RESEARCH ARTICLE

Psychometric Properties of the Persian Version of the Simple Shoulder Test (SST) Questionnaire

Mohammad H. Ebrahimzadeh, MD; Ehsan Vahedi, MD; Aslan Baradaran, MD; Ali Birjandinejad, MD; Seyyed-Hadi Seyyed-Hoseinian, MD; Farshid Bagheri, MD; Amir Reza Kachooei, MD

Research performed at Orthopedic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Abstract

Background: To validate the Persian version of the simple shoulder test in patients with shoulder joint problems.

Methods: Following Beaton`s guideline, translation and back translation was conducted. We reached to a consensus on the Persian version of SST. To test the face validity in a pilot study, the Persian SST was administered to 20 individuals with shoulder joint conditions. We enrolled 148 consecutive patients with shoulder problem to fill the Persian SST, shoulder specific measure including Oxford shoulder score (OSS) and two general measures including DASH and SF-36. To measure the test-retest reliability, 42 patients were randomly asked to fill the Persian-SST for the second time after one week. Cronbach's alpha coefficient was used to demonstrate internal consistency over the 12 items of Persian-SST.

Results: ICC for the total questionnaire was 0.61 showing good and acceptable test-retest reliability. ICC for individual items ranged from 0.32 to 0.79. The total Cronbach's alpha was 0.84 showing good internal consistency over the 12 items of the Persian-SST. Validity testing showed strong correlation between SST and OSS and DASH. The correlation with OSS was positive while with DASH scores was negative. The correlation was also good to strong with all physical and most mental subscales of the SF-36. Correlation coefficient was higher with DASH and OSS in compare to SF-36.

Conclusion: Persian version of SST found to be valid and reliable instrument for shoulder joint pain and function assessment in Iranian population.

Keywords: Persian, Reliability, Simple shoulder test, Validity

Introduction

Outcome measures are useful instruments in orthopedics. They help assess the function and quality of life of patients in the clinical practice (1). Outcome measures are categorized as physician-reported versus patient-reported tools. Furthermore, they can also be classified in terms of assessing the general health status such as short form 36 (SF-36) versus region-specific measures particularly assessing an anatomical region including shoulder (2).

Shoulder conditions are the second most prevalent disorders bringing the patients to the orthopedic clinics. There are several patient reported outcome (PRO) measures evaluating shoulder function and disabilities including the American shoulder and elbow surgeons (ASES), Shoulder pain and disability index (SPADI), disabilities of the arm shoulder and hand (DASH),

Oxford shoulder score (OSS), simple shoulder test (SST), subjective shoulder rating system (SSRS), shoulder severity index (SSI), and University of California Los Angeles (UCLA) shoulder score (3-5).

Simple shoulder test (SST) is a simple, short, and patient reported standardized tool for the assessment of shoulder function. Lippitt et al developed it in 1993 in order to assess the shoulder function before and after the treatment (6). It is comprised of 12 questions with dichotomous 'Yes=1' or 'No=0' response options. The sum of scores makes the total score ranging from 0 showing the worst to 12 showing the best function during the last week. SST is validated and used in different languages including English, Italian, Portuguese, Spanish, and Dutch (7-11). In the current study we aimed to translate it into Persian and test the validity and reliability of cross-culturally adapted questionnaire in Iranian population with shoulder conditions.

Corresponding Author: Ehsan Vahedi, Orthopedic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
Email: Vahedie@mums.ac.ir

THE ONLINE VERSION OF THIS ARTICLE
ABJS.MUMS.AC.IR

Materials and Methods

We performed the study in 3 phases. In phase 1, translation and cultural adaptation was done according to Beaton's guideline (12) [Appendix 1]. In phase 2, was performed a pilot study to find the acceptability and difficulties in understanding the items. In phase 3, we administered the final version of the Persian-SST to patients with shoulder condition.

