

Validity and Reliability of the Turkish Version of the Patient-Reported Impact of Spasticity Measure in Multiple Sclerosis

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ABSTRACT

BACKGROUND: We aimed to evaluate the validity and reliability of the Turkish version of the Patient-Reported Impact of Spasticity Measure (PRISM-TR).

METHODS: Expert opinions and the forward-back translation method were used for linguistic validation. Cronbach α and test-retest analysis were performed for reliability analysis. Correlations between the PRISM-TR and the Modified Ashworth Scale (MAS), the Numerical Rating Scale (NRS), and the Expanded Disability Status Scale (EDSS) were assessed.

RESULTS: A total of 206 individuals with multiple sclerosis (MS; 139 women; mean age, 47.7 ± 11.3 years; mean EDSS score, 5.2 ± 1.5) who had not had a relapse in the previous 3 months were included in the study. Test-retest correlation coefficients were high for all subdimensions of the scale (0.95-0.99). All Cronbach α values for the PRISM-TR subdimensions, except for Positive Impact, were likewise quite high (0.85-0.94). PRISM-TR subscale scores were correlated with MAS, NRS, and EDSS scores ($P < .001$).

CONCLUSIONS: PRISM-TR is a valid and reliable scale for use with Turkish individuals with MS. It is simple to use in the clinic and can be helpful in detecting patients' spasticity early in the disease course.

Int J MS Care. 2024;26:194-198. doi:10.7224/1537-2073.2023-056

Multiple sclerosis (MS) is a chronic, demyelinating illness that progresses with attacks.¹ Spasticity is seen in 80% of people with MS and causes the most disability.^{2,3} It is characterized by an increased muscular tone that results in stiffness, pain, and mobility restriction.⁴ Depending on the location and size of MS lesions, spasticity may affect the lower-extremity muscles in particular, and spasticity may vary from day to day.^{5,6} Spasticity can cause social isolation and depression by causing gait disturbances, falls, fatigue, sleep disturbances, and pain in people with MS. Although health care professionals generally consider spasticity to be an increase in muscle tone, spasticity for patients is multidimensional. Therefore, providing a holistic perspective with a biopsychosocial approach is important in terms of managing spasticity and increasing quality of life.^{3,5,7,8}

In practice, the evaluation of spasticity requires a comprehensive clinical evaluation that also addresses the patient's perception of spasm, pain associated with spasticity, and other associated symptoms. To evaluate spasticity, clinicians most frequently use the Modified Ashworth Scale (MAS), a basic and useful scale; however, MAS cannot be used to measure the extent to which the patient's activities or quality of life are impaired by spasticity.³ Other patient surveys are essential for assessing well-being and understanding the patient's perspective. The Multiple Sclerosis Spasticity Scale was created by Hobart et al to assess how spasticity impacts the patient's everyday life.⁹ This scale has numerous components and focuses solely on negative spasticity-related symptoms. Spasticity can compromise mobility, posture, and bladder control, but it also facilitates standing upright to execute activities such as walking and transferring.^{8,9} Therefore, the Patient-Reported Impact of Spasticity Measure (PRISM) was developed to evaluate the positive and negative effects of spasticity easily and quickly.¹⁰ Validity and reliability assessments of PRISM have been conducted for English and Serbian.^{10,11} The aim of

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this study was to evaluate the validity and reliability of the Turkish version of the PRISM scale for patients with MS.

METHODS

Research Design, Sample, and Setting

The study was conducted in the MS outpatient clinic of Istanbul University Faculty of Medicine between August 2019 and August 2020. It is generally recommended that the sample size for cultural adaptation studies of scales be at least 5 times the number of items so that psychometric analysis can be conducted.¹² Since there are 41 items in the scale, 206 patients seen at the clinic were included in the study. Patients were included if they had a definite diagnosis of MS for at least 1 year (based on the 2017 McDonald criteria), were at least 18 years of age, spoke Turkish, and had been relapse-free for the previous 3 months.

Data Collection

PRISM was administered in a face-to-face interview and readministered 1 to 2 weeks later. The data were collected in the hospital outpatient clinic setting.

Ethics approval was obtained from the Clinical Research Ethics Committee of the Istanbul Faculty of Medicine (approval number 2018/777). Before enrollment, patients gave consent for participation in the study. We also obtained written permission for adaptation from the authors of the scale.

Data Collection Tools

Patients submitted demographic information and took the PRISM-TR. The Numerical Rating Scale (NRS) and MAS were used to evaluate construct validity.^{13,14} In addition, the relationships between the PRISM-TR and the EDSS and sociodemographic and clinical features were investigated.

