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A Validation Study of the Translated Urdu Version of the Arthritis Impact Measurements Scale AIMS 2 in Knee Osteoarthritis Patients

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ABSTRACT

Background: Language difficulties in the healthcare industry can cause misunderstandings or errors in care. Most of the Pakistani population communicates and comprehends in the Urdu language. Keeping this in mind, Urdu was chosen in the current study to gather information from patients with identified knee osteoarthritis in elderly individuals. To determine the validity of the translated version of Arthritis Impact Measurement Scale 2 URDU in knee osteoarthritis patients in Lahore, Pakistan.

Methodology: This cross-sectional study was conducted with 234 participants. The data were collected from knee osteoarthritis patients at the University of Lahore teaching hospital. Data were collected using the AIMS-2 URDU questionnaire and the KOOS questionnaire. The sample was collected using a non-probability-convenient sampling technique.

Results: Out of the total, 116 (49%) were males and 118 (51%) were females. The mean age was 51.1 years. Overall test-retest reliability and internal consistency of the Arthritis Impact scale were 0.990, excellent. The overall inter-item correlation of AIMS2-U was 0.981. For every subscale, the ceiling effect ranges from 5% to 10% and the floor effect ranges from 0% to 4%. The convergent validity between Arthritis Impact Measurement Scale 2—Urdu (arthritis pain, work) and KOOS (pain, symptom, ADLs, knee-related QOL) subscales when calculated through Pearson's correlation coefficient was an excellent negative correlation. The highest factor loading demonstrated in arthritis pain was 0.960. Kaiser-Meyer-Olkin (KMO) degree of sampling adequacy confirmed a high significant value of 0.916. A value of 0.00 on Bartlett's test is considered to be not significant.

Conclusion: The Arthritis Impact Measurement Scale 2 Urdu Version portrays excellent test-retest reliability, excellent internal consistency, and strong positive correlation, i.e., excellent convergent validity.

Keywords: *Validity, reliability, arthritis impact measurement scale, urdu translation, knee osteoarthritis, KOOS.*

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INTRODUCTION

When healthcare workers or patients speak a language different than their mother tongue or country of origin, language barriers can lead to miscommunications or mistakes in treatment[1]. Patients benefit from clear communication in the healthcare system; healthcare worker communication is critical to preserving care quality[2]. Much significance should be given to improving the languages everywhere in the world, just as in Pakistan. There are many languages in Pakistan that are considered mother tongues, but as Urdu is spoken in the majority, it is the national language of Pakistan[3,6]. Most of the Pakistani population communicates and comprehends in the Urdu language[7]. Keeping this in mind, Urdu was chosen in the current study to gather information from patients with identified knee osteoarthritis in elderly individuals. In both established and developing countries, osteoarthritis (OA) is considered a huge problem in the medical, economic, and social sectors[8,10]. It is common knowledge that osteoarthritis has a significant impact on every aspect of life, whether it be easy ADLs or difficult social and entertainment tasks. Research conducted in 1995 and 2004 suggests knee osteoarthritis is one of the most prevalent disorders of the joint and a leading source of dysfunction, especially among the elderly[11,12.] According to some longitudinal studies, knee osteoarthritis impacts health-related quality of life (HRQOL) differently among individuals[13,14]. The goal of modern treatment for most rheumatic and orthopedic disorders, including knee osteoarthritis, is to enhance the patient's day-to-day functioning capability; thus, health conditions should be monitored and observed as an essential endpoint in research studies exploring these conditions[15.] Knee osteoarthritis is a prevalent degenerative condition that affects the elderly. Knee osteoarthritis is found in roughly 13% women and 10% men over age of 60, accordingly a spring 2011 paper by Behzad Heidari, MD. Most older people have experienced knee pain at some point in their lives, and while the symptoms are unpleasant, they are always treatable or manageable, if not curable[16]. Osteoarthritis of the knee is a degenerative joint condition characterized by articular cartilage wear and tear and gradual loss. It is of two types. The most common variety is a form of articular degeneration that has no recognized cause. The secondary kind is caused by improper force distribution throughout the joint, such as from trauma post a reason or faulty articular cartilage, as in rheumatoid arthritis (RA)[17]. Although the prevalence of knee OA rises as people get older, there is mixed evidence about whether this rise continues into old age. The sole study that looked into this issue discovered that the prevalence of OA of the knee did not rise with age in senior people. Furthermore, cartilage, which is thought to be the location of pathologic alterations in OA, may change little histologically or biomechanically as people get older[18]. Knee osteoarthritis is caused by a number of factors, the most common of which is age. Obese people have a higher risk of developing obesity. Hereditary, having a higher chance of occurrence in families that have had past occurrences. Women are more likely to contract the disease due to their gender. Repetitive stress injuries are common among workers. Patients with rheumatoid arthritis, for example, suffer from illness-related issues[17]. Severe patellar pain, swelling, warmth, pain in motion, joint stiffness, soreness, lack of flexibility, grating sensation, and bony spurs are some of the clinical symptoms. Given all of the symptoms, diagnosing a patient with knee osteoarthritis is relatively simple. With the help of x-rays, the grading system (grades 0-4) is extensively employed. Grade 0 indicates a healthy normal knee; grade 1 indicates bone spurs; grade 2 indicates pain and stiffness with an increase in bone spurs; grade 3 indicates pain and a reduction in joint gap; and grade 4 indicates key features of OA, including decreased joint space, cartilage almost absent, no synovial fluid present, and pain and severe discomfort[19]. Diagnosing becomes challenging when the disease's impact on handicap is in question. In 1980, Robert F. Meenan created the Arthritis Impact Measurement Scale, which was revised in 1991. For years, the Arthritis Impact Measurement Scales[20] were extensively utilized in diverse nations to evaluate the fitness status of sufferers of arthritis. AIMS has gone through substantial testing and improvement with the purpose of qualifying as a good instrument for assessing the fitness circumstances of human beings with osteoarthritis. The AIMS has been proven to be powerful in assessing patients' movement level, dysfunction level, and discomfort