Translation

We used the forward-backward method according to the published guidelines for cross-cultural adaptation of health status measures to translate the original English SST into Persian (12). Initially, two native Persian-speaking researchers translated SST into Persian. The two drafts were compared in a session to reach to a consensus of about the translation and wording of the items. Furthermore, a native English speaker, who was not aware of the original SST, back translated the Persian draft into English. This version was then compared to the original SST and minor discrepancies were addressed [Appendix 1].

To test the face validity, we administered the Persian version to 20 patients with shoulder problems to find difficulties in understanding. There were minor issues that were addressed in the final Persian version.

Patients

Our Institutional Review Board approved this study and patients were verbally consented to fill the questionnaires. We enrolled 148 patients with different shoulder conditions from September 2013 to March 2014 [Tables 1; 2].

Validity

To test the validity of a questionnaire, it has to be tested over an already validated questionnaire to check whether any correlation exists in scores, which further shows that they both are measuring what they are supposed to measure. To test the validity of SST, one shoulder specific measure including Oxford shoulder score (OSS) and two general measures including DASH and SF-36 were also administered to the patients. OSS, DASH, and SF-36 have all been validated in Persian (13, 14). We used Spearman's correlation coefficient to show the level and direction of changes in scores of the SST in respect to other applied measures.

Test-Retest Reliability

To measure the test-retest reliability, 42 patients were randomly asked to fill the Persian-SST for the second time after one week. Patients did not receive major treatment in order to avoid substantial changes in symptoms over this period. Test retest reliability was tested using Intraclass correlation coefficient (ICC) with 95% confidence interval. P-values less than 0.05 were considered significant. Higher coefficients show better reproducibility of the tool.

Internal consistency

Cronbach's alpha coefficient demonstrates internal consistency over the 12 items of Persian-SST. Cronbach's alpha between 0.70 and 0.90 is considered as good internal consistency while values above 0.90 shows excellent internal consistency. We also tested the internal consistency of the questionnaire after deletion of each item to check whether the consistency of the items increases without the deleted item.

Results

Validity

Testing for validity showed strong correlation between SST and OSS and DASH. The correlation with OSS was positive while with DASH scores was negative showing that it is measuring what it is supposed to measure because lower DASH scores show less disability, which is similar in context to that of higher OSS and SST scores. The correlation was also good to strong with all physical and most mental subscales of the SF-36. Correlation

Table 1. Characteristics of patients with shoulder condition (N=148)	
Age, mean (SD)	48 (15)
Sex, no. (%)	
Male	78 (53)
Female	70 (47)
Career, no. (%)	
Heavy worker	43 (29)
Employee	12 (8.0)
Jobless	10 (7.0)
Housekeeper	51 (35)
Retired	14 (10)
Missing	18 (11)
Education, no. (%)	
School	50 (34)
Undergraduate	29 (20)
Graduate	17 (12)
Post-graduate	33 (21)
Missing	19 (13)
Involved side, no. (%)	
Right	58 (39)
Left	53 (36)
Bilateral	37 (25)
Diagnosis, no. (%)	
Frozen shoulder	53 (36)
Dislocation	7 (5.0)
Rotator cuff tear	6 (4.0)
Fracture	31 (21)
Non-specific pain	26 (17)
Other	25 (17)

Table 2. Average disability, functional, and quality of life score of patient with shoulder conditions

	Mean (SD)	Range (Min-Max)
Shoulder Simple Test	4.4 (3.3)	0-12
DASH	47 (24)	0-93
Oxford Shoulder Score	25 (12)	0-48
SF-36		
PCS	37 (10)	0-55
Physical functioning	57 (26)	0-100
Role Physical	33 (33)	0-100
Bodily pain	41 (27)	0-100
General Health	53 (20)	0-97
MCS	43 (12)	0-62
Vitality	55 (20)	0-100
Social Functioning	69 (29)	0-100
Role Emotional	38 (37)	0-100
Mental Health	57 (22)	0-100