PRISM-TR. A self-report measure originally developed to evaluate the effect of spasticity on quality of life in people with spinal cord injuries,¹⁰ the measure has 41 items and 7 subdimensions (ie, social avoidance, psychological agitation, daily activities, need for intervention, positive impact, need for assistance, and social embarrassment). Answers are given on a 5-point Likert scale with each item scored between 0, *never*, and 4, *very often*. The scale does not have a cutoff score, and the score obtained from each subdimension shows the extent of the impact of spasticity on that subdimension. As the score increases, the impact of spasticity increases.

NRS. A clinician-administered measure, patients are asked to indicate the level of muscle stiffness that they have experienced over the past 24 hours using a numerical rating scale from 0, *no spasticity*, to 10, *worst possible spasticity*.¹³

MAS. This scale assesses muscle hypertonia in knee extensors (range 0-4) bilaterally and the highest score was used for analysis.¹⁵ The Turkish validity of this scale was confirmed by Akpınar et al.¹⁴

EDSS. Developed by Kurtzke et al¹⁶ to assess MS-related neurological disability, the EDSS score is calculated by evaluating pyramidal, cerebellar, brain stem, sensory, visual, bowel-bladder, and mental functions. The total score range is 0 to 10;

PRACTICE POINTS



Spasticity-related experiences impact disease treatment outcomes for individuals with multiple sclerosis (MS).

The Patient-Reported Impact of Spasticity Measure Scale-Turkish is the first self-reported measure in Turkish on spasticity experiences for people with MS and is a reliable and valid evaluation of the impact of spasticity. ■

higher scores indicate greater disability. The Turkish version of the EDSS is used routinely in MS clinics.

Statistical Analysis

SPSS Statistics version 21.0 (IBM Corp) software was used for statistical analysis. The normal distribution of the data was evaluated by the Kolmogorov-Smirnov test ($P > .05$). Skewness and kurtosis values were found to be between -1 and 1. If the distribution did not conform to a normal distribution, nonparametric tests were employed. Descriptive statistics, Cronbach α values, Spearman correlation, and intraclass correlation (ICC) analyses were used. The results were evaluated with a CI of 95% and a significance level of $P < .05$.

Linguistic Validation

As the first step of the validity study, the scale was translated from English to Turkish by 2 individuals who worked separately.¹² Then 2 MS experts reviewed these 2 translations, and the questions were finalized by consensus. This combined translation was then reviewed by a panel of 10 experts. The Davis method (*Applied Nursing Research*, 5[4]: 194-197) was used for the content validity analysis of the scale. The content validity questionnaire provided a place for experts to rate each item on its relevance to each particular dimension on a 4-point scale: 1, *not relevant to the item*; 2, *unable to assess relevance without revision of item*; 3, *relevant but needs minor alteration*; and 4, *relevant to the item*. In addition, experts were asked to make comments on any item regarding how to make it clearer or how to make it fit better within its subdimension. The content validity index was obtained by dividing the sum of the experts' 3- and 4-point ratings by the total number of experts.¹⁷ The scale's content validity index was calculated as 0.95. Finally, the scale was retranslated into English and this was compared with the original English scale. It was sent to the author who created

the scale for feedback. To better understand some of the items (eg, items 23, 25), the researchers who developed the scale were consulted. Because the expression “Over the past week, my abnormal muscle control or involuntary muscle movement made me feel powerless” (item 23) is perceived as physical weakness (muscle strength) in Turkish, the word *emotional* was added to this item. We also removed *encouragement* from item 25—“Over the past week, my abnormal muscle control or involuntary muscle movement made me want encouragement or emotional support from friends and family”—to make the sentence shorter and more easily understood. The scale was finalized after being tested on a sample of 10 patients.

RESULTS

Sociodemographic and Clinical Characteristics

The mean age of the 206 patients interviewed was 47.7 ± 11.3 years. The majority were women (67.5%). Mean MS duration was 17.2 ± 10.6 years and mean EDSS score was 5.2 ± 1.5 . Mean MAS score was 2.4 ± 0.9 and mean NRS score was 5.4 ± 2.1 (TABLE 1).

PRISM Reliability

A total of 191 patients completed the test and retest sessions and answered all questions without asking for clarification. The patients' results between the first and second interview were correlated (TABLE 2).

