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Original Article

Physiotherapy Section

Reliability and Validity of the Indian (Telugu) Version of the Shoulder Pain and Disability Index

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ABSTRACT

Introduction: The Shoulder Pain and Disability Index (SPADI) is one of the most commonly used shoulder specific self report questionnaires that is available to evaluate patients with shoulder pathology but it has not been adapted in Telugu version.

Aim: The aim of the present study was to translate, culturally adapt, and validate the Telugu version of the SPADI.

Materials and Methods: Based on the cross cultural adaptation guidelines stated by the American Association of Orthopaedic Surgeons (AAOS) outcome committee, cross cultural adaptation and psychometric testing of SPADI was conducted at the Outpatient Physiotherapy Department of the Susruta Institute of Physical Medicine and Rehabilitation, Hyderabad, India. The test-retest reliability was quantified using the Intraclass Correlation Coefficient (ICC) and Cronbach's alpha was calculated to assess internal consistency of the Telugu questionnaire.

Results: The reliability of the total Telugu SPADI and its subsets (Intraclass correlation coefficient >0.96) were found to be higher than that of the English SPADI and the German SPADI in this population.

Conclusion: The cross culturally adapted version of the English SPADI into a regional Indian language (Telugu) is easy to use and is a reliable and valid tool for measuring shoulder pain and disability in the Telugu speaking population.

Keywords: Cross cultural adaptation, Functional status, Questionnaire

INTRODUCTION

Shoulder complex pain is a common problem of musculoskeletal pain in the general population [1,2]. Shoulder joint disability will disturb the daily activity and quality of sleep [3,4].

In a World Health Organization (WHO) collaborated study, there was a crude prevalence rate of 30.13% of musculoskeletal pain in a South Indian community [5]. Shoulder pain and impaired function are the measures of burden in musculo skeletal disorders [6]. It has been observed that in the developing world, the complex factors such as modernisation and socioeconomics, would influence people to bear, adapt and manage the pain and disability arising from musculoskeletal disorders [5,6].

Range of Motion (ROM) and strength of muscle helps in evaluating shoulder performance. According to Bot SD et al., objective measurement is impractical as it requires a face-to-face contact and is also time consuming [7]. The treatment efficiency is assessed considering the outcome measures that are directly relevant to the patient [8].

Several shoulder disability questionnaires are used by many clinicians to evaluate the treatment and to measure follow up status. Disability of the Arm, Shoulder and Hand scale (DASH) [9], the American Shoulder and Elbow Surgeon Standardised Assessment Form (ASES) and the SPADI are commonly used scales to evaluate the shoulder disability [10].

The SPADI is easily applicable, valid, agreeable, reliable and interpretable with a good construct validity and minimal ceiling and flooring effects [11]. The SPADI is a self administered instrument for the painful shoulder that would evaluate the disability and pain [8].

SPADI Tool Description and Scoring

The SPADI developed by Roach KE et al., is the English self-reported questionnaire which is easy to understand and requires only a short time to answer [12,13]. SPADI was developed for use in an outpatient setting and it was designed to measure the impact of shoulder pathology in terms of pain and disability for both current status and change in status over time. The questionnaire consists of only 13 items divided into two subscales, namely; 'pain' and 'disability' with five and eight questions, respectively. Each question was scored using a Visual Analogue Scale (VAS), with "no pain or no difficulty in doing an activity" at one end and "unbearable pain or so difficult it require help" at the other end. The scores are calculated according to the guidelines that were given by the author. This scale has been widely used and become a standard, reliable and a valid region-specific measure for the shoulder.

Owing to its standard validity and reliability, there was a need for cross cultural adaptation into a regional Indian language (Telugu). In addition, it was translated to many languages including German, Persian, Slovenian, Tamil, Italian and Brazilian [14-19]. For these reasons, the purpose of the present study was to translate English version and culturally adapt the SPADI to Telugu version and to assess its internal consistency and criterion validity. The study hypothesised that the SPADI would be a valid and reliable questionnaire to assess shoulder disability among Telugu people having shoulder pain.