DASH=Disabilities of the Arm Shoulder and Hand, PCS: Physical Condition Scale, MCS: Mental Condition Scale

coefficient was higher with DASH and OSS in compare to SF-36 showing that region specific measures are more

Table 3. Spearman's Correlation Coefficient (rho) between SST and the other disability, functional, and quality of life measures

	SST	
	r	P
DASH	(-0.596)	<0.001
Oxford Shoulder Score	0.586	<0.001
SF-36		
PCS	0.411	<0.001
Physical functioning	0.454	<0.001
Role Physical	0.191	0.028
Bodily pain	0.218	0.010
General Health	0.218	0.011
MCS	0.151	0.094
Vitality	0.164	0.060
Social Functioning	0.239	0.005
Role Emotional	0.168	0.053
Mental Health	0.196	0.022

DASH=Disabilities of the Arm Shoulder and Hand, PCS: Physical Condition Scale, MCS: Mental Condition Scale

Table 4. Internal consistency and test-retest reliability of the Persian version of the Simple Shoulder Test

Questions	Cronbach's alpha if item deleted	(Intraclass Correlation Coefficient)			P value
		ICC	95% CI		
			Lower Bound	Upper Bound	
1	0.859	0.567	0.142	0.780	0.009
2	0.84	0.676	0.367	0.834	0.001
3	0.82	0.665	0.337	0.830	0.001
4	0.822	0.608	0.221	0.803	0.004
5	0.825	0.679	0.375	0.837	<0.001
6	0.824	0.788	0.587	0.891	<0.001
7	0.815	0.675	0.343	0.838	0.001
8	0.817	0.363	-0.249	0.676	0.095
9	0.83	0.717	0.444	0.855	<0.001
10	0.826	0.608	0.235	0.799	0.003
11	0.824	0.425	-0.105	0.704	0.050
12	0.834	0.318	-0.355	0.654	0.136
Total SST	0.841	0.610	0.226	0.802	0.004

SD=Standard Deviation, ICC=Intraclass Correlation Coefficient, CI=Confidence Interval

sensitive than general measures and more prone to be affected by the specific regional condition [Table 3].

Test-retest reliability
Intraclass correlation coefficient for the total questionnaire was 0.61 showing good and acceptable test-retest reliability. ICC for individual items ranged from 0.32 to 0.79. This variation may be because of a one-week interval between test and retest that may have affected the response to some items although major treatment was not received. However the reliability and reproducibility of the questionnaire is confirmed for the whole questionnaire [Table 4].

Internal consistency
The total Cronbach's alpha was 0.84 showing good internal consistency over the 12 items of the Persian-SST. Cronbach's alpha after deletion of each item did not exceed the total coefficient showing that all items are consistent and measure in a same direction [Table 4].

Discussion
The aim of our study was to assess the validity and reliability of the Persian-SST in Persian speaking population with shoulder conditions. We confirmed the validity and reliability of the Persian simple shoulder test questionnaire and usefulness of this instrument in quantifying pain and function of this specific joint.
One of the limitations to our study is that we administered the SST to patients who had the history of shoulder surgery or injection regardless of time limits in

terms of recent or remote surgery. This may have affected the responsiveness of patients with recent versus patients with remote surgery. Another limitation to our current study is testing the validity of the Persian SST over the two more general health related questionnaires including the DASH and SF-36 (2). However, both of them are patient-based questionnaires.

Internal consistency and test-retest reliability indicated good reliability of Persian-SST. Also measurement of Spearman`s correlation coefficient confirmed the construct validity of Persian-SST by showing strong correlation with Persian OSS, DASH, and majority of subscales of SF-36 questionnaires. In our study, Cronbach`s alpha was 0.84 showing good internal consistency and high level of reliability over the items. Test-retest reliability of Persian SST was 0.61 that was high enough to confirm the test-retest reliability and proved to be a reproducible tool.

