language disorder history, no drug dependency or alcoholism and assuring that they had no movement disorder in upper organs and severe lack of sight due to MS.

Sampling was done by random numbers among those referring to special clinics of neurology, which had the entry criteria. Patients with mild relapse during the study were excluded. Twenty nine healthy people were selected as controls from clinic or hospital's employees and other referrer people. All participants were informed that the tests have no risk and filled a written consent. Both groups were matched in gender, age and education level. This study was conducted in clinics and hospitals of university for four months in 2010.

Testing method

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The subject was placed in a room without any distracting factor (no audio and visual distraction) in front of a monitor with 30 cm distance. The test was based on reaction time assessment and was conducted in 3 stages. In each stage, 25 words (including animals, fruits and objects that were familiar for everybody) were randomly presented. The laps between stages was 10 seconds and the duration of presentation of each word was 1000 ms and the laps between presentation of two words was 2000 ms. In the first stage that was aimed to recognize animals' names from the presented words, the subject should press first key whenever seeing an animal's name and press second key if not. The second and third stages (recognizing names of fruits and objects) were also conducted as the same.

Data were analyzed using SPSS with repeated measure ANOVA, two-way ANOVA, and independent-samples t-test.

RESULTS

In general, MS patients showed delay in replying in all 3 stages as compared with controls [Figure 1].

Descriptive statistics are presented for both groups separately in Table 1. In order to investigation interaction effect stimulus*group, repeated measure ANOVA was performed [Table 2]. We made two-way ANOVA [Table 3] to investigation of effect of RT and CR in each group and finally independent-samples t-test [Table 4] was performed to measure difference between each type of stimulus between two groups.

According to repeated measure analysis, there was a significant difference between both groups and stimuli.

There isn't any significant difference between RT of stimuli in MS patients, while processing of correct responses is intact. It indicates that MS affects speed of processing of stimuli.

There is significant difference between two groups for all stimuli.

DISCUSSION

In this study, the speed of words' conceptual processing (response reaction and accuracy) in three areas of fruits, animals and objects were assessed. The results show that MS patients are slow in speed processing in all three areas as compared to healthy people. These findings are in agreement with other studies that present cognitive disorder in MS patients.^[6,7,10,13,14]

According to the present study, these patients similar to controls show a delay in the speed processing of objects

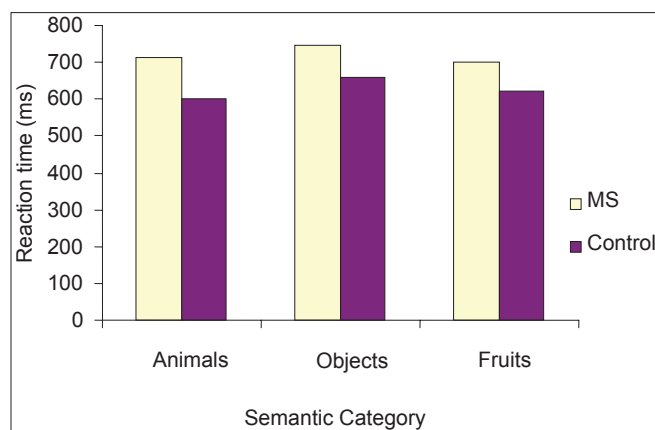


Figure 1: Comparison delay in replying in different stages of MS and control group

Table 1: Descriptive data for both groups

	Mean		P value
	MS	Control	
RT			
Object	778.3±81.5	661.1±70.3	<0.001
Animal	733±80	602.2±59.8	
Fruit	751.5±82.2	617.3±78.5	
P value	<0.001		
CR			
Object	8.7±1.2	8.7±1.2	<0.001
Animal	8.5±1.6	9.6±0.57	
Fruit	8.3±9.1	9.1±0.88	
P value	<0.001		

MS=Multiple sclerosis; RT=Reaction time; CR=Correct responses

Table 2: Two-way ANOVA

		F	P-value
RT	MS	0.775	0.463
	Control	8.101	<.001
CR	MS	14.560	<.001
	Control	12.051	<.001

Table 3: Independent-samples t-test

Stimulus	t	P value
RT		
Object	7.043	<0.001
Animal	8.775	<0.001
Fruit	7.918	<0.001
CR		
Object	-5.456	<0.001
Animal	-4.537	<0.001
Fruit	-3.317	<0.001

RT=Reaction time; CR=Correct responses

as compared with the two other areas (fruits and animals). According to the existing theories in this field one of the reasons for this delay is the wide range of this area as compared with other areas. The results of studies on the

reaction time of MS patients show that these patients as compared to healthy people have delay in reaction times.^[6,12] The study by Rao *et al.*, (1989) on MS patients showed a delay in the mental processing of these patients.^[7-9] Kujala *et al.*, (1994) in their studies on MS patients found that the speed processing in all cognitive areas especially memory has problem in these patients.^[10] Also Patty and Ebers (1998) in a study reported that one of the most significant disorders that follow MS is the delay in information processing speed and conceptual memory.^[11] Demaree *et al.*, (1999) in a study used visual and audio tests on MS patients as compared with healthy people and found that patients show delay in the speed processing in both tests. However, when they were given sufficient time, they acted like healthy people.^[13] Lock (1997) in a test for the retrieval speed of words that start with specific alphabet found that processing speed of MS patients had no difference with that of healthy people. He said that lack of difference in his study was related to small number of subjects.^[14] In other studies also the deficit of speed processing was mentioned as the primary problem of MS patients.^[15] In a study by Archibald *et al.* in 2004, it was found that posterior fossa area lesions can lead to reduced cognitive speed processing and memory in MS patients.^[16,17,18] The findings of the present study also showed a delay in the speed processing of conceptual areas in MS patients, which was in agreement with other studies in this field. Therefore, it can be concluded from the results of this study and other similar studies that the speed processing which is somehow the active memory, is disturbed in MS patients and that memory disorder is related to the daily functioning of these patients. Therefore, more studies of the subject and developing proper treatments seem necessary.

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