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Multiple Sclerosis Walking Scale-12, translation, adaptation and validation for the Persian language population

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ABSTRACT

The Multiple Sclerosis Walking Scale-12 (MSWS-12) is a multi-item rating scale used to assess the perspectives of patients about the impact of MS on their walking ability. The aim of this study was to examine the reliability and validity of the MSWS-12 in Persian speaking patients with MS. The MSWS-12 questionnaire was translated into Persian language according to internationally adopted standards involving forward-backward translation, reviewed by an expert committee and tested on the pre-final version. In this cross-sectional study, 100 participants (50 patients with MS and 50 healthy subjects) were included. The MSWS-12 was administered twice 7 days apart to 30 patients with MS for test and retest reliability. Internal consistency reliability was Cronbach's α 0.96 for test and 0.97 for retest. There were no significant floor or ceiling effects. Test-retest reliability was excellent (intraclass correlation coefficient [ICC] $_{agreement}$ of 0.98, 95% CI, 0.95–0.99) confirming the reproducibility of the Persian MSWS-12. Construct validity using known group methods was demonstrated through a significant difference in the Persian MSWS-12 total score between the patients with MS and healthy subjects. Factor analysis extracted 2 latent factors (79.24% of the total variance). A second factor analysis suggested the 9-item Persian MSWS as a unidimensional scale for patients with MS. The Persian MSWS-12 was found to be valid and reliable for assessing walking ability in Persian speaking patients with MS.

1. Introduction

Multiple sclerosis (MS) is a debilitating, neurodegenerative, and disabling disease of the central nervous system (CNS), which affects a wide range of body systems including neuromuscular, motor, and cognitive systems. Prevalence of MS is high all around the world. An estimated 2.5 million people are affected worldwide [1]. The period prevalence of MS in Isfahan, Iran was reported 35.5 per 100,000 [2]. A systematic review on the epidemiology of MS in Iran found incidence data from 0.68 to 9.1/100,000 per year, and prevalence from 5.3 to 74.28/100,000 with higher prevalence in females (female/male ratio, 1.8–3.6) [3]. In the United States, approximately 400,000 people have MS with an annual cost estimation of $6.8 billion [4,5].

The cause of MS is not known but it is regarded as multifactorial with a combination of autoimmune, environmental, and geographical factors. The most common symptoms observed in patients with MS are muscle spasticity, muscle weakness, fatigue, sensory impairments, and walking problems. It has been documented that 80% of patients with MS experience walking problems [6]. Walking is important for physical functioning in activities of daily living and social participation. The limitation in walking ability over time is one of the greatest concerns of patients with MS [7]. Therefore, it is important to measure walking limitations accurately in patients with MS using rigorous, valid and reliable measures.

There are a number of walking measures (both self-report and directly examined) to quantify gait impairments in MS. These scales are not without limitations [8,9]. Studies indicate that the Kurtzk Expanded Disability Status Scale (EDSS) [10] is cumbersome to administer, and has low sensitivity, poor reliability, and is not responsive to change [11]. The Hauser Ambulation Index (HAI) [12] is easier to use than the EDSS but has a low responsiveness to change [8]. The Rivermead Visual Gait Assessment (RVGA) can quantify the gait pattern objectively but it takes a relatively long time to score and needs a clinician with experience in gait assessment [13]. Timed walk tests are objective instruments to measure walking performance quantitatively. Although these measures may seem simple they are not disease specific, and

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only assess the given distance, and walking speed [14]. Furthermore, they can have a floor effect [the Timed 25-Foot Walk (T25FW)] [15,16], require a walkway of sufficient length [the 6-Minute Walk (6MW) Test] [17] or a specific test field and setup [(the Six Spot Step Test (SSST)] [18], and the time needed to complete the test may not just measure walking ability [Timed Up and Go (TUG) test] [19].

One suitable measure used commonly for assessing walking ability in MS is the Multiple Sclerosis Walking Scale-12 (MSWS-12). The MSWS-12 is a multi-item rating scale that considers the perspective of patients about the impact of the disease on their walking ability. The MSWS-12 has been reported as a reliable, valid, and responsive patient-based measure of walking ability in patients with MS [9,20,21]. The MSWS-12 has good psychometric properties and when combined with a short administration time have made it a useful, practical tool for evaluation of walking ability in clinical and research settings [8].