The Cronbach α coefficient was used to assess internal consistency (also known as reliability), which is defined as the interrelationship among the scale's items. The Cronbach α coefficient was greater than 0.84 for all PRISM-TR subscales (except for positive impact). In the test-retest analysis, the Spearman correlation coefficients ranged from 0.98 to 0.99. The patients obtained the highest scores on the social avoidance subdimension (Table 2).

Cronbach α was calculated for the test and retest sessions of each PRISM-TR subscale separately; a Cronbach α of more than 0.9 was considered excellent internal consistency, 0.8 to 0.9 was good, 0.7 to 0.8 was acceptable, 0.6 to 0.7 questionable, and 0.5 to 0.6 poor.¹⁸ The ICC was computed using a 2-way mixed model for absolute agreement. The single-measure ICC was reported and interpreted as poor (< 0.40), moderate (0.40-0.59), good (0.60-0.74), and excellent (≥ 0.75) (TABLE S1).¹⁹

Construct Validation

The construct validity of a scale can be assessed by examining its relationship with other validated instruments.¹⁸ For this purpose, PRISM-TR scores were compared with scores of the MAS, EDSS, and NRS, and significant moderate to strong correlations between the scales were observed ($P < .001$). The exception was the positive impact subscale, which showed weak correlations with other scales (TABLE S2).

For further validation, the relationships of PRISM-TR scores with sociodemographic and clinical characteristics were evaluated. No correlations were found between PRISM-TR scale subdimensions of Daily Activities, Need for Assistance, Positive Impact, or Need for Intervention and age or disease duration.

TABLE 1. Sociodemographic and Clinical Characteristics

	n (%)
Sex	
Male	67 (32.5)
Female	139 (67.5)
Education	
Primary school	96 (46.6)
High school	59 (28.6)
University and above	51 (24.8)
Employment	
Employed	63 (30.6)
Homemaker	97 (47.1)
Student	3 (1.5)
Retired	34 (16.5)
Unemployed	9 (4.3)
Income	
More than expenses	8 (3.9)
Equal to expenses	153 (74.3)
Less than expenses	45 (21.8)
Marital status	
Single	48 (23.3)
Married	141 (68.4)
Divorced/widowed	17 (8.3)
Uses an assistive device	
Yes	122 (59.2)
No	84 (40.8)
Age (mean \pm SD)	47.67 \pm 11.25
MS duration (mean \pm SD)	17.14 \pm 10.64
EDSS (mean \pm SD)	5.24 \pm 1.48
MAS (mean \pm SD)	2.39 \pm 0.92
NRS (mean \pm SD)	5.39 \pm 2.11

EDSS, Expanded Disability Status Scale; MAS, Modified Ashworth Scale; MS, multiple sclerosis; NRS, numerical rating scale.

DISCUSSION

Spasticity is one of the most common symptoms of MS, making it difficult for patients to perform activities of daily living and reducing their quality of life.²⁰ PRISM is a scale that was developed to assess the degree to which spasticity impacts the quality of life of people with MS.¹⁰ This study aimed to adapt the PRISM Scale to the Turkish language. The first step of scale validation is testing linguistic validity.¹² In our study, the linguistic validity of the scale was confirmed using forward-backward translation and an expert panel. Following linguistic validation, the relationships of the PRISM-TR with the MAS, NRS, and EDSS scales were examined to evaluate construct validity. The MAS and NRS scales, which measure the severity of spasticity, were found to be correlated with

TABLE 2. Descriptive Statistics and Test-Retest Correlations of PRISM-TR Scale

PRISM subscales	Mean \pm SD	Range	Test-retest	
			r	P
Social avoidance	21.15 \pm 10.16	0-44	0.993	<.001
Psychological agitation	10.46 \pm 4.83	0-20	0.989	<.001
Daily activities	11.50 \pm 6.47	0-24	0.987	<.001
Need for assistance	8.78 \pm 5.06	0-20	0.984	<.001
Positive impact	12.62 \pm 2.93	0-16	0.949	<.001
Need for intervention	8.48 \pm 4.47	0-20	0.984	<.001
Social embarrassment	9.75 \pm 4.82	0-20	0.994	<.001

PRISM-TR, Patient-Reported Impact of Spasticity Measure-Turkish.