MATERIALS AND METHODS

This cross cultural adaptation study was conducted on 200 participants with shoulder pain and dysfunction who were recruited from the outpatient department of Susruta Institute of Physical Medicine and Rehabilitation, Hyderabad, India, after obtaining Institutional Ethical Approval and written informed consent. The present study was done for a period of one year (February 2016 to January 2017). Both men and women with symptomatic shoulder pain and restriction of ROM, older than 21 years, and who were able to read and understand Telugu were included. Participants with previous shoulder surgeries, neck pathology, disabling upper limb osteoarthropathic and neuropathic conditions along with the inability to read and understand Telugu were excluded from the study.

Procedure

The permission for cross cultural adaptation of SPADI and to assess its reliability and validity of the Telugu scale were also granted by the original author. The participants were briefed about the procedure before responding to the scale. In the study, participant's age, sex, duration of shoulder problem, pain, educational level, and presence of comorbidities were recorded from the interview and medical records. As per the guidelines of the AAOS outcomes committee, translation and cross cultural adaptation of SPADI was done [20].

The procedure consists of six stages as follows:

Stage I: Forward translation (English to Telugu) by an informed translator (i.e., health professional, T1) and uninformed translator (T2).

Stage II: Synthesis of T1 and T2, resolving any discrepancies, leading to version T-12.

Stage III: Back translation (Telugu to English) of the version T-12 by two native English speaking back translators (BT1 and BT2) who were unaware of the purpose of the instrument.

Stage IV: Expert committee review consisting of all four translators, one methodologist, and one language professional to reach a consensus on discrepancies or ambiguities, and to establish a prefinal version (Telugu).

Stage V: Test of the prefinal version.

The final stage of adaptation of the new questionnaire is testing the prefinal version in subjects/patients from the target setting.

Stage VI: Submission of documentation to the AAOS Committee.

The final stage in the adaptation process is to verify whether the recommended stages were followed or not.

A pilot study, including 60 patients was done using the prefinal version (Stage V). These participants were later included in the final analysis. Telugu Questionnaire was given to the participants and they were asked to mark the appropriate point on the scoring system, which represented their status of shoulder pain and disability.

In the present study, an investigator was present during scale administration without influencing the subject's scoring on the questionnaire. The subscale scores were calculated by adding the item scores for that subscale and dividing this number by the maximum score possible for the items that were deemed applicable by the subject. This number was then multiplied by 100. If not applicable was marked by the subject in any item then it was not included in the maximum possible score and no score was calculated if more than two items were marked as 'not applicable'. The score ranges from 0 to100 the higher the score, the greater the impairment to the shoulder function. The total SPADI score was calculated by the average score of pain and disability subscale scores [12]. After the completion of the telugu questionnaire, the active ROM of the shoulder was measured, using a standard universal goniometer [21]. The standard test positions were used for the goniometric measurements. The criterion validity of the questionnaire was calculated using range of motion values. The second assessment by the same investigator was scheduled at least 24 hours after the first session to assess test-retest reliability.

STATISTICAL ANALYSIS

Data were analysed using SPSS for Windows version 20.0 (Statistical package for Social Sciences, IBM Inc. USA www.spss.com). The test-retest reliability of the total Telugu SPADI, pain and disability subscales was assessed using intraclass correlation coefficients at 95% confidence interval levels. Internal consistency of the Telugu SPADI was measured using Cronbach's alpha coefficient. The criterion validity was assessed using Pearson correlation coefficients. A Chi-square test was used to compare the demographic data of the study population.

RESULTS

The mean and standard deviation of the age for male was 54.957±7.9695 and for female it was 55.971±8.6083. The sample consisted of 95 female and 105 male participants. The right shoulder was affected in 92 participants and left shoulder was affected in 108 participants. There was no significant difference in the incidence of shoulder dysfunction among male and female.

