



## Prevalence and predictors of dysphagia in Iranian patients with multiple sclerosis

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### Abstract

**Background:** Dysphagia is frequently observed in patients with multiple sclerosis (MS). Dysphagia and its complications are common causes of morbidity and mortality in final stages of MS disease. This study aimed at determining the prevalence of dysphagia in Iranian patients with MS and identifying predictors associated with dysphagia.

**Methods:** A total of 230 MS patients were enrolled in this cross-sectional study. Dysphagia was evaluated using Mann Assessment of Swallowing Ability (MASA). Demographic characteristics (age and gender), duration of the disease, disease course, and Expanded Disability Status Scale (EDSS) were recorded for all participants.

**Results:** In total, dysphagia was found in 85 participants (37%) with mild to severe dysphagia (mild 50.6%; moderate 29.4%; and severe 20%). The logistic regression model demonstrated that disability status in EDSS (OR= 2.1; 95% CI 0.5-1.2) and disease duration (OR= 2.3; 95% CI 0.4-1.1) predicts a high risk for dysphagia in MS patients.

**Conclusion:** Dysphagia is prevalent in Iranian patients with MS. Disability level and disease duration are significant predictors of dysphagia after MS.

**Keywords:** Multiple Sclerosis, Deglutition, Deglutition disorders, Prevalence, MASA

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### Introduction

Multiple sclerosis (MS) is a demyelinating disease of the central nervous system (CNS) in which the insulating covers of nerve cells in the brain and spinal cord are damaged (1). The etiology of the MS is remained unknown; both the genetic as well as the environmental factors play a role (2). MS is one of the most common neurological diseases in the world that appears in young adults, especially females (3, 4). The prevalence of the MS varies widely in different geographic regions of the world (5). Iran has a highest prevalence of MS in the Middle East and Asia. The prevalence of MS in Iran has been increased significantly during recent years (3, 4, 6), ranging from 7.4 to 89 per 100 000 (3). The common clinical symptoms of MS such as weakness, visual disturbances, ataxia, loss of sensation, motor problems, and

speech and swallowing disorders are specifically determined by the locations of the lesions within the nervous system (2).

Dysphagia, defined as any disturbances of the normal swallowing function (7), is frequently observed in MS patients (8-12). For some reasons, such as variability in CNS damage in MS, wide range of disease severity, and different patterns of disease progression, there is potential for abnormality in every aspect of swallowing physiology with wide range of severity in the MS patients (13). Dysphagia increases the risk of dehydration and aspiration pneumonia and decreases quality of life in the patients with MS (7, 11, 14). The above-mentioned complications are causes of morbidity and mortality in the final stages of MS disease (8, 11, 14, 15). Therefore, dysphagia is a serious problem

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#### ↑What is “already known” in this topic:

The prevalence of dysphagia in patients with MS was reported to range from 10% to 90%. Factors like disability level, disease duration, and cerebellar dysfunction are associated with dysphagia in patients with MS.

#### →What this article adds:

Dysphagia is common in Iranian patients with MS. The disability level and disease duration were independent predictors for dysphagia after MS. Therefore, patients with MS, especially, those with high level of disability and longer disease duration should be evaluated for swallowing dysfunction.

in MS disease that needs more attention.

The published literatures have revealed the prevalence of dysphagia ranges from 10% to 90% in MS patients (16-22). Authors have identified some clinical markers, such as disability level associated with dysphagia (19-21, 23). The prognostic factors of dysphagia were only investigated in one study. Calcagno et al. (11) suggested brainstem impairment and disability level as clinical predictors of swallowing disturbances. A recent systematic review on the prevalence of dysphagia in patients with MS found that the included studies were mainly from developed countries, in particular Europe, and suggested further investigation across the world to better figure out the MS-related dysphagia worldwide (12).

Only one study from Isfahan, Iran, investigated the prevalence of dysphagia in 101 MS patients and found that 31% of the participants had dysphagia (20). Neurological disability, cerebellar dysfunction, and disease duration were found to be associated with dysphagia in MS patients (20). There is a dearth of published literature investigating the predictors for dysphagia in patients with MS. The aims of the present study were as follow: (1) to determine the prevalence of dysphagia and its severity, and (2) to identify variables predicting dysphagia in Iranian MS patients.

## Methods

### Participants

A total of 250 patients with an established diagnosis of MS according to McDonald's criteria (24) were included in this cross-sectional study via convenience sampling. The patients were recruited from the MS Clinic of Sina university hospital and MS Research Center of Tehran University of Medical Sciences (TUMS) during August 2015 and January 2016. The patients were excluded if they had relapse in the last 2 months and had comorbidities that resulted in swallowing problems. Finally, 230 patients with MS satisfied all the eligibility criteria and agreed to participate in the study.