level in preceding studies studying the performance and sensitivity of modern health status indicators. AIMS2 uses a questionnaire with 12 scales to find out how each aspect affects the patient, such as movement, self-care tasks, social life, etc. It makes a decision about the patient based on the results of a 78-item questionnaire. This allows us to learn about the severity of the injury and track individual patients' progress in order to compare the progress of individuals in rehabilitation programs[21]. AIMS is developed in the English language. As the questionnaire requires being filled out by the patient himself, it has also been translated into Dutch, Persian, French, and Chinese to help these communities. And needless to say, the translations have all lived up to the standard of the original. There is no study available on the validation of this instrument in Urdu. Therefore, the purpose of this research is to successfully translate the AIMS2 and test its validity on patients with knee osteoarthritis.

METHODOLOGY

Investigators conducted this cross-sectional study on 234 University of Lahore Teaching Hospital participants. The sampling technique was non-probability-convenient sampling. After informing the participants of the objectives and aims of the study, the authors asked them to read the directions carefully and sign an agreement document. The investigators calculated the sample size by using the Kline thumb rule. The Arthritis Impact Measurement Scales 2 (to assess the impact of arthritis on an individual's life. It's designed to measure various aspects of physical, emotional, and social functioning affected by arthritis. It is scored on a 5-point scale according to the degree of disability it has; a greater score denotes a higher level of disability. The score is graded using a recognized methodology on a range of 0-10, was first translated and then used with the Knee injury and Osteoarthritis Outcome Score (KOOS) were used to gather data for 234 people between the ages of 40 and 60. The AIMS 2 questionnaire is composed of 78 questions divided into 12 subscales and is self-administered. There are five different sections in the KOOS questionnaire: (1) Pain (nine items); (2) Other Symptoms (seven items); (3) Activities of Daily Living (ADL), with seventeen items; (4) Sport and Recreation Function (Sport/Rec), with five items; and (5) Knee-related Quality of Life (QoL), with four things. Every component is assessed separately, and scores run from zero—which denotes serious knee difficulties—to one hundred—which denotes no knee problems at all[22].The data were entered in SPSS version 21.0. Utilizing the intraclass correlation coefficient (ICC at 95% confidence interval), test retest reliability was assessed. Internal consistency was obtained by Cronbach’s alpha value. Inter-item correlation was also measured for all subscales of AIMS2-U. Convergent validity was analyzed by the Pearson correlation coefficient. The highest and lowest possible scores were obtained by the floor and ceiling effect, and sampling adequacy was measured by the Kaiser-Meyer-Olkin (KMO) degree of sampling adequacy and Bartlett’s test.

