Knee Surg Sports Traumatol Arthrosc (2015) 23:603–607
DOI 10.1007/s00167-014-3401-y

SHOULDER

Rotator cuff-quality of life scale: adaptation to Turkish

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Received: 6 May 2014 / Accepted: 22 October 2014 / Published online: 11 November 2014

Abstract
Purpose The adaptation of scales to the native language and cultural setting of the patient is essential for obtaining more reliable results in scientific studies. In this study, the rotator cuff-quality of life scale (RC-QoLS) was translated into Turkish, and validity and reliability testing was performed on the scale.
Methods The scale was first translated into Turkish and then from Turkish to English by another language specialist. Subsequently, the two translations were evaluated by two orthopaedic surgeons who had comprehensive knowledge of English to create the final Turkish version of RC-QoLS. The scale was used for the assessment of 54 patients (average age 56 years) with rotator cuff tear scheduled for surgery. The scale was completed by each patient two times with 1-week interval.
Results The Cronbach's alpha coefficients ranged between 0.895 and 0.980 and intraclass correlation coefficients ranged between 0.807 and 0.976, this rendered all domains reliable. The scale gave results very near to those obtained by the original questionnaire with respect to the constructed validity and internal consistency as well as domain relationships.
Conclusions In general, the Turkish version of the RC-QoLS is a valid and reliable test with high differentiating power that may be used in the evaluation the quality of life of patients with RC tear in patients who are native Turkish speaker. The use of the Turkish version of RC-QoLS may contribute to the making of a more reliable evaluation in the studies on RC problems in the Turkish society.

Keywords Rotator cuff-quality of life scale · Rotator cuff · Quality of Life · Turkish

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Introduction

Rotator cuff (RC) injuries significantly affect the functions of shoulder joint and upper extremities [8, 12]. Such injuries may also affect the general health condition [9] and quality of life [4, 8] of patients.

There are various scales used to measure the treatment results of RC. Most of these scales are surgery-based. There may be differences between surgeons and patients with regard to the evaluation of the therapy results [14]. The therapy may be evaluated according to its impact on general health and specific disorder or specific joint [18]. At present, for the comparison of patient populations, combined use of evaluation systems for general health and for specific disorder is recommended [2, 18].

One of the means used in the evaluation of RC pathologies is the rotator cuff-quality of life scale (RC-QoLS) [5]. This scale was first introduced in the year 2000 for the evaluation of large-to-massive RC tears [5]. The scale has 34 questions, and as in a visual analogue scale-type response option, each question is answered by scoring a point between 0 and 100.

The scale consists of five domains which are symptoms and physical complaints (16 questions), sports and hobbies (four questions), work (four questions), life style (five questions), and emotions (five questions). The RC-QoLS may be used for the evaluation of all RC problems [10]. The validity [16] and reliability [5] of RC-QoLS have been assessed, and the scale has been adapted to German [6] and Italian [13].

In this study, the original English version of RC-QoLS [5] was translated into Turkish, and validity and reliability testing was performed on the scale. It was hypothesised that the Turkish version of RC-QoLS is valid and can be used in evaluating the patients with rotator cuff disease.

Materials and methods

The study included 54 patients (age range, 36–78; average age, 56) with RC tear on one shoulder scheduled for surgery. The number of patients and methodology of the study were determined according to the original RC-QoLS [5] and its adaptations in German [6] and Italian [13]. The study included RC tears with diameter more than 2 cm in the frontal direction and causing complaints for more than 3 months. The diagnosis of RC was verified by clinical findings and magnetic resonance imaging, and the tear dimensions were radiologically measured. Patients with infection, inflammatory disease, history of past surgery, instability, osteoarthritis, or ankylotic shoulder were not included in the study.

Two lecturers from department of foreign languages of Gaziosmanpasa University and two orthopaedic surgeons competent in English participated in the translation process. One of the lecturers translated the English version into Turkish. The back translation of the Turkish version into English was done by the second lecturer. The original form and the one translated from Turkish to English were compared by the two lecturers, and the lecturers' final form of the Turkish version was prepared. Finally, the two orthopaedic surgeons, who were fully competent in both languages, controlled and revised the lecturers' final Turkish version to obtain the Turkish version used in this study.

