

## RESEARCH ARTICLE

# Validity and reliability of Persian version of activities-specific balance confidence scale in patients with multiple sclerosis

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Received: 13 Dec 2016, Revised: 3 Jan 2017, Accepted: 8 Jan 2017, Published: 15 Apr 2017

### Abstract

**Background and Aim:** Multiple sclerosis is a chronic inflammatory disease of demyelinating lesions in the brain, spinal cord and optic nerve. One of the most debilitating symptoms of multiple sclerosis (MS) patients is impaired balance. Thus in people with MS, collecting information about the impact of impaired balance on life style and the disability which is being perceived by the patient is essential and its information cannot solely be achieved through any of balance and functional tests. The aim of this study was to assess the validity and reliability of Persian version of the Activities-specific Balance Confidence (ABC-P) scale in patients with MS.

**Methods:** A hundred and sixty two patients aged between 20 to 50 years old with MS disorder were examined. To analyze the data, Lawshe method, content validity ratio (CVR), content validity index (CVI), test-retest reliability, and internal consistency reliability were utilized.

**Results:** Intraclass correlation coefficient (ICC), and Cronbach's alpha coefficients were 0.93, 0.97, 0.96 and 0.97, respectively.

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**Conclusion:** ABC-P scale has essential validity and reliability in people who are suffering from multiple sclerosis among Iranian society.

**Keywords:** Multiple sclerosis; reliability; validity; activities-specific balance confidence scale

### Introduction

Multiple sclerosis is a chronic inflammatory disease that is recognized by demyelinating lesions in the brain, spinal cord, and optic nerve [1]. Demyelination lesion is accompanied by progressive destruction of neurons in several CNS areas [2,3]. Nearly more than two million people are involved with multiple sclerosis (MS) around the world. It is now estimated by MS society that there are about 400000-450000 MS patients in the United State of America [4]. The studies in Iran have been reported that the prevalence rate of MS in southeast Iran is about 13.96 in every 100000 [5]. Several studies have indicated that the balance problem is one of the most disabling symptoms of MS disease [6,7]. In other words most of these people complain about symptoms associated with balance disorder. Additionally, it is said that in 20% of cases dizziness and vertigo are the first symptoms in MS and 80% of cases experience these symptoms during their sickness [8,9]. Therefore, it seems necessary to gather information

about the effects of the balance disorder on lifestyle in patients and their perceived disability, which is not achievable by any of the functional and balance tests [10]. In order to gather this information, self-assessment questionnaires are useful tools to be used as patients' tasks [11]. The Activities-specific Balance Confidence (ABC) questionnaire is one of the several questionnaires that have been studied on MS patients and its psychometric results have been reported as outstanding, it was introduced by Myers and Powell (1995) in Waterloo University in Ontario, Canada. This questionnaire aims to assess perceptions of the patients (especially in the elderly with high levels of mobility) from their balance confidence (directly) and fear of falling (indirectly). This questionnaire has been translated into Persian and its psychometric properties were determined by Hassan et al. [12]. Also, it has been used in different studies for evaluation of the balance confidence in MS patients and has been translated into different languages and standardized for various groups [13-23]. In all of the studies, it is showed that in terms of validity and reliability ABC is one of the best available questionnaires for evaluating the balance disorder [24,25].

The purpose of this study was to determine the validity and reliability of ABC in Persian speaking patients with MS.

### Methods

This descriptive study is a psychometric tool and the validity and reliability of ABC-P was examined on patients with MS. The samples were selected in a simple and non-randomized and according to the inclusion criteria and a neurologist confirmation, subjects were chosen from among the patients who referred to MS clinic of Sina Hospital in Tehran.

The inclusion criteria were: age range of 20-50 years, diagnosis of MS with  $0 \leq$  disability state scale (Expanded EDSS)  $\leq 6$  index, willingness to participate in the study, lack of cognitive disorders, having the ability to read and write, not using the wheelchair, no history of any other disorder of the inner ear (e.g. Meniere, vestibular neuritis, endolymphatic hydrops, and

other neurologic illness such as Migraine and Parkinson). After obtaining written consent from the patients, sufficient instruction about the aim and steps of completing the questionnaire were presented to patients. Four of 166 participants were removed from the study due to their incomplete forms. Finally, answers of 162 patients were statistically analyzed. It should be mentioned that only 38 subjects returned their completed questionnaire within one week.