RESULTS

There were 234 individuals in this study, of which 116 (49%) were males, and 118 (51%) were females. The age range was between 40-60 years, whereas the mean was 51.1±5.94. The participants showed a mean KOOS Pain score of 25.3±10.3. Participants characterized that their mean social activity score was 5.8±2.3, mean household task score was 4.0±3.0, mean self-care score was 6.7±3.0, and mean mobility score was 5.9±0.8.

Variables	Mean	Standard Deviation
Age	51.1	±5.94
Gender (male/female)	116(49%) / 118(51%)	
Mobility level	5.9	±0.8
Walking and bending	5.6	±3.0
Hand and finger function	1.0	±1.3
Arm function	0.90	±1.1
Self-care	6.7	±3.0
Household task	4.0	±3.0
Social activity	5.8	±2.3
Support from family and friends	3.0	±2.4
Arthritis pain	5.5	±2.8
Work	5.31	±2.1
Level of tension	4.17	±1.9
Mood	4.9	±1.7
KOOS pain	25.3	±10.3
KOOS symptoms	18.9	±7.8
KOOS ADL's	46.9	±19.9
KOOS Sport and recreation function	16.3	±6.7
KOOS Knee related quality of life	11.3	±4.5
KOOS	118.9	±4.8

Table 1: Baseline characteristics of participants

All the subscales of Arthritis Impact Measurement Scale 2 showed good to excellent test re-test reliability as the ICC values ranged between 0.861-0.997 at CI=95%. The questionnaire showed good to excellent internal consistency as the value of Cronbach's alpha fell between 0.861 and 0.997 in each subscale. Inter-item correlation for all subscales ranged between 0.822-0.994. Overall test re-test reliability and internal consistency of the Arthritis Impact scale was 0.990.

Variables	Inter item Correlation	Cronbach's alpha	ICC (95%)
Mobility level	0.946	0.910	0.946
Walking and bending	0.992	0.871	0.871
Hand and Finger function	0.972	0.861	0.861
Arm function	0.964	0.982	0.964
Self-Care	0.991	0.995	0.991
Household task	0.989	0.994	0.994
Social activity	0.994	0.997	0.997
Support from Family and friend	0.989	0.935	0.935
Arthritis pain	0.822	0.895	0.895
Work	0.980	0.988	0.988
Level of tension	0.988	0.994	0.994
Mood	0.981	0.990	0.990
Satisfaction with each health area	0.992	0.996	0.996
Current health	0.984	0.968	0.968
Overall arthritis Impact	0.981	0.990	0.990

Table 2: Test-retest Reliability of Arthritis Impact Measurement Scale 2

Table 3 indicates the tabulation of the floor and ceiling effect. Data analysis showed that mean score of items lied between 1.0-6.7. There were 3 missing individuals in every subscale. In the overall of 234 patients none of them acquired the highest or lowest possible score. For every subscale the ceiling effect ranges from 5-10% and the floor effect ranges from 0-4%.

AIMS2-U	MEAN	SD	FLOOR%	CEILING%
Mobility level	5.9	0.834	4	7.5
Walking and bending	5.6	3	0	10
Hand and finger function	1	1.27	0	5
Arm function	0.9	1.08	0	4.5
Self-care tasks	6.7	3.01	0	10
Household tasks	4	3	0	10
Social activity	5.8	2.3	0.5	9
Support from family and friends	3	2.4	0	10
Arthritis pain	5.5	2.8	0	10
Work	5.31	2.07	0.5	8.5
Levels of tension	4.17	1.94	0	10
Mood	4.9	1.7	1.5	8.5

