Cross-cultural adaptation and validation of the Portuguese version of the Oxford Shoulder Score (OSS)

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ABSTRACT

Objective: To translate and culturally adapt the Oxford Shoulder Score (OSS) to the European Portuguese language, and to test its reliability (internal consistency, reproducibility and measurement error) and validity (construct validity).

Methods: The OSS Portuguese version was obtained through translations, back-translations, consensus panels, clinical review and cognitive pre-test. Portuguese OSS, Disabilities of the Arm, Shoulder and Hand (DASH) questionnaires, and the visual analogue scales of pain at rest [VAS rest] and during movement [VAS movement] were applied to 111 subjects with shoulder pain (degenerative or inflammatory disorders) and recommended for physical therapy. A clinical and sociodemographic questionnaire was also applied.

Results: The reliability was good, with a Cronbach's alpha coefficient of 0.90, an intraclass correlation coefficient (ICC) of 0.92, a standard error of measurement (SEM) of 2.59 points and a smallest detectable change (SDC) of 7.18 points. Construct validity was supported by the confirmation of three initial hypotheses involving expected significant correlation between OSS and other measures (DASH, VAS rest and VAS movement) and between OSS and the number of days of work absenteeism.

Conclusion: The Portuguese OSS version presented suitable psychometric properties, in terms of reliability (internal consistency, reproducibility and measurement error) and validity (construct validity).

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INTRODUCTION

Shoulder pain is a common condition affecting millions of patients worldwide. There is a variety of degenerative and inflammatory disorders affecting the shoulder and causing pain and loss of physical function: adhesive capsulitis, impingement syndrome with or without rotator cuff tear, calcified deposits in rotator cuff and osteoarthritis[1]. These disorders negatively affect the different dimensions of health status[2] which therefore leads to the need for health care, including physical therapy[3]. Therapeutic exercise is a component of physical therapy that is effective in reducing pain and improving physical function in painful shoulder conditions[4]. These shoulder outcomes are commonly assessed using rating scales and scoring systems[5].

In a literature review on shoulder outcome measures by Wright & Baumgarten[5], more than 30 instruments were identified for use in research and clinical settings. The Oxford Shoulder Score (OSS)[6], one of these instruments, is a short patient-reported outcome measure of pain and physical function which have been used to assess patients with several shoulder problems, except instability. The psychometric properties of the OSS have been tested over time in the context of cross-cultural adaptation and validation of several international versions, all of them presenting good psychometric properties[7-19]. Although the OSS is used internationally, so far a European-Portuguese version was not available. In order to use this shoulder outcome measure in Portugal we needed to undergo a rigorous cross-cultural adaptation and validation process.

The aim of this study was to translate and culturally adapt the OSS to the European Portuguese language

and to test its reliability (internal consistency, reproducibility and measurement error) and validity (construct validity) in patients with shoulder pain due to degenerative or inflammatory disorders and referred for physical therapy.

METHODS

CROSS-CULTURAL ADAPTATION

This process was conducted according to previously established guidelines[20,21], under license of the OSS copyright holder (© Isis Innovation Limited, 1998. All rights reserved. www.isis-innovation.com). The English OSS[6] was translated into Portuguese independently by two Portuguese native professional translators. The obtained translations were discussed in a first consensus panel to achieve the first preliminary version. This consensus version was then translated back to English by two English native professional translators, without prior knowledge of the original version. The translations and back translations were discussed in a second consensus panel to achieve a second preliminary version. This consensus version was submitted to a clinical review performed by a physical therapist and a physician, both specialists in degenerative or inflammatory shoulder disorders. They analyzed the more technical parts of the consensus version of the questionnaire, keeping in mind the most appropriate manner to communicate with Portuguese shoulder pain patients. The revised version was completed by 12 patients with degenerative or inflammatory shoulder disorders to confirm if all items of the questionnaire were understandable and included all the expected concepts without any redundancy. A third consensus panel was formed to achieve the final version.

VALIDATION STUDY

Subjects

The sample consisted of consecutive patients with shoulder pain due to degenerative or inflammatory disorders (diagnosis validated by a physician), referred for physical therapy and attending 17 health care institutions in Portugal during a 4 months period.