Reliability

Test and Retest Mean±SD of total SPADI values were 81.3114±8.2308 and 79.8382±8.1768 [Table/Fig-1]. The ICC values for the SPADI pain score (0.9645), SPADI disability score (0.96342) and total SPADI (0.9792) which showed high reproducibility of the questionnaire [Table/Fig-2]. By normal standards, the association between the two variables would be considered statistically significant ($p<0.05$). The internal consistency of the Telugu SPADI pain subscale, disability subscale and total scale was excellent. Cronbach's alpha coefficients were 0.88, 0.90 and 0.91, respectively.

	Test	Retest
Mean±SD	81.3114±8.2308	79.8382±8.1768

[Table/Fig-1]: Test and retest Mean±SD of total SPADI.
SD- Standard deviation

SPADI scale	ICC	95%CI (Confidence Interval)	
		Lower bound	Upper bound
Pain scale single measure	0.96458	0.954	0.973
Disability single measure	0.96342	0.952	0.972
Total score single measure	0.97923	0.973	0.984

[Table/Fig-2]: Reliability of telugu language SPADI.
SPADI- Shoulder pain and disability index
ICC- Intraclass correlation coefficient

Validity

Face validity was established in the original version (English) of the SPADI and was considered adequate for the Telugu SPADI after calculations, i.e., the content of the translated items were understandable and they are related to activities of the shoulder in daily living and could be used in the assessment of shoulder pain and function. Pearson's correlation between the initial total SPADI score, individual pain score, individual disability score and the baseline active range of motion of shoulder was calculated to assess the criterion validity. The baseline active range of motion of shoulder scores are given in [Table/Fig-3].

Shoulder movements in degrees	Mean±SD
Flexion	94.055±14.0982
Extension	38.395±6.8919
Abduction	83.010±17.2548
Internal rotation	45.625±10.8997
External rotation	41.055±9.8672

[Table/Fig-3]: Mean±SD of shoulder range of motion.
SD- Standard deviation

There was a moderately strong negative correlation between shoulder range of motion and pain score (correlations ranged from -0.40394 to -0.5360), shoulder range of motion and disability score (correlations ranged from -0.3868 to -0.5403) and shoulder range of motion and total SPADI score (correlations ranged from -0.3500 to -0.5053) [Table/Fig-4]. The predictive criterion validity showed that it had a strongly high negative

n=200	Pain score	Disability score	Total score
Shoulder flexion	-0.42472	-0.40594	-0.37586
Shoulder extension	-0.53607	-0.54029	-0.50531
Shoulder abduction	-0.40394	-0.38686	-0.35003
Shoulder internal rotation	-0.47163	-0.45937	-0.43441
Shoulder external rotation	-0.41850	-0.40521	-0.38024

[Table/Fig-4]: Criterion validity: correlation between SPADI scale and shoulder ROM.

correlation.

DISCUSSION

The process of cross cultural adaptation of the SPADI was done through constant discussions with the original author, the primary researcher, and a linguistic specialist. There was no major problems encountered in the cross cultural adaptation into the Telugu language. However, there was a discussion for phrases such as "at its worst," "highshelf," "buttoning shirts," "washing the neck and back," and "back pocket." Translating the questionnaire did not have much difficulty apart from a few words which have synonyms, such as the first leading questions Telugu word "thatukolenibujjamnoppi" can be interpreted as excessive, bad, or extent. In the same way the first question in the pain domain the Telugu word "bujjamnoppitheevratha" can be interpreted as very bad or worse as the first backward translator translated it. Later it was deliberated that "thatukolenianthabujjamnoppi" will be used to translate "at its worst." A few words had been adapted for both sexes, for example buttoning the shirt. Thus, the Telugu question was adapted accordingly.