DASH questionnaire was used in the validation process of Spanish and Dutch versions of SST (7, 9). Correlations between SST and DASH in Spanish and Dutch versions were stronger than Persian version (r=-0.73 in Spanish version and r=-0.74 in Dutch version compared to r=0.596 in Persian version). OSS questionnaire was used in validation process of Dutch and Persian versions. Correlation between SST and OSS was stronger in Dutch version than Persian version(r=-0.74 in respect to r=0.586). SF-36 questionnaire was used in validation process of Portuguese and Persian versions of SST (8). SST has fair correlation with SF-36 in Persian version compared to significant correlation with Portuguese version. Godfrey et al published results of their study about validity, reliability and responsiveness of SST in patients with shoulder instability and rotator cuff injuries in 2007 (11). The ICC for SST was >0.90 demonstrating an excellent test-retest reliability. Membrilla-Mesa et al tested the validity and reliability of Spanish version of SST (9). Cronbach's alpha was 0.79 and ICC was 0.91 showing high test-retest reliability. Validity determined

from the relation between Spanish SST and DASH was strong and inversely related (r=-0.73; *P*<0.001) and quite inversely related to VAS (r=-0.53; *P*< 0.001). There were poor and direct correaltions with Physical Component Scores and Mental Component Scores of SF-12, respectively. Validation of SST in Portuguese Brazilian population showed that Cronbach's alpha and ICC were 0.82 and 0.84, respectively (8). In another study by van Kampen et al, the Dutch version of SST was validated with a good internal consistency (alpha=0.78), and a excellent test-retest reliability (ICC=0.92) (7). There were strong correlations between the Dutch version of SST and the DASH (r=-0.74) as well as OSS (r=-0.74). For the Italian version of SST authors showed that the Italian versions of UCLA shoulder scale, SPADI, and SST are valid and reliable instruments (10).

Simple Shoulder Test is a reliable and valid instrument for the assessment of shoulder conditions, which showed to be applicable in different cultures and languages. Using an identical technique in our validation studies, we confirmed that Simple Shoulder Test is a standardized outcome measure for the assessment of shoulder pain and dysfunction (3, 15).

Mohammad H. Ebrahimzadeh MD
Ehsan Vahedi MD
Aslan Baradaran MD
Ali Birjandinejad MD
Seyyed-Hadi Seyyed-Hoseinian MD
Farshid Bagheri MD
Amir Reza Kachooei MD
Orthopedic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

References

1. Kennedy CA, Beaton DE, Smith P, Van Eerd D, Tang K, Inrig T, et al. Measurement properties of the QuickDASH (disabilities of the arm, shoulder and hand) outcome measure and cross-cultural adaptations of the QuickDASH: a systematic review. Qual Life Res. 2013; 22(9):2509-47.
2. Kachooei AR, Ebrahimzadeh MH, Erfani-Sayyar R, Salehi M, Salimi E, Razi S. Short Form-McGill Pain Questionnaire-2 (SF-MPQ-2): a cross-cultural adaptation and validation study of the persian version in patients with knee osteoarthritis. Arch Bone Jt Surg. 2015; 3(1):45-50.
3. Ebrahimzadeh MH, Birjandinejad A, Golhasani F, Moradi A, Vahedi E, Kachooei AR. Cross-cultural adaptation, validation, and reliability testing of the Shoulder Pain and Disability Index in the Persian population with shoulder problems. Int J Rehabil Res. 2015; 38(1):84-7.
4. Ebrahimzadeh MH, Moradi A, Vahedi E, Kachooei AR, Birjandinejad A. Validity and reliability of the persian version of shortened disabilities of the arm, shoulder and hand questionnaire (Quick-DASH). Int J Prev Med. 2015; 6(5):59.
5. Kachooei AR, Moradi A, Janssen SJ, Ring D. The influence of dominant limb involvement on DASH and QuickDASH. Hand (N Y). 2015; 10(3):512-5.
6. Lippitt SB, Harryman DT, Matsen FA, Fu FH, Hawkins RJ. A practical tool for evaluating function: the simple shoulder test. The shoulder: a balance of mobility and stability. Rosemont, IL: American Academy of Orthopaedic Surgeons; 1993. P. 501-18.
7. Van Kampen DA, van Beers LW, Scholtes VA, Terwee CB, Willems WJ. Validation of the Dutch version of the Simple Shoulder Test. J Shoulder Elbow Surg. 2012; 21(6):808-14.