The Turkish version of RC-QoLS was used for the assessment of patients with RC tear scheduled for surgery. The Turkish version of the RC-QoLS was answered by the patients themselves. One orthopaedic surgeon was in the interview room in order to help the patients in case they needed assistance, which was the case only in a few elderly patients. The scale was completed by each patient twice with 1-week interval.

Statistical analyses

From the view point of constructed validity, first an exploratory factor analysis was conducted on the scale, which consisted of 34 items and five domains, and factor burdens were calculated. Then, by using confirmatory factor analysis, root mean square error of approximation (RMSEA), standardised root mean square residual (SRMR), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), and comparative fit index (CFI) were determined.

The internal consistency of the scale was evaluated by reliability analysis, and Cronbach's alpha (CA) coefficients were calculated. In view of the additivity of the points in all domains according to the Tukey's test of additivity, the points of the questions in each domain were totalled to obtain the total points of each domain.

For the control of the reliability of the scale, test–repeat test method, and for the evaluation of the agreement between the two measurements, intraclass correlation coefficient (ICC) was used. A value of ICC above 0.8 indicates that the scale can reliably be repeated.

The points of the scale were shown by arithmetic means and standard deviation. *P* values under 0.05 were accepted as statistically significant. For statistical analysis, IBM SPSS Statistics 19 (SPSS inc., an IBM Co., Somers, NY) program was used.

Results

To verify the structure and show similarity to the original, the five domains of the 34-item scale translated into Turkish were evaluated by using reliability analysis. The construct validity of the test was determined with previously mentioned test, and results are shown in Table 1. According to test results about construct validity, we obtained values closer to those of the original version.

Table 1 The results of the tests which were used for construct validity

	RMSEA	SRMR	GFI	AGFI	CFI	*P*
Test	0.12	0.07	0.50	0.42	0.74	<0.001
Retest	0.12	0.07	0.50	0.42	0.74	<0.001

RMSEA root mean square error of approximation, *SRMR* standardised root mean square residual, *GFI* goodness of fit index, *AGFI* adjusted goodness of fit index, *CFI comparative fit index*

Table 2 Coefficients (Cronbach's alpha and ICC) of internal consistency of the scale domains

Domains	Cronbach alpha	ICC (95 % CI)	Question—All correlations (Range)
A—Symptoms and physical complaints	0.958	0.944 (0.905–0.967)	0.636–0.843
B—Work or profession	0.895	0.959 (0.931–0.976)	0.729–0.837
C—Recreation and sports	0.921	0.954 (0.922–0.973)	0.744–0.878
D—Life style	0.925	0.901 (0.836–0.942)	0.608–0.875
E—Social and emotional aspects of shoulder problems	0.907	0.807 (0.688–0.883)	0.648–0.844
RC-QoL total	0.980	0.976 (0.959–0.986)	0.585–0.871

ICC intraclass correlation coefficient

Table 3 The distribution of total domain points (mean and standard deviation)

Domains	Test	Repeat test	*P*
A—Symptoms and physical complaints	49.47 ± 27.50	49.10 ± 27.66	0.769n.s.
B—Work or profession	46.43 ± 30.17	47.05 ± 29.78	0.599n.s.
C—Recreation and sports	41.04 ± 31.61	43.79 ± 30.67	0.037*
D—Life style	41.60 ± 28.85	45.16 ± 28.15	0.044*
E—Social and emotional aspects of shoulder problems	41.98 ± 26.93	46.03 ± 28.67	0.091n.s.
RC-QoL total	45.86 ± 26.53	47.20 ± 26.66	0.098n.s.

* Statistically significant;
n.s statistically non-significant

The Cronbach's alpha coefficients ranged between 0.895 and 0.980 and ICC ranged between 0.807 and 0.976, which rendered all domains reliable (Table 2). The value of ICC was found above 0.8, indicating that the scale was reliable. Each item of the scale-total correlations was calculated between 0.608 and 0.878, indicating strong relationship between the items and domains. The total comparative points of domains in test and repeat test are shown in Table 3. When the test and repeat test values were compared, both values of all domains showed a high degree of agreement except recreation and sports (C) and life style (D). Though there was a significant difference between test–retest of the C and D domains, the calculated values of the test–retest for these domains were close to each other and did not have any effect on the internal consistency of the test.