This study was approved by MS Research Center and the Ethical Committee of TUMS. Written informed consent was received from all the patients before taking part in the study.

### Procedure

All patients were neurologically assessed by the study neurologist. Age, sex, duration of disease, and MS type were recorded. Kurtzke's Expanded Disability Status Scale (EDSS) was used to quantify the disability of the patients. The Speech and Language Pathologist who was the principal researcher diagnosed the dysphagia and its severity by means of MASA test.

### Instruments

EDSS is a standard neurological test which can categorize MS patients according to their neurological disability. EDSS scores range from 0 representing no disability and 9.5 representing complete disability. The score of 10 represent patients who died due to MS (25).

MASA is a comprehensive simple to use diagnostic test for evaluation of neurogenic oropharyngeal dysphagia (26, 27). It includes 24 items comprising 3 main components. The maximum possible score is 200. It has cut-off criteria for dysphagia and aspiration severity. Each severity level was assigned a numerical value on an ordinal scale rating from 0 to 3 (Table 1) (26). MASA is valid and reliable with sensitivity of 73%, specificity of 89%, and provide good interrater and intrarater reliability (26, 28).

In this study, the reliability of MASA was assessed in advance with 30 patients with MS, and a good interrater ( $k=0.76$ ,  $SE=0.082$ ,  $p<0.001$ ) and intrarater reliability ( $k=0.71$ ,  $SE=0.09$ ,  $p<0.001$ ) was demonstrated.

### Statistical methods

Statistical analysis was performed using SPSS software Version 18.0 (SPSS Inc., Chicago, IL, USA). Prevalence was calculated using percentages of MS patients with oropharyngeal dysphagia. Independent sample t test and chi square test were used to evaluate differences between groups (dysphagic and non-dysphagic). The independent variables included in the analysis were age, gender, disease duration, EDSS, and MS type. Logistic regression model (forward stepwise) was used to calculate the odds ratio (OR) for significant variables predicting dysphagia in patients with MS. Dysphagia as the outcome variable was dichotomous (presence or absence of dysphagia). Moreover, 95% confidence interval (CI) was calculated using standard methods (29). P-value less than 0.05 was considered as significant.

## Results

### Patients

Demographic characteristics and clinical data are presented in Table 2. A total of 230 patients with MS were included in the study, of them, 168 (73%) were female. The mean $\pm$ SD age of the participants was 43.71 $\pm$ 8.7 years (range 26-63 years). The mean $\pm$ SD disease duration was 7.2 $\pm$ 2.9 years (range 2-15.9 years). The mean $\pm$ SD EDSS was 3.04 $\pm$ 1.8 (range 0.0-8.5). Most patients had relapse-remitting MS: 154 (66.9%). The mean MASA score was calculated for all participants: 179.80 $\pm$ 21.27 (range 118-200).

### Prevalence of dysphagia

A total of 85 (37%) patients had dysphagia (95% CI 30.9-43.5). Among dysphagia patients, 17 (20%) had severe dysphagia, 25 (29.4%) had moderate dysphagia, and 43

Table 1. MASA<sup>a</sup> score cutoff for severity groupings of dysphagia and severity rating

Severity Ratings	Severity Groupings	MASA score- Dysphagia
0	Nil abnormality detected	178-200
1	Mild	168-177
2	Moderate	139-167
3	Severe	$\leq$ 138

<sup>a</sup>: Mann Assessment of Swallowing Ability

**Table 2.** Demographic characteristics and clinical data of the participants

	All patients (N= 230)	Dysphagic (N= 85)	Non-dysphagic (N= 145)	p
Age (mean±SD)	43.7 (±8.7)	44.4 (±7.9)	43.3 (±9.2)	0.35
Gender				0.07
Male (%)	62 (26.9%)	24 (28.2%)	38 (26.2%)	
Female (%)	168 (73.1%)	61 (71.8%)	107 (73.8%)	
Disease Duration (years) (mean±SD)	7.2 (±2.9)	8.1 (±2.9)	6.7 (±2.7)	<0.001
EDSS <sup>a</sup> (mean±SD)	3.04 (±1.8)	4.5 (±1.7)	2.19 (±1.1)	<0.001
MS Type				0.45
RR <sup>b</sup> (%)	154 (66.9%)	60 (70.5%)	94 (64.8%)	
PP <sup>c</sup> (%)	13 (5.6%)	4 (4.7%)	9 (6.2%)	
SP <sup>d</sup> (%)	63 (27.5%)	21 (24.8%)	42 (29%)	
MASA Score(mean ± SD)	179.80(±21.2)	157.35 (±19.5)	192.9 (±5.1)	<0.001

