Cross-cultural adaptation, validation, and reliability testing of the Shoulder Pain and Disability Index in the Persian population with shoulder problems

Mohammad H. Ebrahimzadeh[a], Ali Birjandinejad[a], Farideh Golhasani[a], Ali Moradi[a], Ehsan Vahedi[a] and Amir R. Kachooei[a,b]

We aimed to validate the translated and cross-culturally adapted Persian version of the Shoulder Pain and Disability Index (SPADI). The final Persian SPADI was administered to 190 patients, out of whom 83 patients returned for the retest. We administered the Persian version of the SF-36 quality-of-life inventory and the disabilities of the arm shoulder and hand (DASH) questionnaires at the first visit to assess the convergent validity. Cronbach's α was 0.94 for the total SPADI, which showed excellent internal consistency. The intraclass correlation coefficient was 0.84 for the total SPADI, which showed good reliability between the test and retest. Convergent validity was confirmed, as the Spearman correlation between total SPADI and DASH was 0.61. Moreover, there was significant correlation between the subscales of the SPADI and SF-36 scales. The Persian version of the SPADI proved to be a reliable and valid instrument to be implemented in the Persian population with shoulder disorders. Level of evidence: level II. *International Journal of Rehabilitation Research* 38:84–87 Copyright © 2015 Wolters Kluwer Health, Inc. All rights reserved.

Introduction

The Shoulder Pain and Disability Index (SPADI) is deemed a quality-of-life measure and comprises two subscales: pain and disability (Roach *et al.*, 1991). It is considered a high-quality instrument because of the fewer number of questions (13 items) and simple numerical rating system ranging from 0 to 10, which requires only 5–10 min to respond (Roach *et al.*, 1991; Bot *et al.*, 2004).

Persian is the first language used in countries such as Iran, Afghanistan, and Tajikistan, as well as in some regions of Pakistan and Iraq. It has been advised to translate and culturally adapt questionnaires rather than create new instruments to minimize the uncoordinated proliferation of various measures (Guillemin *et al.*, 1993; Beaton *et al.*, 2000). In this study, we aimed to validate the translated and cross-culturally adapted Persian version of the SPADI in the Persian-speaking population with shoulder problems.

Patients and methods

Patients

In an institutional review board-approved study, we enrolled 190 consecutive patients from a shoulder clinic through a convenience sampling from February to October 2013. Patients having mainly a shoulder problem, aged 18 years or older, with more than 4 weeks of symptom duration, and were native literate Persian speakers were included in the study. We excluded patients with neoplasm, radiating pain with cervical spine origin, and systemic inflammatory disease (Tables 1 and 2).

Translation

For cross-cultural adaptation of the SPADI, we followed the guidelines provided by Beaton *et al.* (2000) (Guillemin *et al.*, 1993). Three independent Persian-speaking individuals including two orthopedic surgeons and one professional English teacher with no medical background translated the original English version of the SPADI to Persian (Farsi). Thereafter, in a meeting, the three translations were reconciled and combined together into a single Persian SPADI version. Afterward, a native American English speaker, who was fluent in Persian and was not aware of the original English SPADI, back-translated this Persian version into English.

In a second meeting between the authors and professional translators, backward English translation was discussed with regard to conformity with the Persian and the original English SPADI. The discrepancies were minor; therefore, a consensus was achieved on the prefinal version of the Persian SPADI. To pretest this version in a pilot study, the Persian SPADI was administered to 30 patients with shoulder problems. Minor difficulties

Table 1 Characteristics of patients with shoulder problems (*n* = 190)

Age [mean (SD)]	41 (15)
Sex [*n* (%)]	
Male	97 (51)
Female	93 (49)
Career [*n* (%)]	
Employee	111 (58)
Jobless	25 (13)
Housekeeper	47 (25)
Retired	7 (4)
Education [*n* (%)]	
School	22 (12)
Undergraduate	57 (30)
Graduate	48 (25)
Postgraduate	63 (33)
Involved side [*n* (%)]	
Right	98 (52)
Left	66 (35)
Bilateral	26 (13)
Diagnosis [*n* (%)]	
Recurrent dislocation	17 (9)
Fracture	10 (5)
Shoulder trauma	3 (2)
Biceps tenosynovitis	14 (8)
Subacromial bursitis	25 (13)
Impingement syndrome	6 (3)
Rotator cuff tear	15 (8)
Frozen shoulder	42 (22)
ACJ OA	5 (3)
Nonspecific pain	37 (19)
Other	16 (8)

ACJ OA, acromioclavicular joint osteoarthritis.