Table 3: Floor and Ceiling Effect of the 12 subscales of AIMS2-U

The convergent validity between Arthritis Impact Measurement Scale 2 –Urdu (arthritis pain, work) and KOOS (pain, symptom, ADL's, knee related QOL) subscales when calculated through Pearson's correlation coefficient was excellent negative correlation. It was negative because each scales grading systems are complete opposite to one another. For example, in AIMS2-U grade 1 represents severe pain however grade 1 in KOOS represents no pain. Hence the negative correlation displayed here actually means excellent positive correlation (Table-4)

AIMS2 and KOOS subscales	r	p-value
AIMS2 Physical and KOOS ADL's	-0.593	<0.001
AIMS2 Physical and KOOS Sport and recreation	-0.607	<0.001
AIMS2 Physical and KOOS Knee related QOL	-0.593	<0.001
AIMS2 Affect and KOOS Pain	-0.390	<0.001
AIMS2 Social Interaction and KOOS Symptoms	0.610	<0.001
AIMS2 Social Interaction and KOOS ADL'S	0.606	<0.001
AIMS2 Arthritis pain and KOOS Pain	-0.963	<0.001
AIMS2 Arthritis pain and KOOS Symptoms	-0.951	<0.001
AIMS2 Arthritis pain and KOOS ADL'S	-0.970	<0.001
AIMS2 Arthritis pain and KOOS Knee related QOL	-0.926	<0.001
AIMS2 Work and KOOS Pain	-0.916	<0.001
AIMS2 Work and KOOS Symptoms	-0.890	<0.001
AIMS2 Work and KOOS ADL'S	-0.930	<0.001
AIMS2 Work and KOOS Sport and Recreation	-0.849	<0.001
AIMS2 Work and KOOS Knee related QOL	-0.926	<0.001

Table 4: Convergent Validity between AIMS 2 and KOOS

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.916
Bartlett's Test of Sphericity	Approx. Chi-Square	5426.798
	Df.	190
	Sig.	0.00

Table 5: KMO and Bartlett's Test

Table 6 suggests the factor loading of all 12 subscales. The highest factor loading demonstrated in Arthritis pain 0.960. Factor analysis of data showed that the Kaiser-Meyer-Olkin (KMO) degree of sampling adequacy confirmed a high significant value of 0.916. A value of 0.00 on the Bartlett's test is considered to be not significant. A one factor structure of AIMS2-U was established based on eigenvalues > 1. The total value of first component was calculated to be 13.033 and the corresponding cumulative variance was 65.166% as shown in the table below.

AIMS2 SUBSCALES	FACTOR 1
Mobility level	0.658
Walking and bending	0.949
Hand and finger function	0.742
Arm function	0.676
Self-care	0.944
Household task	0.947
Social activity	0.830
Support from family and friends	0.392
Arthritis pain	0.960
Work	0.895
Level of tension	0.099
Mood	0.422

Table 6: Factor Analysis- Factor Loading Values

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings	
	Total	% Of Variance	Total	% Of Variance	Total	% Of Variance
1	13.323	66.615	13.323	66.615	13.033	65.166
2	2.54	12.702	2.54	12.702	2.83	14.151
3	0.964	4.819				
4	0.879	4.395				
5	0.535	2.673				
6	0.411	2.054				
7	0.331	1.653				
8	0.217	1.083				
9	0.194	0.968				
10	0.161	0.805				
11	0.1	0.5				
12	0.082	0.412				
13	0.08	0.399				
14	0.052	0.26				
15	0.042	0.209				
16	0.032	0.159				
17	0.024	0.122				
18	0.018	0.092				
19	0.011	0.054				
20	0.005	0.027				

