TRANSLATION, CULTURAL ADAPTATION AND PSYCHOMETRIC PROPERTIES OF URDU VERSION OF SIMPLIFIED MODIFIED RANKIN SCALE IN STROKE PATIENTS

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HIGHLIGHTS

- Worldwide, stroke/cerebrovascular accident is the second leading cause of death and the third leading cause of disability.
- A cross-sectional study was conducted to determine the psychometric properties of the Urdu version of the simplified modified Rankin scale in stroke patients.
- Excellent test-retest reliability and internal consistency of simplified modified Rankin scale Urdu was found in the study. The study found that this scale is a valid and reliable tool that can be used to assess the functional level of disability after a stroke.

ABSTRACT

Background: Stroke, the sudden death of some brain cells due to lack of oxygen when the blood flow to the brain is lost by blockage or rupture of an artery to the brain, is also a leading cause of dementia and depression. **Objective:** To translate, culturally adapt and estimate psychometric properties of the Urdu version of the simplified modified Rankin scale in stroke patients.

Material and Methods: According to the pre-defined guidelines, translation and cultural adaptation were performed by recruiting 150 participants (48% men and 52% women) aged 40-65 years diagnosed with sub-acute stroke. The sample size was calculated to be 150 by using Kline method. A purposive sampling technique was used for data collection and data were collected from the Department of Physical Therapy, University of Lahore Teaching Hospital. People who were neurologically unstable, unable to read Urdu, unwilling participants or people who are on respirators were excluded from the study. The final Urdu version of the simplified modified Rankin scale was tested for test-retest reliability, internal consistency, inter-item correlation, and construct validity.

Results: The Urdu-SMRS demonstrated Excellent test-retest reliability (ICC= 0.973 (0.808-0.880.973 (0.963-0.981); CI=95 percent). Cronbach's alpha was 0.97, indicating that this scale has excellent internal consistency. The study found a strong correlation between the simplified modified Rankin scale Urdu version and the Barthel index, showing that this scale has strong convergent validity. **Conclusion:** The Urdu version of **the** simplified modified Rankin scale is a reliable and valid instrument to measure functional assessment after stroke in the Pakistani population with excellent psychometric properties.

Keywords: Barthel index, reliability, simplified modified Rankin scale, stroke, validity

INTRODUCTION

In 1970, the World Health Organization defined stroke as 'rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin.[1] Worldwide, cerebrovascular accidents (stroke) are the second leading cause of death and the third leading cause of disability.[2] Stroke, the sudden death of some brain cells due to lack of oxygen when the blood flow to the brain is lost by blockage or rupture of an artery to the brain, is also a leading cause of dementia and depression.[3] Stroke is a clinical syndrome with two main pathologic types (ischemic stroke and hemorr-hagic stroke).[4] Each has several subtypes with

distinct underlying vascular pathologies.[5] Ischemic stroke caused by arterial occlusion is responsible for most strokes.[6,7]

Hemorrhagic stroke is due to bleeding into the brain by rupturing a blood vessel.[8,9] Hemorrhagic stroke may be further subdivided into intra-cerebral hemorrhage (ICH) and subarachnoid hemorrhage (SAH).[10,11,12]

The ICH is bleeding into the brain parenchyma, and SAH is bleeding into the subarachnoid space. Hemorrhagic stroke is associated with severe morbidity and high mortality.[13] Risk factors for stroke can be categorized as modifiable and nonmodifiable.[14] Age, sex, and race/ethnicity are nonmodifiable risk factors for both ischemic and hemorrhagic stroke, while hypertension, smoking, diet, and physical inactivity are among some of the more commonly reported modifiable risk factors.[15,16] Each year 55 000 more women than men have a stroke, a discrepancy largely driven by longer life expectancy in women.[17]

Rehabilitation is an important aspect of the continuum of care in stroke. With advances in the acute treatment of stroke, more patients will survive stroke with varying degrees of disability. Research in the past decade has expanded our understanding of the mechanisms underlying stroke recovery and has led to the development of new treatment modalities. The growing evidence suggests that shorter and more frequent sessions of therapy can be safely started in the first 24 to 48 hours after a stroke. The optimal amount or dose of therapy for stroke remains undetermined, as more intensive treatments have not been associated with better outcomes compared to standard intensities of therapy.[16] The simplified modified Rankin scale (SMRS) was introduced by John Rankin in 1957 and was the primary outcome scale for almost all acute stroke trials.[18] The Rankin scale was modified into a new scale named as modified Rankin scale formed by Charles Warlow in the 1980s, and its reproducibility was first examined by van Swieten. The SMRS was found to be less responsive to change than some other stroke scales.[19] In 2011 Askiel Bruno et al. improved the reliability of the SMRS at the same time as keeping the assessments relatively simple and short and preserving the construct and validity of the original SMRS. He created five relatively simple questions that address the key functional states assigned to SMRS. This questionnaire requires yes or no answers to five questions by a patient or a caregiver and takes on average only 1.67 minutes to administer. The slightly revised SMRS shows excellent reliability that is similar to the original version. In addition, this latest SMRS appears to have excellent reproducibility by telephone.[20]