Table 2 Average pain, disability, and functional scores of patients with shoulder problems (*n* = 190)

DASH [mean (SD)]	44 (26)
SF-36 [mean (SD)]	
Physical functioning	58 (26)
Role physical	28 (34)
Bodily pain	37 (27)
General health	55 (20)
Vitality	58 (20)
Social functioning	61 (31)
Role emotional	41 (40)
Mental health	61 (20)
PCS	36 (9.7)
MCS	45 (11)
SPADI [mean (SD)]	
Pain	60 (27)
Disability	46 (31)
Total	52 (28)

DASH, disabilities of the arm shoulder and hand; MCS, mental component summary; PCS, physical component summary; SPADI, Shoulder Pain and Disability Index.

in understanding were addressed and the final version was created (Fig. 1).

Shoulder Pain and Disability Index
This self-administered 13-item questionnaire was developed to measure pain and disability of the shoulder in an outpatient setting (Roach *et al.*, 1991; Bot *et al.*, 2004). It consists of two subscales: a five-item subscale of pain representing pain severity in the last week and an eight-item disability subscale representing shoulder function in activities of daily living. The total score

Fig. 1

Persian (Farsi) version of the Shoulder Pain and Disability Index administered to patients with shoulder problems.

ranges from 0 to 100, with the higher score representing higher pain intensity and disability.

Psychometric analysis
Reliability is tested by measuring the intraclass correlation coefficient (ICC) between test and retest. Internal consistency was tested by means of Cronbach's α coefficient, which calculated the internal correlations of all the items on the same scale and the items in each subscale. To test the convergent validity, we used the already approved valid Persian-DASH (disabilities of the arm shoulder and hand) (Mousavi *et al.*, 2008) and Persian SF-36 (Motamed *et al.*, 2005) survey to test the validity of the SPADI. We assessed the statistical validity by calculating Spearman's correlation coefficient between the SPADI and the DASH and SF-36.

Results
The ICCs demonstrated good reliability between each individual item test and retest (Table 3). ICC showed good reliability for the subscales of pain and disability as well as for the total SPADI score between test and retest (Table 4).

Table 3   ICC between test–retest of the individual SPADI items (test: n = 190, retest: n = 83)

Items	Subscale	Minimum	Maximum	Mean	SD	ICC	95% CI	P-value
	Pain: how severe is your pain?							
1	At its worst?	0	10	7.0	2.8	0.63	0.23–0.65	< 0.001
2	When lying on the involved side?	0	10	6.3	3.4	0.65	0.38–0.80	< 0.001
3	Reaching for something on a high shelf?	0	10	6.3	3.5	0.72	0.50–0.84	< 0.001
4	Touching the back of your neck?	0	10	5.1	3.7	0.75	0.57–0.86	< 0.001
5	Pushing with the involved arm?	0	10	5.3	3.7	0.65	0.39–0.80	< 0.001
	Disability: how much difficulty do you have?							
6	Washing your hair?	0	10	4.0	3.8	0.72	0.51–0.84	< 0.001
7	Washing your back?	0	10	5.8	3.8	0.90	0.83–0.94	< 0.001
8	Putting on an undershirt or jumper?	0	10	4.8	3.8	0.70	0.48–0.83	< 0.001
9	Putting on a shirt that buttons down the front?	0	10	2.6	3.5	0.56	0.25–0.74	0.0010
10	Putting on your pants?	0	10	3.2	3.7	0.62	0.34–0.78	< 0.001
11	Placing an object on a high shelf?	0	10	5.7	3.7	0.69	0.46–0.83	< 0.001
12	Carrying a heavy object of 10 pounds?	0	10	6.2	3.7	0.72	0.51–0.84	< 0.001
13	Removing something from your back pocket?	0	10	4.8	4.1	0.76	0.58–0.86	< 0.001

CI, confidence interval; ICC, intraclass correlation coefficient; SPADI, Shoulder Pain and Disability Index.

Table 4   Internal consistency and test–retest reliability of the Persian version of the SPADI

			Intraclass correlation coefficient		
Subscales	Number of items	Cronbach's α (T1, T2)	ICC	95% CI	P-value
Pain	5	0.85, 0.87	0.78	0.61–0.87	< 0.001
Disability	8	0.94, 0.90	0.84	0.71–0.91	< 0.001
Total	13	0.94, 0.94	0.84	0.70–0.91	< 0.001

CI, confidence interval; ICC, intraclass correlation coefficient; SPADI, Shoulder Pain and Disability Index; T1, test; T2, retest.

Cronbach's α coefficient showed good internal consistency across the items in the pain subscale and excellent internal consistency across the items in the disability subscale as well as excellent internal consistency across all 13 items of the Persian SPADI. Cronbach's α was almost identical at the first and second visit for both subscales and for the total measure (Table 4).