8. Neto JO, Gesser RL, Steglich V, Bonilauri Ferreira AP, Gandhi M, Vissoci JR, et al. Validation of the Simple Shoulder Test in a Portuguese-Brazilian population. Is the latent variable structure and validation of the Simple Shoulder Test Stable across cultures? PloS One. 2013; 8(5):e62890.

9. Membrilla-Mesa M, Tejero-Fernández V, Cuesta-Vargas A, Arroyo-Morales M. Validation and reliability of a Spanish version of Simple Shoulder Test (SST-Sp). Qual Life Res. 2015; 24(2):411-6.

10. Marchese C, Cristalli G, Pichi B, Manciocco V, Mercante G, Pellini R, et al. Italian cross-cultural adaptation and validation of three different scales for the evaluation of shoulder pain and dysfunction after neck dissection: University of California-Los Angeles (UCLA) Shoulder Scale, Shoulder Pain and Disability Index (SPADI) and Simple Shoulder Test (SST). Acta Otorhinolaryngol Ital. 2012; 32(1):12-7.

11. Godfrey J, Hamman R, Lowenstein S, Briggs K, Kocher M. Reliability, validity, and responsiveness of the simple shoulder test: psychometric properties by age and injury type. J Shoulder Elbow Surg. 2007; 16(3):260-7.

12. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000; 25(24):3186-91.

13. Mousavi SJ, Parnianpour M, Abedi M, Askary-Ashtiani A, Karimi A, Khorsandi A, et al. Cultural adaptation and validation of the Persian version of the Disabilities of the Arm, Shoulder and Hand (DASH) outcome measure. Clin Rehabil. 2008; 22(8):749-57.

14. Montazeri A, Goshtasebi A, Vahdaninia M, Gandek B. The Short Form Health Survey (SF-36): translation and validation study of the Iranian version. Qual Life Res. 2005; 14(3):875-82.

15. Kilinc AS, Ebrahimzadeh MH, Lafosse L. Subacromial internal spacer for rotator cuff tendon repair: "the balloon technique". Arthroscopy. 2009;25(8):921-4.

Simple Shoulder Test

مركز تحقيقات ارتوپدی
Orthopedic Research Center

Mashhad University of
Medical Sciences

مشخصات بيمار:
نام و نام خانوادگی بيمار:
سن بيمار:
جنس: زن ☐   مرد ☐
تحصيلات: بيسواد ☐   ابتدايی☐   سيکل ☐   ديپلم ☐   بالاتر از ديپلم ☐
نوع بيماری:
سمت بيمار: راست☐   چپ ☐   هر دو طرف☐
شغل:
شماره تماس:
تلفن همراه:

آزمون ساده شانه

به هر يک از سوالات زير با "بلی" يا "خير" پاسخ دهيد

اگر شما معمولاً آن فعاليت ذکر شده را انجام نمی دهيد،می توانيد انجام دادن آن را تصور کنيد . آيا شانه شما مانع از انجام اين فعاليت خواهد

شد؟ اگر اين فعاليت دردناک نيست يا ندرتاً باعث درد می شود پاسخ "بلی" را انتخاب نماييد ولی اگر در انجام اين فعاليت در مواردی، اغلب

اوقات و يا هميشه شانه شما مشکل پيدا می کند، پاسخ "خير" را انتخاب کنيد.