The participants were asked to respond to the ABC-P questionnaire during the 16 activities with various difficulty levels from a scale of 0 (no confidence) to 100 (full of confidence) [12,26]. The ABC-P questionnaire comprises of 16 questions without any subscale that is classified from 0 to 100. The score of zero means that individual's prognosis is that he/she will not be able to do that activity, whereas the score of 100 means complete confidence of doing the activity without losing the balance. The final score will be considered as the mean of the total score of the questionnaire. The minimum and maximum scores are related to balance and fear of falling, respectively. The results are classified as follow: the score above 80 is considered high potential in doing physical activity, 50-80 means moderate, and less than 50 represents low physical activity. For prediction of fear of falling score of 67 is likely to be acceptable [12]. Researchers used the quantitative method for content validity i.e. the two coefficients of the content validity ratio (CVR) and content validity index (CVI).

With regard to the present study, to determine CVR, first a panel of 10 experts was requested to check each item on the basis of the whole triplex (including "it is necessary", "useful but not necessary", "not necessary"). Afterwards, responses were calculated by CVR. If CVR is more than 0.62, the content validity of that item is acceptable. Based on the number of experts who determine the content validity, the acceptable value for every item is different. The value of 0.62 is the minimum score which is acceptable in this study. In order to evaluate CVI, three criteria including simplicity, particularity, and clarity were separately studied by 8 experts in a four-part range for each item. The accepted

**Table 1. Demographic information of the patients with multiple sclerosis (n=162)**

	Level	Number	Percent
Types of multiple sclerosis	Relapsing-remitting	135	83.3
	Primary progressive	7	4.3
	Secondary progressive	20	12.3
Expanded disability state scale (EDSS)	Mild (0-3.5)	117	72.2
	Moderate (4-6.5)	45	27.8
Familial history	Yes	24	15.6
	No	130	84.4
Falling history	Yes	56	34.6
	No	106	65.4

items were higher than 0.79 according to the CVI [27].

The data were analyzed by SPSS 18, and the CVR, CVI and test-retest reliability by intra-class correlation (ICC) and internal consistency reliability were assessed using Cronbach's alpha, with significance level of 0.05.

### Results

The ABC-P questionnaire was conducted on 162 participants with MS. The age range of subjects was 20-50 years old with mean and standard deviation of  $33.76 \pm 7.20$  years old (Table 1).

To evaluate the ABC-P distribution scale score in patients with MS, we used descriptive statistical measures such as median, mean and SD, minimum and maximum (Table 2).

However, in this study for evaluating the

content validity quantitatively, the Lawshe method was used. This means that CVR was between 0.8 and 1 for each item (1 to 16) and the total value was 0.93. Also, based on three index specificity of CVI (mentioned above) result of each item of the questionnaire was 0.87 to 1, with total value of 0.97 (Table 3). Therefore, ABC-P had a good content validity for MS patients.

Considering that only 38 of 162 patients returned their completed questionnaire, in order to calculate the reliability, we used test-retest (of both rounds) with intraclass correlation coefficient (ICC). That showed significant correlation (ICC=0.96,  $p < 0.05$ ) between two scores. The least and most values of ICC were 0.75 and 0.96, respectively. These coefficients indicate high reliability of ABC-P (Table 4).

We used Cronbach's alpha index to evaluate the

**Table 2. Descriptive statistics of the Persian version of activities-specific balance confidence (ABC-P) total scores in patients with multiple sclerosis**

	Mean (SD)	Median	Minimum	Maximum
Total score	76.52 (24.67)	85.31	5.62	100

**Table 3. Content validity index (CVI) and ratio (CVR) for each item in Persian version of activities- specific balance confidence (ABC-P) in patients with multiple sclerosis**

Item	CVI			CVI of the scale	CVR
	Comprehensiveness	Charity	Simplicity		
1	1	1	1	1	1
2a	1	1	1	1	1
2b	1	0.875	1	0.958	1
3	1	1	1	1	0.8
4	0.875	0.875	0.875	0.875	0.8
5	1	0.875	0.875	0.916	1
6	1	0.875	1	0.958	1
7	1	1	1	1	0.8
8	1	1	1	1	0.8
9a	1	1	1	1	0.8
9b	1	1	1	1	1
10	1	1	0.875	0.958	0.8
11a	1	1	1	1	1
11b	1	0.875	1	0.958	1
12	1	1	1	1	1
13	1	0.875	1	0.958	1
14a	0.875	1	1	0.958	1
14b	1	0.875	1	0.958	0.8
15a	1	0.875	1	0.958	1
15b	1	0.875	1	0.958	1
16	1	0.875	1	0.958	1
<b>Total</b>	0.988	0.940	0.982	0.970	0.933

internal consistency reliability of all the ABC-P items. The item-scale correlation coefficient of all items was between 0.69-0.89, this amount was 0.97 for ABC-P. Cronbach's alpha index is more than 0.8 which indicates that this scale is desirable for this study. We have also noticed that by omitting an item, results does

not change and Cronbach's alpha index for all items was 0.97. The correlation coefficient item-scale was not less than 0.69. According to these findings, none of the ABC-P items were non-heterogeneous; therefore, VBC-P scale is a valid and reliable tool to be used on MS patients.