Using the MSWS-12, patients are asked to rate how much MS has impacted their ability to walk, run, climb stairs, balance in standing or walking, and how much support they need while walking in the past two weeks. Aspects of walking such as distance, effort needed when walking, gait smoothness, and concentration needed while walking are also incorporated. The limitation in walking is graded from 1 (not at all) to 5 (extremely) and a total score from 0 to 80 is calculated [patient's score – 12 (minimum score possible)/60 (the maximum score) × 100], which high scores indicate greater impairment in walking. In addition the summed score of all 12 items may be reported with a possible range of 12–60.

English scales such as MSWS-12 must be cross-culturally adapted and psychometrically tested before use in clinics or research in non-English speaking countries. This ensures the equivalence between the original tool and target adapted version, thus maintaining content validity of the instrument [22].

The MSWS-12 is available in Swedish [23], Brazilian [24], and Brazilian Portuguese languages [25]. Since the original MSWS-12 is in English, the instrument needs to be translated and adapted into Persian language to be used in the Persian population. The aim of the present study was to translate and adapt the MSWS-12 into the Persian language for patients with MS.

2. Materials and methods

2.1. Design

This study used a cross-sectional design to cross-culturally adapt a self-administered outcome questionnaire. The study protocol was approved by the Research Council of Rehabilitation, School of Rehabilitation, and the Ethical Committee of Tehran University of Medical Sciences (TUMS). All patients gave their informed consent prior to participation.

2.2. Patients

Patients diagnosed with MS were included in the study if they had the following criteria: (1) age ≥18 years; (2) stable MS; and (3) able to read and write. Patients were excluded if they had: (1) additional neurological diseases such as stroke; and (2) did not wish to participate in the study.

2.3. Translation and adaptation

A standard procedure for the process of cross-cultural adaptation of patient-reported questionnaires was followed to translate and adapt the MSWS-12 [22]. The stages involved were:

(1) Forward translation into the target language of Persian by two translators.
(2) During a meeting with the two translators and three physiotherapist experts in neurological rehabilitation, the translations and the original English version were reviewed to resolve discrepancies and synthesize the translation. A consensus version was obtained at this stage.
(3) Back translation was performed by two independent translators without prior medical knowledge blinded to the scale.
(4) An expert committee of 8 individuals (three physiotherapists, a methodologist, and four translators) reviewed all the translations and developed the pre-final version of the scale.
(5) Testing of the pre-final version was performed with 30 patients with MS. Each patient completed the scale, and was interviewed about the meaning and acceptability of the items to ensure the equivalency of the adapted Persian version in a test situation. Patients had no problems with understanding each item of the scale.
(6) Subsequently, the expert committee reviewed all reports and documents, and the final version emerged for further psychometric testing (Appendix).

2.4. Administration of the Persian MSWS-12

Patients with MS were recruited over a 3 month period, from May to July 2012. A sample size of 50 patients was recommended for analysis of construct validity using known group methods [26]. Therefore, an equal number of patients with MS and healthy subjects without neuromuscular pathology were included in the study. The patients were recruited from the Iranian Multiple Sclerosis Society and the University Hospital of Shariati, Tehran, Iran, and completed the Persian MSWS-12 (PMSWS-12). Thirty of these patients were randomly selected from this initial cohort of 50 patients and completed the PMSWS-12 with an interval of 7 days for test-retest reliability. The 50 healthy subjects also completed the PMSWS-12, but did not complete a test-retest measure.

2.5. Data analysis

Independent *t* tests comparing summed items and calculated total score of the PMSWS-12 were used to examine the construct validity using known group methods. Internal consistency was assessed using item to total correlation and Cronbach's alpha. Item to total correlation using Pearson correlations measures the strength of association between an item and the remainder of its scale and correlations of 0.4 or above are considered acceptable [27]; however it is suggested items show a moderate correlation of 0.7–0.9 to insure strong internal consistency [28]. Cronbach's alpha assesses the overall correlation between all items within a scale and values greater than or equal to 0.7 are considered acceptable [28]. The intraclass correlation coefficient (agreement) ($ICC_{agreement}$) (two-way random effects model, absolute agreement) was calculated to measure the test-retest reliability. A minimum ICC of 0.70 is recommended for reliability (≥0.75: excellent; 0.60–0.75: good; and 0.40–0.59: fair) [29]. The floor and ceiling effects were calculated, and values greater than 15% were considered to be significant [26,30]. Before examining the factor structure of the PMSWS-12, the psychometric properties of each item were analyzed. Items were excluded for heterogeneity, if skewness exceeded ±1. Other exclusion criteria were item loadings <0.50 and negative loadings of the items. The factor structure of the PMSWS-12 was analyzed by means of a factor analysis. A principal component analysis with varimax rotation was used to determine the number of extracted factors. An analysis of the Eigen values