PRISM-TR. Similarly, we found a strong correlation between the scale and the EDSS. Numerous studies reporting a strong positive correlation between spasticity and physical disability support our findings.²¹

We also assessed the association of PRISM-TR with sociodemographic and clinical variables to support the construct validity of the scale. When PRISM-TR subscale dimension mean scores were evaluated for sociodemographic factors (eg, age, sex, MS duration), no significant difference was found. Given the progressive nature of MS, the longer the disease duration, the more a patient or clinician can expect an increase in spasticity or physical impairment.²²

PRISM-TR reliability was evaluated by the Cronbach α and test-retest analysis. The scale lacked a total rating, but when the subdimension scores were analyzed, patients had the highest ratings on the social avoidance subdimension. Patients may withdraw from socialization as spasticity restricts their movements, and they perhaps become worried about trauma or falling. Although almost all the subdimensions measure the negative effect of spasticity, there is also a subdimension that is reverse coded and evaluates whether it has a positive effect. The high mean score of the positive effect subdimension in this study indicates that the patients in our sample did not see spasticity as a symptom with a positive effect. Although spasticity has a function that facilitates walking and standing for some patients, it is seen by most patients as a factor that causes gait disturbance, falls, fatigue, and pain.²³ Similar results in the study by Knezevic et al¹¹ support our findings.

The Cronbach α coefficient is one of the most common methods used to assess the reliability of a Likert-type scale. For a scale to have adequate internal consistency, a Cronbach α value of greater than 0.70 is recommended.²⁴ The Cronbach α values of the PRISM-TR subdimensions are between 0.74 and 0.96 for the original version, 0.78 and 0.93 for the Serbian version, and 0.59 and 0.94 for the Turkish version. In our study, Cronbach α coefficients for all subdimensions were high (0.85-0.94) except for the Positive Impact subdimension. Other studies of the scale have found the Cronbach α coefficient of the positive effect subdimension to be less than that of the other subdimensions.^{10,11} This could be because the patients did not perceive spasticity as a positive factor

or because they had difficulty understanding the questions. Therefore, we recommend a brief explanation of this issue be added to the scale's instructions.

The strong test-retest correlation results obtained in our study also support the reliability of the scale; studies of the original version of the scale and other versions yield comparable results.

This study also found that the psychometric properties of the Turkish version of the PRISM scale were sufficient. Scales are used in the clinic by medical experts to determine the degree and severity of spasticity in individuals. There isn't a scale that measures how spasticity affects quality of life. This scale, which we adapted, shows how the patient's quality of life can be negatively affected by spasticity. Determining a patient's spasticity level is the first step in determining what interventions can be taken to address it.

Our study has a few limitations. Some clinical characteristics were not addressed in our study, including MS subtype and symptomatic treatments for spasticity. Confirmatory factor analysis could not be performed. In addition, no measure was used to assess quality of life. Therefore, we recommend that measurements of these clinical features be considered for future studies. ■

CONFLICT OF INTEREST: The authors declare no conflicts of interest.

FUNDING/SUPPORT: The authors received no funding for this paper.

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TABLE S1. Internal Consistency and Test-Retest Reliability for PRISM-TR Subscales

PRISM-TR subscale	Internal consistency Cronbach α		Test-retest ICC	
	Test	Retest	Observed	95% CI
Social avoidance	0.941	0.941	0.992	0.990-0.994
Psychological agitation	0.889	0.847	0.994	0.985-0.991
Daily activities	0.919	0.924	0.993	0.982-0.990
Need for assistance	0.858	0.851	0.992	0.979-0.988
Positive impact	0.594	0.593	0.974	0.933-0.962
Need for intervention	0.853	0.841	0.992	0.978-0.988
Social embarrassment	0.892	0.892	0.997	0.991-0.995

ICC, intraclass correlation coefficient for agreement; PRISM-TR, Patient-Reported Impact of Spasticity Measure-Turkish.

TABLE S2. Correlations Between the PRISM-TR and MAS, NRS, and EDSS Scores

PRISM subscale	MAS		NRS		EDSS	
	r	P	r	P	r	P
Social avoidance	0.621	<.001	0.685	<.001	0.565	<.001
Psychological agitation	0.586	<.001	0.690	<.001	0.512	<.001
Daily activities	0.671	<.001	0.691	<.001	0.629	<.001
Need for assistance	0.632	<.001	0.681	<.001	0.585	<.001
Positive impact	-0.344	<.001	-0.381	<.001	-0.390	<.001
Need for intervention	0.630	<.001	0.625	<.001	0.570	<.001
Social embarrassment	0.591	<.001	0.611	<.001	0.519	<.001

EDSS, Expanded Disability Status Scale; MAS, Modified Ashworth Scale; NRS, numerical rating scale; PRISM-TR, Patient-Reported Impact of Spasticity Measure-Turkish.