Subjects were selected after obtaining formal informed consent and checking the inclusion and exclusion criteria. To be included in this validation study, subjects had to have adhesive capsulitis, impingement syndrome with or without rotator cuff tear, calcified deposits in rotator cuff or osteoarthritis, to be aged 18 years or older, and to be referred to physical therapy due to shoulder pain due to degenerative or inflammatory disorders. Subjects were excluded if they had shoulder instability, history of dislocation or subluxation events, acute traumatic shoulder injury, perceived shoulder pain due to non-shoulder pathology (e.g., fibromyalgia or cervical radiculopathy), neurological disease, or any other disabling condition or if they were illiterate, not knowing how to read and/or to write. All health care institutions obtained approval from their respective review boards.

Measurements

Patients were assessed during a clinic visit for a physical therapy treatment at the above mentioned health care institutions. The patients who agreed were assessed again 48 to 96 hours later. This time interval was considered large enough so that the patients were unable to recall the previous answers and small enough to minimize the probability of occurrence of relevant changes in patient's clinical condition. Data was collected using patient self-administered measures.

The OSS[6] contains 12 items: worst pain from shoulder, trouble with dressing, trouble with transport, using a knife and fork, doing household shopping alone, carrying a tray of food, brushing/combing hair, usual level of shoulder pain, hanging clothes in wardrobe, washing under both arms, work interference due to pain and pain in bed at night. According to the original scoring system[6], a final global score from 12 (least difficulties) to 60 (most difficulties) is produced for the scale. Also based on a revised scoring system[22], a final global score from 0 (worst outcome) to 48 (best outcome) is produced. In the present study the revised scoring system was used.

The Disabilities of the Arm, Shoulder and Hand (DASH) outcome measure[23] contains 30 core items that measure physical function and symptoms of the upper limb. The DASH also includes two optional modules: work (four items) and sports/performing arts (four items). A score, from 0 (best physical function/symptoms) to 100 (worst physical function/symptoms), is independently produced for total scale and optional modules.

Two visual analogue scales (VAS) were used to evaluate, respectively, the intensity of shoulder pain during movement (VAS movement) and the intensity of shoulder pain during rest (VAS rest). Both VAS ranged from 0 (no pain at all) to 100 mm (worst imaginable pain).

A form was used to collect subject information on

gender, age, body mass index, marital status, educational level, profession, professional situation, work absenteeism, shoulder problem, involved shoulder, most painful shoulder, time since onset of shoulder pain, time since onset of shoulder problem.

Statistical analyses

Quantitative variables were described using mean and standard deviation values whereas categorical variables were described using frequency and percentage values.

Reliability. Internal consistency was assessed using Cronbach's alpha coefficient and corrected item-total correlations. A Cronbach's alpha coefficient between 0.70 and 0.95 was considered acceptable for the OSS[24]. Corrected item-total scale correlation of 0.30 or higher was considered acceptable for each item in the OSS[25]. Reproducibility of the OSS was assessed using intraclass correlation coefficient (ICC) for agreement, formula 2,1. Reproducibility of each item in the OSS was tested using quadratic weighted kappa coefficients. An ICC or a weighted kappa coefficient greater than or equal to 0.70 received a positive rating[24]. Measurement error was estimated using standard error of measurement (SEM) and smallest detectable change (SDC), calculated at individual (SDCind) and group (SDCgroup) levels: SEM was calculated as SEM = SDbaseline*√(1-ICC); SDCind was calculated as SDCind = 1.96*√2*SEM; SDCgroup was calculated as SDCgroup = (1.96*√2*SEM)/√n[24].

Validity. Construct validity was investigated by testing 3 predefined hypotheses involving expected significant correlations between OSS scale, DASH scale and modules, VAS and the number of days of work absenteeism: (1) OSS should yield at least moderate (negative) correlations with DASH total scale and optional modules; (2) OSS should present higher (negative) correlations with DASH total scale and optional modules than for the VAS movement and VAS rest; (3) OSS should yield at least a low (negative) correlation with the number of days of work absenteeism. Construct validity was analyzed using Spearman's correlation. Spearman's correlation coefficients were read as follows: very high correlation if higher than or equal to 0.90; high correlation if between 0.89 and 0.70; moderate correlation if between 0.69 and 0.40; low correlation if between 0.39 and 0.20, very low correlation if lower than or equal to 0.19[26]. A p value of 0.05 was taken as the reference level of significance.