A simplified modified Rankin scale for stroke has been translated into many languages like Chinese, Swedish, Japanese, etc but the Urdu translation is not yet available. The SMRS for the functional assessment of stroke is a reliable and valid instrument. In neurorehabilitation clinics the most common issue with the patients who come for rehabilitation is stroke. So, it is highly required to translate valid and reliable instruments like SMRS into the Urdu language. So, that patients will be able to understand the questionnaire in their native language and will be able to talk about the actual state of their condition.

MATERIAL AND METHODS
A cross-sectional study was conducted to translate, culturally adapt and validate the Urdu version of SMRS for stroke patients in the Pakistani population. The study recruited 48% males and 52% females aged between 40-60 years with sub-acute stroke in the study. The sample size was calculated to be 150 by using Kline method. A purposive sampling technique was used for data collection and data were collected from the Department of Physical Therapy, University of Lahore Teaching Hospital. People who were neurologically unstable, unable to read Urdu, unwilling participants or people who are on respirators were excluded from the study.
All patients signed a written informed consent

form and approval was sought from the Ethics Committee of the University of Lahore. The translated Urdu version of SMRS will be then used for data collection. The procedure includes four steps. First, for forward translation two native Urdu speakers translated the SMRS independently of each other into Urdu. One translator was familiar with medical terminology and the other translator was from the non-medical field (T1, T2). Afterward, both initial translations were combined and one final version was formed. In the second step, the combined final version of the questionnaire was translated back into English by two independent professional translators who were unfamiliar with both the questionnaire and health care terminology (BT1, BT2) to ensure a consistent translation of the English version of the instrument.

In the third step, a meeting was organized with a research committee composed of three physiotherapists, a neurophysician, all translators, a language expert and authors. During the meeting, the research committee evaluated all versions of SMRS (T1, T2, T-12, BT1, BT2, B-12) to ensure that translations reflect Urdu cultural characteristics and discrepancies. They also analyzed the questionnaire methodologically and grammatically. Then they approved a pre-final version of SMRS. All 150 patients were asked whether they could clearly understand the questions and interpret them correctly. The answers were discussed among the authors and a final Urdu version of SMRS was formed.

Analysis was carried out on SPSS version 23. The quantitative variables were presented with mean and standard deviation and qualitative variables were presented with frequency and percentage. Test-retest reliability was determined using an intra-class correlation coefficient (ICC) and 95% confidence intervals (CIs), Internal consistency was determined with Cronbach's alpha, measurement error was determined by calculating the standard error of measurement (SEM) and the smallest detectable change (SDC). Pearson correlation was found between the Barthel index and SMRS Urdu version to evaluate construct validity.

RESULTS

The results presented the mean age of the participants; i.e., 56.07±6.46 years with a minimum age of 40 and maximum age of 65 years, whereas there were 48% males and 52% females in this study. Out of all, 66.7% of participants had hypertension, 50.7% of subjects had diabetes and 30% had coronary artery disease at baseline with stroke (Table I).

Table I: Demographic Data of Participants

Variable		Mean± S. D	Minimum	Maximum
Age		56.07 ± 6.46	40.00	65.00
			Frequency	Percentage
Gender	Male		72	48.0
	Female		78	52.0
Hypertension	Yes		100	66.7
	No		50	33.3
Diabetes Mellitus	Yes		76	50.7
	No		74	49.3
Coronary Artery Disease	Yes		45	30.0
	No		105	70.0

The total score of SMRS on day 1 was categorized and there were 40% of participants with a slight disability. Whereas, on day 3, 38.7% of participants had slight disability. The total score of the Barthel index score on day 1 was also presented in Table II. There were 58% of participants severely dependent, while 63.3% were severely dependent when measured on day 3.

Table II: Score Calculations of SMRS and Barthel Index at Two Different Evaluations

Variable		Frequency	Percentage
Total Score of smRSQ on Day 1	No symptoms	17	11.3
	No significant disability	72	48.0
	Slight disability	61	40.7
Total Score of smRSQ on Day 3	No symptoms	19	12.7
	No significant disability	73	48.7
	Slight disability	58	38.7
Total Barthel Index on Day 1	Total dependency	27	18.0
	Severe dependency	87	58.0
	Moderate dependency	36	24.0
Total Barthel Index on Day 3	Total dependency	12	8.0
	Severe dependency	95	63.3
	Moderate dependency	43	28.7

The mean score of item one of SMRS on days 1 & 3 was 1.28± 0.66, with Cronbach's Alpha of 0.89 i.e. excellent test re-test reliability, ICC of 0.89 (0.84 - 0.92) i.e. excellent internal consistency, standard error of measurement (SEM) of 0.041 and minimal detectable change (MDC) of 0.09 (Table III).

