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Persian Translation, Internal Consistency and Reliability of Wolf Motor Function Test

Ezzati Kamran (PhD) [1*] , *Salavati Mahyar (PhD)* [2] , *Abdollahi Iraj (PhD)* [3] , *Shakeri Hasan (PhD)* [3] , *Esmaili Kimia (MSc)* [4]

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1. Assistant Professor, Department of Physiotherapy, Guilan University of Medical Sciences, Rasht, Iran
2. Professor, Department of Physiotherapy, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
3. Associate Professor, Department of Physiotherapy, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
4. Physiotherapist

***Corresponding author:**
Assistant Professor, Department of Physiotherapy, Guilan University of Medical Sciences, Rasht, Iran
Email: ez_kamran@yahoo.com

ABSTRACT

Background: Wolf Motor Function Test (WMFT) is used in the assessment of upper extremity motor function in stroke patients. This scale contains 15 items and assesses joint-segment movements and functional tasks.
Objectives: Translation and assessment of internal consistency and reliability of the Persian version of WMFT in Iranian stroke patients.
Materials and Methods: After translation (based on the international quality of life assessment method), the Persian version of WMFT was used in 56 stroke patients. Item-level internal consistency was assessed using Spearman's correlation, reliability in frequent tests using Intraclass Correlation Coefficient (ICC), and internal consistency using Cronbach's alpha coefficient.
Results: Translation was simple in 94.4% of items, and the quality of translation was favorable in 89.7% of cases. A high correlation was observed between the most of items and total WMFT score. Based on ICC, reliability in frequent tests was high (from 0.97 and 0.99). Internal consistency was 0.78 in scores obtained.
Conclusion: The Persian version of WMFT has a favorable reliability for use in the assessment and development of rehabilitation programs for improving functional abilities of upper extremities in Iranian stroke patients.

Keywords: Stroke; Translations; Upper Extremity; Reproducibility of the Results

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Introduction

Stroke is one of the main causes of long-term disability in adults. Disability is indicative of functional constraints caused by motor and functional disturbance and also secondary defects. In other words, a patient that is unable to independently perform essential tasks is considered disable [1].

One of the most common areas that suffer stroke-induced disability is the upper extremities. Impaired upper extremity affects 65% of these patients, and despite recovery in

their overall physical activities, many of these patients experience serious problems in using their hands and arms, which affects their daily activities and social life [2].

In the acute and flaccid phase of the disease, functional ability is lost due to patient's inability to activate muscles with appropriate strength and coordination. However, motor and muscle strength improvement does not necessarily mean the functional use of the arms; many patients, who have enough strength to use hands for grabbing and other functional movement, cannot match it with daily chores [3].

The following issues are very important in the assessment of upper extremity movements: Alignment of segments in relation to one another and motility of upper extremities, movement patterns in the shoulder, elbow, and hands, and ultimately functional use of upper extremities [1]. Although some tools relating to disability, general health and patient satisfaction may be used in assessing upper extremity recovery, functional assessment is the key in the assessment of outcome of treatment provided to improve the daily activity of upper extremities in stroke patients [3,4].

The majority of stroke patients suffer disability, handicap, and poor quality of life. However, it is hard to find a tool that is simple, useful, valid, repeatable, and responsive to assess these problems [1]. Yet, outcome-measuring tools are particularly important, and essential to obtaining necessary information for making health policy decisions [5,6].

Tools used for the assessment of rehabilitation outcomes should have acceptable reliability [5]. A current problem in research among different cultures is that the majority of tools have been developed in English, and there are few tools which have been appropriately translated and naturalized in non-English speaking cultures [5,6].

On the other hand, acceptable reliability of a tool in a language does not ensure its features remaining intact after naturalization into another language. Thus, assessment of psychometric properties of the tool in the new language prior to its reliable scientific use is essential [5,7].

WMFT is one of the commonly used tools in the assessment of upper extremity function in stroke patients [8]. WMFT is not a self-reporting tool, but based on performing movement tasks by patients, which are observed and scored by the therapist. Scales based on practical tests measure individual's abilities in specific situations. WMFT has so far been translated into French, German, and Korean. Hence, being a performance-based scale is not criteria to not translating it into another language [8-10].