Statistical analyses were conducted using SPSS 20.0 for Macintosh.

RESULTS

CROSS-CULTURAL ADAPTATION

The revised version of the Portuguese OSS questionnaire was well accepted and all the questions and response options were considered simple and easily understood by the subjects of the pre-test. No item was left blank. Therefore, this version was used in the validation study, without any additional modification. The mean time required to complete the Portuguese OSS was 3 minutes and 46 seconds.

VALIDATION STUDY

Subjects

The descriptive statistics are presented in Table I. A total of 111 shoulder pain patients were included in the validity and internal consistency assessment, of which 51 (45.9%) were also included in the reproducibility and measurement error assessment. There were no missing data for any individual items of the OSS and DASH.

RELIABILITY

Cronbach's alpha coefficient was 0.90 and corrected item-total scale correlations ranged from 0.35 to 0.76. ICC was 0.92 for the OSS and weighted kappa coefficients ranged from 0.70 to 0.87, with the exception of two items: worst pain from shoulder (0.46) and trouble with dressing (0.69). SEM was 2.59 points, SDC was 7.18 points at individual level and SDC was 1.01 points at group level (Tables II and III).

VALIDITY

The three predefined hypotheses regarding construct validity were confirmed (Table IV).

DISCUSSION

In this study we reported the process of cross-cultural adaptation and validation of the OSS to the European Portuguese language. This OSS version performed well in terms of reliability and validity in patients with shoulder pain due to degenerative or inflammatory disorders and referred for physical therapy.

The procedures of translation and cultural adaptation were developed successfully and resulted in a Portuguese version of the OSS easy to understand and complete. No major problems were noticed in the cross-cultural adaptation, guaranteeing semantic

TABLE I. DEMOGRAPHIC AND DISEASE CHARACTERISTICS OF THE SUBJECTS

Characteristics	Total sample (N = 111)	Reproducibility and measurement error group (N = 51)*
Gender		
Female	67 (60.4)	28 (54.9)
Male	44 (39.6)	23 (45.1)
Age (years)	58.8 ± 11.0	57.6 ± 10.3
Body mass index (kg/m2)	27.1 ± 4.4	27.8 ± 5.0
Marital status		
Married	85 (76.6)	40 (78.4)
Not/no longer married	26 (23.4)	11 (21.6)
Educational level		
Below the level of compulsory education	69 (62.2)	28 (54.9)
Level of compulsory education or higher	42 (37.8)	23 (45.1)
Profession		
Non manual	71 (64.0)	35 (68.6)
Manual	40 (36.0)	16 (31.4)
Professional situation		
Economically active	53 (47.7)	25 (49.0)
Not economically active	58 (52.3)	26 (51.0)
Number of days of work absenteeism in the last 12 months (days)	26.7 ± 75.4	34.7 ± 88.4
Shoulder problem		
Adhesive capsulitis	35 (31.5)	15 (29.4)
Impingement syndrome without rotator cuff tear	45 (40.5)	19 (37.3)
Impingement syndrome with rotator cuff tear	9 (8.1)	5 (9.8)
Calcified deposits in rotator cuff	14 (12.6)	7 (13.7)
Osteoarthritis	8 (7.2)	5 (9.8)
Involved shoulder (shoulder with problem)		
Unilateral	77 (69.4)	36 (70.6)
Bilateral	34 (30.6)	15 (29.4)
Most painful shoulder		
Dominant	69 (62.2)	33 (64.7)
Non-dominant	42 (37.8)	18 (35.3)
Time since onset of shoulder pain (months)	28.0 ± 51.3	23.8 ± 38.9
Time since onset of shoulder problem (months)	35.1 ± 58.2	26.0 ± 34.2
Scales scores		
OSS (points)	27.8 ± 9.7	28.3 ± 9.2
DASH (points)	44.9 ± 18.9	43.8 ± 17.7
DASH work module (points)	52.4 ± 31.8 †	41.5 ± 19.5 §
DASH sport/performing arts module (points)	43.4 ± 28.4 ‡	53.1 ± 34.8 ‖
VAS movement (mm)	5.6 ± 2.1	5.5 ± 2.2
VAS rest (mm)	3.3 ± 2.7	3.1 ± 2.8