Table III: Test Re-test Reliability, Intraclass Correlation Coefficient, Inter-Item Correlation and Measurement Errors of Simplified Modified Rankin Scale Questionnaire Between Two Intervals

Test Re-test Reliability	
Mean and Standard Deviation	1.28 ± 0.66
Cronbach's Alpha	0.89
Intraclass Correlation Coefficient	0.89 (0.84-0.92)
Inter-Item Correlation	0.80
Standard error of measurement	0.041
Smallest detectable change	0.09

The total score of SMRS on day 1 and day 3 was correlated with the total score of the Barthel index scale on day 1 and day 3 to find out the relationship between them. Correlation between both scales at different intervals showed the value of 1 (strong positive relationship) with a statistically significant p-value of less than 0.0001 (Table IV).

Table IV: Construct Validity, Correlation of SMRQ with Barthel Index Scale at Two Intervals

Items to be correlated	Pearson Correlation	p-value
SMRS at day 1 vs Barthel Index on day 1	1	<0.0001
SMRS at day 1 vs Barthel Index at day 3	1	<0.0001
SMRS at day 3 vs Barthel Index at day 1	1	<0.0001
SMRS at day 3 vs Barthel Index at day 3	1	<0.0001

DISCUSSION

The present study demonstrates that the simplified modified Rankin scale Urdu version is a useful tool to measure functional assessment after stroke on two variant occasions. Multicultural adaptation of smRSQ in the Urdu language has been made in the study. First of all, the tool was translated from English to Urdu language to regularize its psychometric properties in the respondents of Stroke and then Urdu SMRS was used among the patients who had Stroke. The tool was used again after 3 days to check its reliability. The results of the study found that SMRS Urdu has excellent test-retest reliability and internal consistency in patients who had a stroke. The Urdu version of SMRS is simple to understand and apparent in concept to all populations. All the obstacles that were experienced during the translation and adaptation process were efficiently resolved. The expert review committee worked efficiently throughout the whole process.

The version changes of known and gold standard questionnaires are done to eradicate the cultural differences in terms of their psychometric properties. Step-by-step processes of translations were made that includes forward and backward translation to convert the Original English version of SMRS into Urdu SMRS After that a critical analysis was made by the established review committee. Decisions were concluded after several steps of the translation procedure. A total of 150 participants with both gender having low back pain were added to the study. Urdu is the National language of Pakistan that's why its importance can't be neglected. As the population of people having low back pain is too high in Pakistan that's why the most common and reliable questionnaire SMRS is converted into the Urdu language so that the Pakistani population can understand the questionnaire well and would be able to describe the actual state of their condition. The study included 150 of the participants who had stroke. The mean age of the participants was 56.07±6.46 years with minimum age of 40 and maximum age of 65 years in the study. There were 48% of males and 52% of females recruited in the study. Excellent test-retest reliability and excellent internal consistency were found for SMRS Urdu in the study which shows that it is a valid and reliable tool to measure the level of functional disability after stroke. Similar to the current study another study was conducted by Xiaoying Chen et al. to check the validation of the Rankin scale for stroke trials. The results of the study found adequate agreement with the SMRS which shows that it is a valid and reliable tool. However, the current study found excellent test-retest reliability and internal consistency of the SMRS Urdu version.[21]

Another study by A. Fernandez Sanz et al. in the year 2022 converted the original SMRS into the Spanish language to check its validity and reliability in the Spanish population who had a stroke. In contrast to the current study, the study compared the Spanish version of SMRS with the stroke impact scale. However, the current study compared the Urdu version of SMRS with the Barthel index. Similar to the current study, the study found excellent test-retest reliability and internal consistency which shows that the Spanish-language SMRS is reliable and simple,and saves time in the functional assessment after a stroke.[22]

Urdu is the National language of Pakistan that's why its importance can't be neglected. As the population of people having a stroke in Pakistan is too high in Pakistan that's why the most common and reliable questionnaire SMRS is converted into the Urdu language so that the Pakistani population can understand the questionnaire well and would be able to describe the actual state of their condition.

CONCLUSION

Excellent test-retest reliability and internal consistency of the simplified modified Rankin scale Urdu version were found in the study. The study found that this scale is a valid and reliable tool that can be used to assess the functional level of disability after a stroke. For future studies, there is a need for gender-specific studies to get more accurate results. Future studies in bigger and heterogeneous samples along with more reliability tests are encouraged to evaluate the validity of this instrument with more objective measures. Furthermore, there is a recomm-endation for more translations of other question-naires as well.

DECLARATIONS
Consent to Participate:
Written consent had been taken from participants. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None Funding: No funding source is involved.

Authors' contributions: All authors read and approved the final manuscript.

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