It has been found in inter-cultural studies that words have different meanings in different cultures and their equivalents cannot be easily found [6,7]. On the other hand, given the text of WMFT and its different interpretations in translation, the process of translation can affect the psychometric features of the scale [5,8].

Given all the above, translation of WMFT into Persian is essential to outcome-based studies and to creating a common language among rehabilitation specialists in Iran. No study has so far been conducted in Iran on psychometric features of WMFT, thus the present study aims to translate and equate WMFT in Persian, and assess its psychometric features.

Materials and Methods

Study design and patient population

In the present non-experimental methodological study, the test-retest reliability and internal consistency of the Persian version of WMFT was assessed.

Stroke patients in physiotherapy clinics affiliated to University of Social Welfare and Rehabilitation Sciences and also patients in an old people's nursing homes in Tehran, Iran were selected according to non-probability sampling method. Selection criteria included: 1) history of a stroke that happened at least six months before; 2) middle-age and old men and women diagnosed with stroke; 3) Persian speaking and ability to understand verbal instructions; 4) ability to extend wrist, thumb, and two other fingers by 10 degrees; and 5) ability to maintain balance in sitting position. Exclusion criteria were: 1) unwillingness to take part; 2) history of previous arm or hand disability; 3) shoulder and hand pain; 4) cognitive disorders [Mini Mental Status Exam (MMSE) score<24]; 5) medical history of other neurological diseases such as Parkinson disease, multiple sclerosis, and brain trauma. Ultimately, 56 stroke patients took part in the present study and fill the informed consent.

Translation process

In the present study, the standard International Quality of Life Assessment method was used in translation and accommodation of WMFT [5]. Before commencement, written permission was obtained from the original author of WMFT via an e-mail. Translation stages were as follows:

1. Translation from English into Persian: This was performed by two native Persian speaking translators with sufficient experience and expertise in translating English texts (translators 1 and 2) [5,11].
2. The difficulty in all translated sections was determined: Translators 1 and 2 rated difficulty of instructions and advice in WMFT using a 100-point visual scale [11].
3. The first draft of the translated version was prepared: The first draft of translation was discussed and assessed in several meetings with translators 1 and 2 and researchers**.** Given difficult translation cases and suggested alternative terms, an agreement was reached on a Persian translated version [11].
4. The quality of translation was assessed by two other translators (translators 3 and 4): The quality of translation of instructions and advice in WMFT was given a score by translators 3 and 4, who also gave a score on a 100-point scale to instructions, answers, and advice in the Persian version of WMFT.

   Mean quality score less than 90 was considered the criterion for poor translation quality. Translation quality of some instructions, answers, and advice in Persian was deemed poor (based on the above criterion), for which, alternative words and sentences suggested by translators 1 and 2 were used, and the quality of translation was assessed again. This process continued until optimum (or near optimum) translation quality was obtained (mean score between 80 and 90). By the end of this stage, a Persian version that was of optimum quality in

view of all translators was obtained [5,11].

5. To determine face validity of the Persian version of WMFT, it was made available to 15 neuro-rehabilitation specialists, including 2 physicians, 6 physiotherapists, 4 occupational therapists, and 3 nurses.
6. The first Persian version was translated back into English by two native English speaking translators with sufficient experience in translating Persian texts into English (backward translation).
7. The two versions obtained by these translators were compared in the meetings with participation of translators and researchers, and an agreement was reached on a common English version.
8. The version prepared in the previous stage was matched with the original version of WMFT.
9. The English version thus obtained was sent to Wolf SL, and its match with the original `version was checked.

   The above stages eventually led to producing a Persian version of WMFT with satisfactory quality, which was used in the next stages to collect data from participating stroke patients.