The scale gave results almost similar to those obtained by the original questionnaire with respect to constructed validity and internal consistency as well as domain relationships.

Discussion

In general, the Turkish version of the RC-QoLS is a valid and reliable test with high *differentiating power that may be used in the evaluation of the quality of life of patients with RC tear in Turkish Society.* Hollinshead et al. [5] have reported that RC-QoLS is more specific and sensitive than the systems of SF-36 and American shoulder and elbow surgeons in evaluating the symptoms of RC pathologies.

Two procedures have to be followed for the adaptation of scales into different languages and cultural settings. The language equivalency should be ensured, and the original language and translation of the scales should be equivalent with regard to meanings and concepts [1]. For this purpose, the scale should be translated from the original language by two translators, and then, the translation should be translated back into the original language by another translator, and finally the translations in both languages should be checked for meaning and concept and revised by a master of both languages [1]. In this study, all these requirements were fulfilled except that the first translation of the scale from the original language was done by an academician of English language. The first translation of the scale from English to Turkish by one translator instead of two translators might be a limitation of this study. Another requirement is the measurement of cognitive equivalency between the original version and adaptation of the scale in another language, for which the reliability, reproducibility, and internal consistency of the adapted version should be measured.

The other issue is construct validity. Construct validity analysis compares the factorial structure of the original and translated versions in order to find similarities and differences between them. The results obtained in the GFI and AGFI were reported in values between 0 and 1. Values close to 1 were seen in compatible models [15]. CFI

values close to 1 were also accepted as a sign of compatible model [3]. In RMSEA, values equal to or less than 0.05 and in SRMR, values equal to or less than 0.08 show that the model is compatible [3]. According to these results, the Turkish version of RC-QoLS is compatible with original version of scale regarding construct validity.

The ICC is quite a suitable parameter in evaluating the reliability of scales [7, 17]. The ICC may have a value between 0 and 1; a value near 0 indicates no reliability and a value near 1 shows quite a high degree of reliability. For the evaluation of positive reliability, the minimal number of samples should be 50 and a value of ICC above 0.70 [17]. In this study, the ICC value of the Turkish version of RC-QoLS ranged between 0.807 and 0.976 and the samples were more than 50, which rendered the test highly reliable. The ICCs were obtained in all domains, and in total, they were above 0.8. The repeatability of a scale is evaluated by the degree of agreement of tests or measurements repeated with a time interval in-between. Similar answers obtained in the first test and repeat test give an idea about the reliability of the test. The important point in the repeatability of a scale is the significant time interval between the two tests in order to minimise the memory effect, which is generally suggested to be 1 or 2 week(s) [17]. In this study, there was a time interval of 1 week between testing and retesting, and there were no significant measurement differences between the domains of the Turkish version of RC-QoLS with the exception of sports and life style. The calculated values of the test–retest for such domains were close to each other and did not have any effect on the internal consistency of the test.

Internal consistency is a measure based on the correlations between different items on the same test and measures whether several items that aim to measure the same general construct produce similar scores. Internal consistency is usually and satisfactorily measured with Cronbach's alpha [17]. The correlation between the domains of the scale is evaluated; a high CA value indicates high consistency [17]. Since CA is dependent on the number of domains, it shows a tendency to be high in scales including a large number of domains.

For the internal consistency of scales, Nunnally and Bernstein [11] suggest CA to be between 0.70 and 0.90, whereas Terwee et al. [17] suggest a value between 0.70 and 0.95 for scales with a large number of domains. Since CA in the domains of the Turkish version of RC-QoLS was found between 0.895 and 0.980, we can say that the internal consistency of the scale was quite high.

The major limitation of this study was presence and in need assistance of an orthopaedic surgeon during the administration of the questionnaire. The same method was used in several adaptation studies, and it was a necessity especially in elderly patients.

Conclusion

The Turkish version of RC-QoLS is valid and reliable and can contribute to doing more reliable evaluations in the studies on RC problems in native Turkish people.

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