Table 7: Factor Analysis- Eigenvalues

DISCUSSION

A recent study found that for measuring knee osteoarthritis in senior people, the AIMS Urdu version is an effective tool. The "Multicultural Adaption of AIMS into Urdu" is offered in this paper. This tool was first translated into Urdu to control its "psychometric qualities" among senior respondents. The AIMS system was then employed among osteoarthritic patients[23]. This tool was used again after 48 hours to ensure its validity. It was discovered that the Urdu-translated version of the AIMS had reasonable reliability and cogency, as well as appropriate psychometric properties in senior people. AIMS in Urdu appeared to be well comprehended and understood by all populations. This method is frequently used to improve a standard tool in order to reduce cultural differences while maintaining its validity and reliability. The translation process comprised sequential forward and backward translations, supervised by a review panel entrusted with assessing the most recent version of AIMS 2. At several points during the translation process, decisions were made. 234 elderly individuals, comprising both male and female participants, were included in the study[24]. The present study recruited 48.9% males and 49.9% females, which is like previous surveys. In 1997, research was conducted to design a concise version of the Arthritis Impact Measurement Scales 2[25] questionnaire, with content validity as the primary criterion. Firstly, the Delphi technique was used, and secondly, the nominal group technique was used. The AIMS2 Short Form (AIMS2SF) and AIMS2 psychometric qualities were calculated using data from 127 patients diagnosed with rheumatoid arthritis who completed the AIMS2 twice before starting methotrexate (MTX) medication and 12 weeks after starting MTX treatment. The two parties agreed on an AIMS2SF list of 26 items. Convergent validity (r = 0.240.59), test-retest reproducibility, and sensitivity to change at 12 weeks were all very close to the original AIMS2 values[23]. In 1996, a group of researchers worked on a Dutch variation of AIMS2 that would succeed DUTCH-AIMS. They evaluated the scales' reliability in terms of internal consistency and validity using both internal and external criteria. 231 patients diagnosed with rheumatoid arthritis and 131 controls filled out and returned the questionnaires correctly. The health status measures' internal consistency coefficients ranged from 0.66 to 0.89. Factor analysis revealed that each of the 11 health domains falls into three dimensions. As suggested by the results, the DUTCH-AIMS2 is acceptable in terms of reliability and validity in a number of situations. In 1996, a research study was conducted to design and test a French variation of the Arthritis Impact Measurement Scale 2 to be used by French speakers. The most frequently used procedure of translation involved the backward translation method, committee review, and pretesting to create a French version of the AIMS2. The AIMS2 was tested on 127 individuals diagnosed with rheumatoid arthritis (RA) who were scheduled to start methotrexate medication (MTX). The collected data was calculated and analyzed to find out the construct validity, which was good. Most results obtained were identical to AIMS2, except for a few subscales. Significant correlations were observed with the tool's convergent validity. All of the measures were reliable (intraclass correlation coefficients lying between 0.60 and 0.90). The total variance percentage was more than half on all but one scale. Cronbach's alpha lies between 0.70 and 0.90. To conclude, in patients with RA who are starting MTX medication, this French variation of AIMS2 has proven to be more than appropriate[26]. Lewis E. et al. carried out study in 1992 to improve the Arthritis Impact Measurement Scales. Three new subscales were also introduced to the AIMS scale. The new name for the scale was AIMS2. A content and format test, as well as a test of performance in each domain, were conducted. In a pilot study of 24 patients, the average time to complete the questionnaire was 23 minutes. After a total of 408 individuals were assessed, 299 of them were found to have RA and 109 to have OA; 45 of these patients finished a second round of AIMS2 in less than 21 days. Internal consistency values for the 12 subscales in the RA group ranged from 0.70 to 0.90. 0.70–0.90in the OA group, which are both considered to be good. To conclude, as the results prove, the AIMS2 is a modified and further elongated questionnaire for finding out the health status of an individual, and it is a more than appropriate tool for use on patients and in future studies[27].

CONCLUSION

The Arthritis Impact Measurement Scale 2 Urdu Version (AIMS2-U) portrays excellent test reliability, internal consistency, and strong positive correlation, i.e., excellent convergent validity. Hence, clinicians can use the Urdu version for osteoarthritis patients. So patients can easily understand the questions in their native language and respond to this patient outcome measure.

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The following authors have made substantial contributions to the manuscript as under:
Conception or Design: Hafiza Sana Ashraf, Zarqa Sharif
Acquisition, Analysis or Interpretation of Data: Hafiza Sana Ashraf, Zarqa Sharif, Moeeza Arshad, Tooba Asif, Hammad Shakeel
Manuscript Writing & Approval: Atta Muhammad
All authors acknowledge their accountability for all facets of the research, ensuring that any concerns regarding the accuracy or integrity of the work are duly investigated and resolved.

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