OSS: Oxford shoulder score; VAS: Visual analogue scale; DASH: Disabilities of the arm, shoulder and hand.
Quantitative variables: mean ± standard deviation; Categorical variables: frequency (percentage).
OSS: 0 (worst) to 48 (best) points; DASH: 0 (best) to 100 (worst) points; VAS: 0 (best) to 100 (worst) mm.
*Group where all subjects were assessed again 48 to 96 hours later.
† N= 60; ‡ N= 18; § N= 29; ‖ N= 9

TABLE II. RELIABILITY OF THE OSS SCALE

N	Cronbach's alpha coefficient	N	Intraclass coefficient correlation (95% CI)*	Standard error of measurement (95% CI)	Smallest detectable change at individual level (95% CI)	Smallest detectable change at group level (95% CI)
111	0.90	51	0.92 (0.87 – 0.95)	2.59 (2.05 – 3.30)	7.18 (5.68 – 9.16)	1.01 (0.80 – 1.28)

OSS: Oxford Shoulder Score; CI: confidence intervals
*The questionnaire was administered twice, separated by 48 to 96 hours

TABLE III. RELIABILITY OF THE OSS SCALE ITEMS

Portuguese OSS items	Corrected item-total coefficients [N=111]	Weighted kappa coefficients [N=51]*
1. Como descreveria a pior dor que teve no seu ombro?	0.47	0.46 †
2. Tem tido alguma dificuldade em vestir-se por causa do seu ombro?	0.75	0.69 †
3. Tem tido alguma dificuldade em entrar e sair de um carro ou usar transportes públicos por causa do seu ombro?	0.67	0.73
4. Tem sido capaz de usar a faca e o garfo ao mesmo tempo?	0.71	0.83
5. Tem conseguido fazer as compras para a casa sem ajuda?	0.69	0.87
6. Tem conseguido levar um tabuleiro com um prato de comida, atravessando uma sala (ex: do balcão para a mesa)?	0.73	0.82
7. Tem conseguido escovar/pentear o seu cabelo com o braço afectado?	0.67	0.80
8. Como descreveria a dor que normalmente tem tido no seu ombro?	0.36	0.70
9. Tem conseguido pendurar as suas roupas no roupeiro, usando o braço afectado?	0.75	0.72
10. Tem sido capaz de se lavar e limpar debaixo de ambos os braços?	0.76	0.78
11. Até que ponto a dor no seu ombro tem interferido com o seu trabalho normal (tanto o trabalho fora de casa como o trabalho doméstico)?	0.66	0.77
12. Tem sido incomodado/a pela dor no seu ombro à noite na cama?	0.35	0.73

OSS: Oxford shoulder score
*The questionnaire was administered twice, separated by 48 to 96 hours; †Indicates a weighted kappa coefficient lower than 0.70.

TABLE IV. CONSTRUCT VALIDITY OF THE OSS SCALE (N = 111)

	OSS
Scales scores	
DASH (points)	**-0.77**
DASH work module (points)†	**-0.76**
DASH sport/performing arts module (points) ‡	**-0.62**
VAS movement (mm)	*-0.36*
VAS rest (mm)	-0.14*
Number of days of work absenteeism in the last 12 months (days)	*-0.30*

Spearman's correlation coefficients.
OSS: Oxford shoulder score; VAS: Visual analogue scale; DASH: Disabilities of the arm, shoulder and hand
OSS: 0 (worst) to 48 (best) points; DASH: 0 (best) to 100 (worst) points; VAS: 0 (best) to 100 (worst) mm.
High correlations in bold/underline; moderate correlations in bold; low correlations in italic; very low or no correlations in regular.
† N= 60; ‡ N= 18; *Non-significant correlations (P > 0.05)

equivalence to the original instrument[6]. Among the thirteen published OSS international versions[7-13], only the Italian[10], the Korean[13] and the Chinese[16] have introduced minor changes due to cultural differences. In the Italian version the item 6 (carrying a tray of food) was modified because the Italians usually eat in the kitchen not having the routine of using trays of food[10]. In the Korean version the item 4 (using a knife and fork, at the same time) needed change because the Koreans normally use a spoon and chopsticks with their dominant hand[13]. In the Chinese version, car was replaced by private automobile (item 4), knife and fork were replaced by chopsticks and spoons (item 5) and tray was replaced by bowl (item 6)[16].