<sup>a</sup>: Expanded Disability Status Scale; <sup>b</sup>: Relapse-Remitting; <sup>c</sup>: Primary Progressive; <sup>d</sup>: Secondary Progressive

**Table 3.** Logistic regression between dependent variable (dysphagia) and independent variables

Independent variables	Dysphagia				
	B <sup>a</sup>	SE <sup>b</sup>	p	OR <sup>c</sup>	95% CI <sup>d</sup>
Age	-0.1	0.02	0.09	0.9	-0.1 – -0.04
Gender	-0.76	0.38	0.07	0.4	-1.6 – -0.04
Disease duration	0.31	0.08	< 0.001	2.3	0.4 – 1.1
EDSS score	0.78	0.13	< 0.001	2.1	0.5 – 1.2
MS Type	-0.17	0.19	0.3	0.8	-0.6 – 0.2

<sup>a</sup>: Regression coefficient, <sup>b</sup>: Standard errors, <sup>c</sup>: Odds ratio, <sup>d</sup>: confidence interval

(50.6%) had mild dysphagia (Table 2).

### Predictors of dysphagia

EDSS scores and disability duration were statistically different between the 2 groups of dysphagia and non-dysphagia patients (Table 2). Patients with dysphagia had significantly higher EDSS scores than patients without dysphagia ( $p < 0.001$ ). Also, disease duration was significantly higher in dysphagic group compared to non-dysphagic group ( $p < 0.001$ ).

Logistic regression analysis revealed that disability level (OR= 2.1; 95% CI 0.5-1.2,  $p < 0.001$ ) and disease duration (OR= 2.3; 95% CI 0.4-1.1,  $p < 0.001$ ) were significant predictors of dysphagia (Table 3).

### Discussion

MS is a progressive neurological disease that is associated with sensory and motor dysfunction. Therefore, MS can potentially affect swallowing function. This study investigated the prevalence of MS related dysphagia in a group of Iranian patients with MS using MASA test. MASA as an objective tool was used to evaluate the nature and severity of swallowing dysfunction.

The results of this study showed that dysphagia is a common problem in Iranian MS patients. Also, disability level and disease duration were 2 significant prognostic factors for dysphagia in Iranian MS patients.

In line with recent studies (8, 10-14, 19, 30), our findings confirmed the high prevalence of dysphagia in MS patients. The prevalence of dysphagia in patients with MS reported to be 10% and 90% (21, 22). The wide range of prevalence of dysphagia in MS patients might be explained by differences in the sample size, data collection procedures, and diagnostic tools used for examination. Moreover, the prevalence of MS related dysphagia in our study corroborates previous studies performed in Europe and United States (12, 16).

This study demonstrated that most patients had mild dysphagia (50.6%) similar to the results (40.8%) found by Fernandes et al (21). Indeed, nearly half of the patients with swallowing disorders had moderate to severe dysphagia which indicate that swallowing function of the MS patients needs more attention. Dysphagia in the MS patients should be assessed and treated early to prevent possible complications such as aspiration, pneumonia, and malnutrition (7, 28).

The regression analysis revealed that the disability level was an independent predictor of dysphagia in MS patients. Patients with MS scored high on the EDSS were nearly 2 times more likely to have dysphagia. This result suggests that the MS patients with higher disability are at risk of developing dysphagia. The previous studies (8, 11, 16, 19-22) found a significant association between EDSS score and dysphagia, and the MS patients with dysphagia had high level of disability compared to patients without dysphagia.

In this study, the disease duration was found another predictor for dysphagia in MS patients. The MS patients with longer disease duration were nearly two times as likely to develop dysphagia. Poorjavad et al (20) found significant association between disease duration and dysphagia. These findings indicate that the swallowing problems mostly occur later in the course of the MS disease.

There are some limitations to this study that should be noted. The patients were recruited from two centers which may affect the level of representativity of MS patients. However, Sina University Hospital is the main referral center for MS patients in the largest and capital city of Iran, Tehran, and patients from across Iran are referred to this hospital for diagnosis and treatment of the MS disease.

### Conclusion

This study showed that the dysphagia is prevalent in Iranian patients with MS. The disability level and the disease

duration were independent predictors for dysphagia. Therefore, the patients with MS especially those with high level of disability and longer disease duration should be evaluated for swallowing function and receive appropriate therapy if needed.

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### Conflict of Interests

The authors declare that they have no competing interests.

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