**Table 4. Intraclass correlation (ICC) coefficient of the Persian version of activities-specific balance confidence (ABC-P) in patients with multiple sclerosis**

Item	ICC	95% confidence interval		p
		Lower	Upper	
Total score	0.96	0.93	0.98	<0.001

### Discussion

The obtained results of ABC-P questionnaire in this study showed a desirable validity and reliability of this scale for patients with MS. The ICC (0.96) in ABC-P shows good validity, and also Cronbach's alpha coefficient (0.97) indicates a high correlation between ABC-P items.

In the research conducted by Myer and Powell [26], participants had to score in percentage their confidence in keeping balance during each activity. Results indicated that the original version has excellent internal consistency with Cronbach's alpha of 0.96, and high validity of test-retest ( $r=0.92$  and  $ICC=0.85$ ) that is consistent with the findings of our study. Other studies such as Jang et al. [14], Botner et al. [21], karapolato et al [6], on different populations also confirmed the desired validity of the ABC questionnaire.

In the study of Hassan et al. [12], which was conducted to evaluate the reliability of the Persian version on the elderly, their research was approved with internal consistency reliability with Cronbach's alpha of 0.96, and test-retest validity of 0.97, therefore, the Persian version of ABC have a high validity and reliability and it can be a useful tool for evaluating the balance confidence in different studies among Iranian population. In the investigation conducted by Cattaneo et al. [28] validity and reliability of ABC were evaluated on 25 patients with secondary progressive MS (8 males and 17 females) by mean age of 41.7 years old. They were able to walk a distance of six meters with or without the use of an assistive device. The

obtained ICC value was between 0.94-0.96 with the validity between 0.85-0.96. Therefore, the balance test was acceptable and it was consistent with our findings.

To evaluate the reliability of the ABC questionnaire on patients with MS (EDSS:1-6) with balance disorder, Nilsagard et al. [29] studied on 84 patients with MS examining different aspects. They obtained internal consistency of the Swedish version with Cronbach's alpha coefficient 0.95 and correlation between 0.30 and 0.83. It was concluded that the ABC reliability for MS is mild to moderate.

In the present study, the ABC-P scores were assessed from two different aspects. Validity was evaluated through measurement of ABC-P twice by one week interval. ICC of repeatability for items were 0.75-0.96 and for total scores was 0.96 that indicate a high reliability. These findings are also consistent with findings of other studies.

As mentioned above, Cronbach's alpha coefficient of the ABC-P was 0.97 in this study that is very close to other researches' findings. It shows suitable homogeneity in questions of the ABC scale and we can evaluate the balance confidence level of the patients with MS, reliably.

As shown in Table 3, the mean level of perceived balance confidence in patients with MS was 76.52 (with the score range of 5.62-100). The highest average (87.53) was related to question 4 (how is your confidence to lose your balance when trying to take a small jar from the shelf at the level of your vision?), and the least score (64.88) relates to question 16 (how is your confidence that you do not lose your balance

when you are walking on a wet or slippery pavement?). The score of 67 has been reported for falling [12].

As mentioned earlier, the ABC scale comprises of 16 questions without any subscore and is categorized from 1 to 100. Based on the Meyer et al. [30], the ABC scores were classified in three groups: more than 80 (high ability in terms of physical performance), 50-80 (moderate ability), and less than 50 (weakness). According to their category the mean of the balance confidence level shows moderate physical performance in MS patients.

### Conclusion

Considering the results obtained in this study, the ABC-P is a reliable and valid scale in MS patients among Iranian population. CVR value for 1-16 items is between 0.80-1 with total value of 0.93, and CVI was from 0.87 to 1, with total value of 0.97 that indicates clarity and simplicity of the ABC-P scale questions for MS patients. Hence, it shows desirable content validity. The ICC for ABC-P is 0.96 that shows suitable validity. Internal consistency with 0.97 Chronbach alpha coefficient indicates high correlation among items of ABC-P scale in Multiple Sclerosis patients.

### Acknowledgements

This paper is extracted from S. Salarifar's MSc thesis with No. 263 in Audiology submitted in Shahid Beheshti University of Medical Sciences, Tehran, Iran.

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