Psychometric features of the Persian version of WMFT

WMFT contains 15 items and assesses upper extremity functions in stroke patients through joint-segment movements (items 1 to 6) and functional tasks (items 7 to 15). Patient's higher score indicates his movements are closer to the normal range [8]. Arm functional ability scores range between 0 and 5; where 0 means the limb cannot be used and 5 means close to normal movement. Median of time and sum of the scores are recorded as total score [8,9]. Implementation of WMFT required some equipment, including a medium size box, a 450-gram weight cuff, a drink can, a pencil, a plastic paper clip, a backgammon piece, index cards, lock and key, a standard face towel, a plastic handled basket, a template, a table and a chair, and a chronometer.

Items were carried out according to the following points: First, a template was placed front edge to front edge on the table, and location of each object on the template was drawn. A quiet room was chosen for performing the items by patients, so as to avoid distracting their concentration. All items were explained and shown twice by the examiner, and patients were not allowed to practice beforehand. During performing items, patients were frequently verbally encouraged by the examiner. A maximum time of 120 seconds was allowed for performing each item [8].

Scores obtained from performing items twice with at least two weeks interval between them were assessed in terms of time reliability in frequent tests, and also in terms of internal consistency.

Statistical tests used in the present study included descriptive tests for assessing underlying variables in stroke patients; Shapiro-Wilk test for assessing normal distribution of study variables; correlation test for assessing the linear relationship between score of items and total score (test-level internal consistency); Intraclass Correlation Coefficient(ICC) for assessing relative reliability of tests; and Cronbach's alpha for assessing reliability of scores in terms of internal consistency.

Results

Of the 93 participating patients, 16 were excluded because of cognitive disorders, 11 because of spastic upper limbs, 8 because of disability and old-age, and 2 because of unwillingness to take part. Thus, the following data were obtained by performing Persian version of WMFT in 56 patients, of whom, 27 (48.2%) were women and 29 (51.8%) were men, with mean age of 67.91±11.08 years (Table 1).

Table 1. Central tendency and distribution of variables according to Shapiro-Wilk's test and the results from stroke patients

Variable	Unit	Count	Minimum	Maximum	Range	Mean	Median	Standard deviation	Variance	Shapiro-Wilk test significant level	Distribution
Age	years	56	45.00	90.00	45.00	67.91	66.50	11.08	122.91	0.13	Normal
Age affected	years	56	42.00	84.00	42.00	63.49	63.00	9.93	98.77	0.39	Normal
Duration of disease	years	56	1.00	15.00	14.00	4.47	3.00	3.73	13.95	0.008	Non-normal
Education level	years	56	0.00	16.00	16.00	7.70	8.00	5.61	37.51	0.04	Non-normal

Assessment of quality components of WMFT translation, including clarity, common language, conceptual similarity and overall quality of translation showed favorable clarity of translation in 100 cases (86.2%) and relatively favorable in the rest (13.8%). Favorable use of common language was found in 104 cases (89.63%) and relatively favorable in 12 cases (10.37%). Favorable conceptual similarity was observed in 107 cases (92.46%) and relatively favorable in 9 cases (7.54%). Finally, overall quality of translation was favorable in 107 cases (92.46%) and relative favorable in 9 cases (7.54%).

The relationship of item scores with scores of subscales and total score of the Persian version of WMFT was assessed by constructing a multiple construct and test matrix of correlation coefficient between item scores, relevant subscale, other subscales, and total score of items. Table 2 presents the results from this matrix and correlation coefficient of all items.

Table 2. The matrix of correlation between items of Persian version of WMFT

Item	Correlation with simple joint movement subscale	Correlation with functional movement subscale	Correlation with total score
1	0.48	0.48	0.46
2	0.66	0.59	0.58
3	0.46	0.63	0.44
4	0.78	0.72	0.69
5	0.67	0.60	0.59
6	0.65	0.74	0.66
7	0.60	0.30	0.37
8	0.68	0.76	0.78
9	0.55	0.80	0.74
10	0.56	0.70	0.81
11	0.65	0.68	0.69
12	0.69	0.81	0.82
13	0.78	0.72	0.82
14	0.63	0.70	0.71
15	0.22	0.41	0.42

In the present study, the correlation coefficient was much higher than the acceptable value for multi-item scales (0.70), and thus it can be concluded that Persian version of WMFT has excellent relative reliability. Reliability is categorized as follows: 0.9 to 0.99 excellent, 0.8 to 0.89 good, and 0.7 to 0.79 moderate, 0.69≤ poor. Table 3 presents the results of ICC test and Cronbach's alpha coefficient.