۱–   آيا شانه شمادر زمانی که در حال استراحت کنار بدنتان قرار گرفته، راحت است؟   بلی◯   خير◯

۲–   آيا شانهشما می گذارد راحت بخوابيد؟   بلی◯   خير◯

۳–   آيا می توانيد دست خود را از پشت به استخوان کتف خود برسانيد؟   بلی◯   خير◯

۴–   آيا می توانيد از پهلودست خود را در پشت سرتان قرار دهيد؟   بلی◯   خير◯

۵–   آيامی توانيد بدون آنکه آرنج خود را خم کنيد،سکه ای بر روی طاقچه ای که همسطح با شانه شماست قرار دهيد؟ بلی◯ خير◯

۶–   آيا می توانيد وزنه نيم کيلويی را بدون خم کردن آرنج تا سطح شانه بلند کنيد؟   بلی◯   خير◯

۷–   آيا می توانيد وزنه چهار کيلويی را بدون خم کردن آرنج تا سطح شانه بلند کنيد؟   بلی◯   خير◯

۸–   آيا می توانيد بار ۱۰ کيلوگرمی را با سمت مبتلا حمل کنيد؟   بلی◯   خير◯

۹–   آيا می توانيد با دست مبتلا يک توپ کوچک را از پائين ۲۰ متر پرتاب نماييد؟   بلی◯   خير◯

۱۰– آيا می توانيد با دست مبتلا يک توپ کوچک را از بالای سر به مسافت ۲۰ متری پرتاب نماييد؟   بلی◯ خير◯

۱۱– آيا می توانيد با دست مبتلا پشت شانه مقابل را بشوئيد؟   بلی◯   خير◯

۱۲– آيا شانه شما اجازه کارتمام وقت در شغلتان را می دهد؟   بلی◯   خير◯

ارزشيابی بيمار از خويش

چه مواردی باعث آسيب ديدگی شانه شما می شود؟

درد شما در کجای طيف زير قرار دارد؟ (آن را علامت بزنيد)

بی دردی کامل◯   درد خفيف◯   بعد از فعاليت غير معمول◯   درد متوسط◯   درد شديد◯   ناتوانی کامل◯

آيا دچار درد شبانه شانه هستيد؟   بلی◯ خير◯

آيا از داروهای مسکن ضد درد استفاده می کنيد؟   بلی◯ خير◯

اسم دارو؟

چند تا قرص در روز؟

آيا احساس سفتی و محدوديت حرکتی در شانه داريد؟   بلی◯ خير◯

آيا در شانه خود احساس لقی و بی ثباتی داريد؟   بلی◯ خير◯

ورزش معمول شما چيست؟ (اگر ورزش می کنيد)

سنگين ترين کاری که در محل کار يا خانه انجام می دهيد چيست؟

لطفاً توانايی شانه خود را برای انجام فعاليتهای زير نمره دهيد؟

(فعاليت طبيعی=۳   محدوديت اندک=۳   با مشکل=۲   فقط با کمک=۱   غير قابل انجام دادن=۰)

۱–استفاده از جيب پشتی شلوار ....   ۲–نظافت خود (توالت)..........   ۳–شستن زير بغل سمت مقابل.........

۳–غذاخوردن با قاشق ....   ۵–شانه کردن موها ....   ۶–استفاده از دستی که در سطح شانه ها باشد ....

۷–حمل بار ۵ تا ۷ کيلويی در کنار بدن ......   ۸–لباس پوشيدن ....   ۹–خوابيدن روی سمت مبتلا ....

۱۰–کشيدن ....   ۱۱–استفاده از دست در بالای سر ......   ۱۲– پرتاب کردن ......

۱۳–بلند کردن ......   ۱۴– انجام دادن شغل معمول ......   ۱۵–انجام ورزش معمول ......