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# Naming error in multiple sclerosis patients: A pilot study in Isfahan, Iran

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**Background:** Although cognitive impairment is common in multiple sclerosis (MS) patients, language difficulties are controversy and little information is available on nonEnglish languages. Therefore, the present cross-sectional study was conducted to assess the naming accuracy in Persian relapsing-remitting MS (RRMS) patients. **Materials and Methods:** Thirty RRMS patients were recruited from Kashani Comprehensive MS Center, Isfahan, Iran. Their performance on measures of mini mental state examination (MMSE), Expanded Disability Status Scale, and Naming Test was compared with control participants. **Results:** MS patients were found to have much more naming errors than the control group ( $2.1 \pm 1.8$  vs.  $0.54 \pm 1.1$   $P = 0.02$ ). Average MMSE score of MS patients was 27.23 (range = 18–30, standard deviation [SD] = 2) versus 28.96 (range = 19–30, SD = 3.2) in controls. **Conclusion:** The present study suggests that naming ability can be impaired in RRMS regardless of disability score. Specific language function tests including naming should be considered in the process of evaluating and rehabilitating patients with MS.

**Keywords:** Acquired language disorder, cognition disorders, naming deficit, relapsing-remitting multiple sclerosis

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## INTRODUCTION

Multiple sclerosis (MS) is the most common nontraumatic neurological condition of early adulthood.<sup>[1]</sup> It can lead to multiple physical and cognitive disabilities.<sup>[2,3]</sup> The prevalence of cognitive impairment has been reported between 43% and 72% in MS patients. This impairment may begin in the early stages of the disease.<sup>[4-6]</sup> Although subcortical cognitive dysfunction, such as decreased information processing speed, visuospatial abilities, executive functions, and working memory is common in MS,<sup>[7,8]</sup> cortical involvement such as language and praxis deficits are also present in some patients.<sup>[8-11]</sup> While there were significant evidences about the incidence and prevalence of dysarthria in MS, little is known about aphasia and its characteristics.<sup>[12]</sup>

Recently, a growing number of research has demonstrated language impairment in MS patients in tasks of naming,<sup>[11,13,14]</sup> word generation,<sup>[11]</sup> making inferences, recreating sentences,<sup>[15]</sup> repetitions,<sup>[14]</sup> semantic manipulation, and processing.<sup>[13]</sup>

A few studies have shown a relation between cognitive dysfunction and some factors such as disease progression, physical disability,<sup>[13]</sup> clinical course,<sup>[13,16]</sup> extent of neural tissue damage, fatigue, mood disturbances, and various medications<sup>[16]</sup> in MS patients.

On the other hand, other studies have shown no association between cognitive impairment with disease duration or physical disability<sup>[13,16]</sup> and disease course.<sup>[13]</sup>

Although most of the relapsing-remitting MS (RRMS) patients but not all of them experience cognitive decline in various domain even in the early stage of disease, the

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prevalence and severity of cognitive impairment seem to be higher in secondary-progressive MS (SPMS).<sup>[17]</sup>

A recent investigation suggested poor performance of language tasks in both SPMS and RRMS which gets worse with conversion in the course of disease from RRMS to SPMS.<sup>[18]</sup>

Almost all previous studies, except one,<sup>[11]</sup> have been conducted in English speakers and little information is available on patients with nonEnglish language.

Considering the possible influence of different cultures on language skills and the controversial nature of language disorders in RRMS patients, the main aim of the present study was to broaden our general knowledge about naming skills in the Persian-speaking RRMS patients. Furthermore, we consider discovering the probable relationship between naming skills of RRMS patients and physical disability according to the Kurtzke's Expanded Disability Status Scale (EDSS)<sup>[19]</sup> or findings of the Mini mental status examination (MMSE).<sup>[20]</sup>

## MATERIALS AND METHODS

This is an observational cross-sectional study which was performed in Kashani Comprehensive MS center, Isfahan, Iran. The study was blind both for the specialists who performed the tests and the statistical analyzer.

### Participants

Thirty patients with a definite diagnosis of RRMS were selected randomly from the registered patients in Kashani MS center and thirty participants with neurologically normal condition were recruited as control group.

The sample size was calculated based on other similar studies and expert ideas, with considering a confidence interval of 95% and alpha-error <5%.<sup>[15,21]</sup>

Inclusion criteria for MS patients include (1) definite RRMS according to the McDonald criteria, (2) age between 18 and 55 years, (3) no relapse during the past 2 months, (4) good visual skills, (5) no other neurological disorders (according to his medical records and the physician report) such as stroke, head trauma, dementia, and Alzheimer's disease, and (6) Persian language.

The noncompliant participants and those who responded to <50% of items in the naming test were excluded from this study.

The study was approved by the Human Research Ethics Committee of the Isfahan University of Medical Sciences (Approval code: 291037), and all participants signed written informed consent form before taking part.