Table 3. ICC values and Cronbach's alpha coefficients for each subscale and total score of Persian version of WMFT

Scores obtained	ICC	Cronbach's Alpha
Correlation with simple joint movement subscale	0.98	0.83
Correlation with functional movement subscale	97- 0.99.0	0.87
Total score of scale	97- 0.99.0	0.78

Discussion

One of the most important features that should always be considered in choosing an outcome assessment tool, which has also been emphasized by experts, is simplicity of translation and good quality of translated version [5]. This is firstly considered by designers of the original version of such tools. A fluent and clear text in WMFT will certainly enable preparation of initial translated versions of this scale by translators in different languages in order to perform next stages of their methodological studies. Such an advantage was clearly observed in the present study [5,8].

In the present study, a correlation matrix was constructed between items and subscales and total score of Persian version of WMFT. The results obtained showed correlation of higher than 0.4 between items and relevant subscale, other subscales and total score of Persian version of WMFT in all cases except item 7 and its own subscale and total score, and also item 15 and other subscales. Correlation of items was categorized as follows: less than 0.4=poor or borderline; between 0.4 and 0.6=moderate, between 0.6 and 0.8=good; and higher than 0.8=excellent [12]. Therefore, scores of each item had a significant and direct correlation with relevant subscale, other subscales, and total score. It can be said that a satisfactory internal consistency has been achieved at the level of items, item and relevant subscale, other subscales and total score [5,8]. Moreover, in most cases, item-scale correlation was higher than the correlation between relevant subscale and other subscales. Given the above, all items have been designed in line with a specific general concept, which is upper extremity function in stroke patients [13].

In many studies conducted on upper extremity function in stroke patients using WMFT, this scale was not divided into simple movement and functional movement subscales, and in all cases, total functional score and time taken to perform items of WMFT were recorded as the main data obtained from assessment of function [14,15]. In a study conducted by Wolf *et al.* to assess WMFT and comparing it with Fugal-Meyer Assessment (FMA) scale in stroke patients, only total score and time taken to perform the items were considered, and simple movement and functional movement subscales were not categorized as such [8,16]. In a study

conducted by Morris *et al.* to assess reliability of WMFT, 15 items were considered as functional items of upper extremity in stroke patients, and total functional score and time taken to perform items were taken as criteria [17].

In terms of test-retest reliability, the above ICC coefficients indicate excellent reliability. In other words, in the two assessment sessions using Persian version of WMFT, participants' relative place remained highly satisfactory. This result shows that WMFT provides researchers with a reliable tool for the assessment of upper extremity function in stroke patients. Previous researchers also found relative reliability of items between 0.97 and 0.99 [8]. In a study conducted by Morris *et al.*, relative reliability obtained was 0.9 for time taken to perform items and 0.95 for total functional score [17]. Given the proximity of coefficients obtained in the present and the above studies, it can be concluded that these studies are clearly in agreement in terms of obtaining excellent levels of relative reliability [8,16,17].

In the present study, alpha coefficient obtained for items of a subscale and also total items of the Persian version of WMFT was between 0.78 and 0.87. Given that in multiple test assessment tools, coefficients higher than 0.7 are considered acceptable; it can be asserted that internal consistency was satisfactory in the version studied. According to Anderson classification, internal consistency higher than or equal to 0.8 is considered excellent, between 0.7 and 0.8 adequate, and less than 0.7 poor [18]. A study showed internal consistency of total score of items of WMFT 0.92. In another study, internal consistency was found between 0.86 and 0.92 for time taken to perform items and total functional score [8,16,17].

Conclusion

The results of the present study are similar to those obtained in other studies. Therefore, given high homogeneity and internal consistency of the original version of WMFT; it can be said that the Persian version of WMFT translated in the present study has been able to uphold homogeneity of the tests in the original version. It is therefore hoped that the tool thus obtained matches with the original tool.

Conflict of Interest

Authors have no conflict of interest.

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