High Cronbach's alpha coefficient for the scale and acceptable corrected item-total coefficients for the 12 items of the questionnaire confirmed that the Portuguese OSS is internally consistent. The results of in-

ternal consistency were similar to those obtained in other studies (expressed in terms of Cronbach's alpha coefficients) such as 0.89 and 0.92 (preoperatively and at 6-month follow-up) by Dawson et al.[6], 0.94 by Huber et al.[7], 0.87 by Ekeberg et al.[8], 0.92 by Berendes et al.[9], 0.95 by Murena et al.[10], 0.93 by Frich et al.[11], 0.92 by Tugay et al.[12], 0.91 by Roh et al.[13], 0.93 by Tuton et al.[14], 0.93 by Lima-Eda et al.[15], 0.92 by Xu et al.[16], 0.95 by Torres-Lacomba et al.[17], 0.91 by Naghdi et al.[18] and 0.93 by Ebrahimzadeh et al.[19].

High ICC for the scale scores and acceptable weighted kappa coefficients for ten of the twelve items of the questionnaire revealed that the stability of the Portuguese OSS over time was good. Even the item 2 (trouble with dressing), which was below the acceptable value of 0.70, yielded a borderline weighted kappa coefficient of 0.69. The lower weighted kappa coefficient of 0.46 obtained for the item 1 (worst pain from shoulder) may be related to the fact that patients already started to receive physical therapy treatments for shoulder pain before retest. The results for reproducibility were similar to those achieved with the other OSS versions (expressed in terms of ICC), even using different time intervals between repeated administrations, such as 0.83 by the Norwegian version (with an average time interval of 7 days)[8], 0.98 by the Dutch version (with a time interval of 24 to 72 hours)[9], 0.99 by the Turkish version (with a time interval of 48 hours)[12], 0.95 by the Korean version (with a time interval of 4 days)[13], 0.91 by the French version (with a time interval of 3 days)[14], 0.97 by the Chinese version (with a time interval of 3 to 5 days)[16], 0.97 by the Spanish version (with a time interval of 48 hours)[17], 0.90 by the Persian version (with a time interval of 1 week)[18] and 0.93 by the other Persian version (with a time interval of 3 days)[19].

The measurement error of the Portuguese OSS was considered acceptable in terms of SEM (2.59), SDCind (7.18) and SDCgroup (1.01), given the range of the OSS final global score (0 to 48 points). The Turkish OSS obtained a SEM of 0.76 points[12]. The Persian version tested by Naghdi et al.[18] obtained a SEM of 6.8 points and a SDCind of 18.8 points on a 0 to 100 points scale. SEM and SDC were not reported for the other OSS international versions[7-11, 13].

The three predefined hypotheses for construct validity were confirmed: (1) OSS yielded moderate to high negative correlations with DASH total scale and optional modules; (2) OSS presented higher negative correlations with DASH total scale and optional modules than for the VAS movement and VAS rest; (3) OSS yielded a low negative correlation with the number of days of work absenteeism. Other studies also confirm the construct validity of OSS as indicated by significant associations with DASH[13,15,19] and with other outcome measures[6-19].

Some limitations of this study should be acknowledged. The sample used is not representative of the entire Portuguese population of patients with shoulder pain due to degenerative or inflammatory disorders. This is due to the fact that the selection process of the subjects only considered patients who were referred for physical therapy. Further validation in additional populations with shoulder problems is recommended. Another limitation to consider is the fact that the responsiveness and the clinical significance (e.g., minimal important change) of the Portuguese OSS were not assessed, which would have added strength to the validation process. In the future, more testing is required in order to assess these important psychometric properties.

CONCLUSION

In conclusion, the Portuguese OSS evidenced suitable psychometric properties, in terms of reliability and validity, for patients with shoulder pain due to degenerative or inflammatory disorders.

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