### Procedure

After filling the demographic questionnaire, the EDSS of patients and MMSE were determined by an experienced neurologist and Persian Aphasia Naming test was done by a skilled speech and language pathologist.

### The mini-mental status examination

MMSE is a 30-point measuring score to quantify the cognitive impairment of the patients in both clinical and research neuropsychiatric settings.<sup>[20]</sup> It is used widely as a primary screening test which is sensitive for cognitive impairment but not specific for MS.

Every participant took a score from 0 to 30 based on their responses to the eight MMSE major categories.

### Persian aphasia naming test

This confrontation naming test consists of 50 drawing pictures of common objects. It has been widely used to evaluate naming problems in people suffering from aphasia. The adapted Persian version had been standardized and validated by Nilipour in 2004.<sup>[21]</sup> The number of incorrectly named objects was the dependent variable in the current study. The speech therapist did not know anything about the exact MMSE score of each participant.

### Data analysis

At first, descriptive analysis menu of the SPSS software (IBM SPSS23- United States Software) was used to show the characteristics of each variable such as mean and range and standard deviation (SD). The Spearman correlation test was applied (since all data sets were discrete variables) to assess the relationship between different variables such as naming accuracy, disease duration, EDSS, and MMSE scores. Since the distributions of data for all variables were found to be highly skewed, the log-transformed data were used in the present study before applying the Spearman correlation test.

All the statistical tests were done using SPSS software version 23, considering a confidential interval of 95%.

## RESULTS

All of the thirty patients with MS and also thirty normal control participants completed the tasks, and there were not any missing data.

Two groups were completely matched based on the age, sex, and educational level by nonrandomized sampling.

The participants' characteristics are shown in Table 1.

**Naming difficulties in people with and without multiple sclerosis disease**

RRMS patients showed an average of 48.96 correct words (range = 45–50, SD = 1.4) in naming test, while the mean number of correct words for the control group was 49.66 (range = 48–50, SD = 0.54), and this difference was found statistically significant ( $P = 0.013$ ).

When we used univariate analysis of variance, it showed that this difference exists but widely depends on MMSE difference between the groups. In fact, MMSE has a mild confounding role on the relation between the naming deficits of two groups. When this problem was corrected, the difference was weaker but still significant, and the value of  $P$  changed from 0.013 to 0.125 (the corrected mean of correct words is 49.03 in MS patients and 49.59 in control group).

**Mini-mental status examination scores of two groups**

The mean of MMSE score was  $27.23 \pm 3.27$  (range = 18–30) in MS patients compared to  $28.96 \pm 2.00$  (range = 19–30) in control group, and the difference between the groups was statistically significant ( $P = 0.016$ ). It should be considered that our two groups were matched in terms of education.

**Relationship between correct words with age, duration of disease, mini-mental status examination, and expanded disability status scale scores**

The mean EDSS score for MS patients was about 2.28 (range = 1–4, SD = 1.2). The mean duration of disease was 6.36 (range = 1–12, SD = 4.32).

According to the Spearman correlation test, there was a positive relationship between the number of correct words in naming test and the MMSE score ( $r = 0.28, P = 0.12$ ).

A mild negative relationship was found between the number of correct words and the EDSS score ( $r = -0.18, P = 0.31$ ) in MS patients.

There was not statistically significant correlation between correct words and age or duration of disease ( $P > 0.5$ ).

**Relationship between the mini-mental status examination, disease duration, age, and expanded disability status scale scores**

EDSS was the only variable that had a significant relationship with the duration of disease ( $r = 0.49, P = 0.005$ ). Of course, a positive correlation was seen between the duration of disease and age ( $r = 0.55, P = 0.001$ ). There was no correlation between the duration of disease with MMSE ( $r = -0.06, P = 0.72$ ) or number of correct words ( $r = 0.09, P = 0.60$ ).

The MMSE score is negatively correlated with age ( $r = -0.36, P = 0.05$ ), but it is not statistically correlated with EDSS ( $r = -0.03, P = 0.86$ ) [Table 2].

**DISCUSSION**

The main purpose of this case–control study was to assess naming accuracy as one of the most vulnerable language skills in RRMS patients. This study showed that RRMS patients had weaker performance in naming test and more naming errors even in lower EDSS scores (with a probable confounding role of MMSE score).

There was a mild negative relationship between the number of correct words and the EDSS score in MS patients.

Although many studies suggest that patients with progressive MS are more prone to language disorders, our study suggests that the naming problem should also be addressed in the RRMS.

This result is consistent with some other studies, suggesting the possibility of language problems in MS patients regardless of disease course (RRMS or SPMS).<sup>[15,16,22]</sup>

In this study, level of education as a confounder variable matched between patient and control groups; also, persons with significant noncompensated visual loss were excluded from the study.