There was a strong correlation between the subscales and total SPADI and the total DASH score. The highest correlation was between total SPADI and total DASH scores ($r = -0.61$, $P < 0.001$). Moreover, the subscales and total SPADI score showed a moderate to strong correlation with the eight subscales and the two domains of the SF-36. The highest correlation was between the pain subscale of SPADI and the bodily pain subscale of the SF-36 ($r = -0.48$, $P < 0.001$). We found a strong interscale correlation between subscales of the SPADI, pain and disability ($r = 0.80$, $P < 0.001$) (Table 5).

Discussion

The purpose of this study was to test the validity and reliability of the Persian version of SPADI in the Persian-speaking population with shoulder disorders.

Our findings have confirmed the validity and reliability of the Persian SPADI as a useful instrument in shoulder problems. The thorough questionnaire demonstrated excellent internal consistency, good reliability, and confirmed convergent

Table 5   Convergent validity expressed by Spearman's ρ correlation coefficient between subscales of the Persian SPADI and subscales of the SF-36 and DASH (n = 190)

	SPADI		
	Pain	Disability	Total
SF-36			
Physical functioning	−0.30**	−0.33**	−0.33**
Role physical	−0.19**	−0.23**	−0.23**
Bodily pain	−0.48**	−0.42**	−0.46**
General health	−0.29**	−0.29**	0.31**
Vitality	−0.17*	−0.16*	−0.17*
Social functioning	−0.34**	−0.39**	−0.39**
Role emotional	−0.32**	−0.31**	−0.33**
Mental health	−0.17*	−0.16*	−0.17*
PCS	−0.32**	−0.33**	−0.34**
MCS	−0.27**	−0.26**	−0.28**
DASH	0.56**	0.59**	0.61**
SPADI			
Pain	1	0.80**	
Disability	0.80**	1	

DASH, disabilities of the arm shoulder and hand; MCS, mental component summary; PCS, physical component summary; SPADI, Shoulder Pain and Disability Index.
*Correlation is significant at the 0.05 level (two-tailed).
**Correlation is significant at the 0.01 level (two-tailed).

validity. The level of reliability and validity of the Persian version is as high as its original English and the subsequent translated versions. In addition, the significant correlation between SPADI and DASH scores establishes the conformity between them in that both are measuring the same context.

Roach *et al.* (1991) developed the SPADI in 1991. Developers of the SPADI examined the level of function and disability based on the active shoulder range of motion, but as there was no evidence in favor of a correlation between active shoulder range of motion and function the construct validity was tested over the sickness impact profile, which is widely used to test the validity of a new disability measure (MacDermid *et al.*, 2006). The results confirmed its validity and showed better responsiveness as a region-specific tool compared with the more generic quality-of-life-related instruments.

For this reason, it is also recommended by physical and occupational therapists to be applied to document the progression f recovery (MacDermid *et al.*, 2006). Furthermore, in a review of 16 shoulder-related instruments used to evaluate clinimetric properties, SPADI proved to be a high-quality measure and the most appropriate instrument in an outpatient setting (Bot *et al.*, 2004).

SPADI has been translated into different languages and adapted to different shoulder problems. The original SPADI was tested on 37 male patients with shoulder problems. The test–retest reliability was 0.64–0.66 and the internal consistency ranged from 0.86 to 0.95 (Roach *et al.*, 1991). Test–retest reliability of the Brazilian (Martins *et al.*, 2010), Danish (Christiansen *et al.*, 2013), German (Angst *et al.*, 2007), Turkish (Bicer and Ankarali, 2010), and Slovene (Jamnik and Spevak, 2008) versions was 0.94, 0.88, 0.94, 0.92, and 0.94, respectively. The results of reliability testing in our study were consistent with that of other studies. The internal consistency measured by Cronbach's α was 0.89, 0.94, 0.95, 0.94, and 0.92 in Brazilian (Martins *et al.*, 2010), Danish (Christiansen *et al.*, 2013), German (Angst *et al.*, 2007), Turkish (Bicer and Ankarali, 2010), and Slovene (Jamnik and Spevak, 2008) versions, respectively, which is consistent with our findings showing excellent internal consistency for the Persian version of SPADI.

For testing the convergent validity, the SPADI was compared with the DASH questionnaire, the SF-36, and the American Shoulder and Elbow Surgeons questionnaire in a German validation study, which showed a correlation of 0.61–0.69 with the SF-36, 0.88 with the DASH, and 0.92 with the American Shoulder and Elbow Surgeons questionnaire (Angst *et al.*, 2007). The Turkish validation study showed a correlation of 0.65 with the visual analog scale and 0.67 with the health assessment questionnaire (Bicer and Ankarali, 2010).

Our results for the validation and cross-cultural adaptation of SPADI are similar to those of prior validation studies; slight differences in cultural adaptation are acceptable as long as the questionnaire proves to be reliable and valid.

Acknowledgements
Conflicts of interest

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