The translator reached a consensus for the selection of appropriate words to be used in the questionnaire and that could be easily understood by the Telugu speaking participants. While finalising the prefinal version, intra state variations of Telugu language and influence of English on the colloquially spoken Telugu language was taken into consideration. It takes five minutes for a patient to complete the questionnaire, as most of the questions are short and easy to understand. The reliability and internal consistency was excellent in both subscales and also the overall total score. The criterion validity of the Telugu SPADI shared a moderately strong negative correlation in pain, disability and total score which was comparable to the original version (English), which had a moderate to high correlation in negative direction.

The reliability of the total Telugu SPADI had an ICC value 0.979, which was higher than the total English SPADI (ICC=0.6552) but was similar to the Marathi SPADI (ICC=0.97), German (ICC=0.94), Slovenian SPADI (ICC=0.94), Tamil SPADI (ICC=0.95), Turkish SPADI (ICC=0.92), Brazilian SPADI (ICC=0.90-0.94) and Dutch SPADI (ICC=0.89) [12,22,14,16,17,23,19,24]. According to Bot SD et al., an ICC value of ≥0.90 allows the reliable assessment of individual participants [7]. This is clearly observed in the present study for the total score and both sub scores in the Telugu SPADI.

The internal consistency of the Telugu SPADI was excellent, similar to the original version (English) of Roach KE et al., Cronbach's alpha=0.95 and other versions included Greek; Cronbach's alpha=0.932, Tamil; Cronbach's alpha=0.95, German; Cronbach's alpha=0.95, Thai; Cronbach's alpha=0.95 and Spanish; Cronbach's alpha=0.92 [12,25,17,14,26,27].

There is no true "gold standard" to assess the criterion validity of the SPADI; hence, we compared the SPADI questionnaire with shoulder range of motion [14,24]. There was moderately strong negative correlation between shoulder range of motion and total SPADI score (r=-0.350 to -0.505) which was correlated with total SPADI of English version (r=-0.5455 to -0.8036) and Tamil version (r=-0.373 to -0.577), where as a weak correlation was showed with VAS score during Active Rom (r=0.065) in SPADI of Turkish version [17,12,23]. In a study conducted by Paul A et al., has showed a weak correlation between shoulder questionnaire scores (Dutch Shoulder Disability Questionnaire, United Kingdom Shoulder Disability Questionnaire, Shoulder Pain and Disability Index and the Shoulder Rating Questionnaire) and active shoulder movement (r=-0.02 to -0.44) [28].

Bot SD et al., evaluated 16 questionnaires and found that the correlations between the Simply Shoulder Test (SST), Shoulder Severity Index (SSI), American Shoulder and Elbow Surgeons Standardised Shoulder Assessment Form (ASES), SPADI, and Disability of the Arm Shoulder, and Hand (DASH) scale was high (>0.74) [7]. Similarly, Rodney TS et al., compared the University of California-Los Angeles Shoulder Scale, the Simple Shoulder Test, and the SPADI [29]. Three scales demonstrated good internal consistency, suggesting that all items for each scale measure the same construct. This was in agreement with the study and supported the results. Paul A et al., in there study on Four questionnaires (Dutch Shoulder Disability Questionnaire, United Kingdom Shoulder Disability Questionnaire, Shoulder Pain and Disability Index and the Shoulder Rating Questionnaire) showed that all had similar validity and confirmed that SPADI was the quickest to complete, without any significant change of scores in stable subjects [28].

The Telugu SPADI proved to be a valid and reliable tool for shoulder pain and function that can be implemented in clinical practice. The steps followed in cross culturally adapting the English SPADI and establishing the validity and reliability of the Telugu SPADI is as per the well accepted norms followed among researchers.

LIMITATION

Limitations of the present study, there was no correlation done between SPADI and other questionnaires, since several tools have the ability to elicit different aspects of pain and functionality. The study was limited to only one health centre. Statistically, factor analysis of individual questions was not performed.

CONCLUSION

The study concluded that the converted version of the English SPADI into a regional Indian language (Telugu) is reliable and valid measure for shoulder pain and disability and it can be easily applied in the Telugu speaking population.

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