It is shown that higher language functions often disrupt in various types of MS and decrease communication skills as well as quality of life.<sup>[23,24]</sup>

The cognitive profile for each phase of disease might controversially be different.

When trying to compare the cognitive impairments of all MS subtypes, new verbal learning capacity was more deficient

**Table 1: Participant characteristics**

|                        | RRMS               | Control             | P     |
|------------------------|--------------------|---------------------|-------|
| Mean±SD of age (range) | 34.9±8.02 (23-53)  | 36.4.9±8.02 (28-54) |       |
| Sex                    |                    |                     |       |
| Men                    | 6                  | 6                   |       |
| Female                 | 24                 | 24                  |       |
| Educational level      |                    |                     |       |
| Diploma                | 15                 | 15                  |       |
| Master                 | 15                 | 15                  |       |
| Mean of MMSE           | 27.23±3.27 (18-30) | 28.96±2 (19-30)     | 0.016 |
| Mean of EDSS           | 2.28±1.2 (1-4)     | -                   |       |
| Mean of naming errors  | 2.1±1.8            | 0.54±1.1            | 0.02  |
| Mean of correct word   | 48.96±1.4          | 49.66±0.54          | 0.013 |

RRMS=Relapsing-remitting multiple sclerosis; MMSE=Mini mental status exam; EDSS=Expanded disability status scale

**Table 2: Correlation between different aspects of patients**

|                     | Age (r, P)  | Duration of disease (r, P) | Correct words (r, P) | MMSE (r, P) | EDSS (r, P) |
|---------------------|-------------|----------------------------|----------------------|-------------|-------------|
| Age                 | 1,000       | 0.55, 0.001                | 0.08, 0.65           | -0.36, 0.05 | 0.17, 0.36  |
| Duration of disease | 0.55, 0.001 | 1, 000                     | 0.09, 0.60           | -0.06, 0.72 | 0.49, 0.005 |
| Correct words       | 0.08, 0.65  | 0.09, 0.60                 | 1, 000               | 0.28, 0.12  | -0.18, 0.31 |
| MMSE                | -0.36, 0.05 | -0.06, 0.72                | 0.28, 0.12           | 1, 000      | -0.03, 0.86 |
| EDSS                | 0.17, 0.36  | 0.49, 0.005                | -0.18, 0.31          | -0.03, 0.86 | 1, 000      |

MMSE=Mini mental status examination; EDSS=Expanded disability status scale

in PPMS and SPMS, while new visuospatial learning skills were more difficult in patients with RRMS and SPMS.<sup>[25]</sup>

However, further studies are needed to compare the language skills in different types of MS using specific language batteries. Although it has been found that naming skills are impaired in MS, the naming test is not one of the commonly used tests for assessing cognitive disorders of MS patients.

According to our results, the EDSS scores are poorly correlated with the number of naming errors, so the problem of naming may begin in the early stages of the disease when there is still no physical disability but increases with the progression of the disability.

Our finding is consistence with the previous study, suggesting that the naming difficulty in MS as a marker of impaired language function should be attributed to mild cognitive deterioration rather than motor factors.<sup>[26]</sup> Nevertheless, one study has reported a positive relation between severity of speech disorder in MS patients with severity of neurological deficits and has shown that speech disorder may reflect subclinical motor impairment.<sup>[12]</sup>

Despite the low sensitivity of MMSE to assess cognitive impairment in MS patients, our results showed a negative relationship between the number of naming errors and MMSE score. Thus, similar to the results of other researches, it seems necessary to use more comprehensive and accurate measurement tools to evaluate different domains of cognitive naming problem in MS patients.<sup>[25,27]</sup>

On the other hand, complete neuropsychological testing including MMSE as well as cortical function tests for memory, praxis, speech, and gnosis may help assess cognition in MS patients. In terms of disease duration, there is no association with neither MMSE nor naming test. It seems that at different stages of the disease, even in cases with a short duration of illness, the naming defect should also be considered. The results support Amato and Bryant studies<sup>[28,29]</sup> who reported a high prevalence of cognitive impairments in those MS patients with relatively short disease duration.

According to the results of one study, MS patients may not be aware of some of their cognitive impairments such as executive and visual functions,<sup>[30]</sup> and this may also apply to the naming problem.

Indeed, this study has shown that executive dysfunction in MS was strongly associated with a lack of awareness of cognitive deficits.<sup>[30]</sup> Hence, the evaluation of various aspects of cognitive impairment including naming ability, as a part of language and cognition examination in MS patients, can help to better management and it may improve the disease prognosis.

## CONCLUSION

The Persian-speaking RRMS patients may experience some degrees of naming difficulties, regardless of their disabilities and duration of the disease. This problem affects their communication skills and reduces their quality of life, whereas naming deficit may have a predictor role for cognitive dysfunction, so assessment of naming ability should be included in neuropsychological evaluations of MS patients.

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## Conflicts of interest

There are no conflicts of interest.

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