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RESEARCH ARTICLE

VALIDITY AND RELIABILITY OF ARABIC VERSION OF KUJALA SCALE TO MEASURE PATELLOFEMORAL PAIN

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ABSTRACT

Background*:** Patellofemoral pain (PFP) has a debilitating effect on sufferers, daily lives by reducing their ability to perform sporting and work related activities pain free. The Kujala Patellofemoral Disorder Score (KPS) was particularly designed and developed for the assessment of patients having anterior knee pain as well as patellofemoral conditions. ***Objective: The purpose of the study were to culturally translate and validate the Arabic version of KPS (and evaluate the test-retest reliability, internal consistency, construct validity ceiling or floor effects of this instruments) in Egyptian patients with PFP to measure the physical function and to ensure better care delivery. ***Methods***: Three expert panels (each consists of nine experts) and 46 patients with PFS participated in this study. Forward translation, development of preliminary initially translated version, backward translation, and development of the pre-final version and testing of pre-final version using experts then testing of the final version on patients were done. Clarity index, expert proportion of clearance, index of content validity, expert proportion of relevance, descriptive statistics, missed item index, time taken to answer the scale, Cronbach's coefficient alpha and Spearman's rank correlation coefficients were used for statistical analysis. ***Results***: The scale index of clarity equaled 89%, while The S-CVI equaled 86.5%. With regard to internal consistency, the Cronbach's alpha equaled 0.598 (range from 0.487 to 0.660). In addition, the Spearman's rank correlations were moderate to strong in the majority of items. ***Conclusion***: The Arabic KPS is a valid and reliable tool and is comparable to the original English version and other translated versions.

INTRODUCTION

Patellofemoral pain (PFP) is often seen in physically active individuals and may account for 25-40% of all knee problems seen in sports injury clinic (Piva *et al.,* 2009) Patellofemoral related problems occur more frequently in women than in men. It is more common in young adolescent with high prevalence between 12-17 years in Patellofemoral pain is characterized by diffuse pain over the anterior aspect of the knee and aggravated by activities that increase patellofemoral joint compressive forces such as squatting, ascending and descending stairs and prolonged sitting as well as repetitive activities such as running (Kuru *et al.,* 2010). It therefore has a debilitating effect on sufferers, daily lives by reducing their ability to perform sporting and work related activities pain free. PFP is successfully treated in over 2/3 of patients through rehabilitation protocols designed to reduce pain and return function to the individual (Duncan *et al.,* 2009). The variability in treatment results may be due to the fact that the underlying factors that contribute to the development of PFP are not being addressed, or are not the same for all patients with PFP (Dye, 2001). Applying preventive medicine strategies, the majority of cases of PFP may be avoided if pre- diagnosis can be made by clinician or certified athletic trainer testing the current researched potential risk factors during a preparticipation screening evaluation (PPSE) (Waryasz and McDermott, 2008). Different scoring system for subjective knee symptoms have been published, but only a few methods focus on symptoms of anterior knee pain. Kujalapatello femoral scale (KPS) also called the anterior knee pain scale is a popular, condition specific, self-administered instruments that fulfills most of the prerequisites for appropriate instruments selection in patients with PFP. This instrument is easy to understand, time efficient (i.e. taking no longer than 20 minutes to complete and comprehensive as to encompass most of the functional activities related to PFP. In addition several studies showed that the KPS is reliable, valid and sensitive outcome measure in the assessment of this specific patient population (Cheung *et al.,* 2012). To date four validation versions of the KPS have been reported in Finnish (Kujala *et al.,* 1993), Turkish (Cheung *et al.,* 2012), Chinese (Cheung *et al.,* 2012) and Persian (Negahban *et al.,* 2012). There is no validation study of this instrument in Arabic countries; thus, the present study aimed to culturally translate and validate the Arabic version of KPS (in patients with PFP.

MATERIALS AND METHODS

Participants and Design: This study was conducted in outpatient clinics of Al- Qasr Al Aini Hospital and outpatient clinic of Faculty of Physical Therapy, Cairo University to investigate the reliability and validity of Arabic version of the KPS in patellofemoral pain syndrome patients. The ethical committee of both institutions approved study's protocol prior to patients' enrollment.

Inclusion Criteria: All patients were diagnosed either by an orthopedic specialist or physiotherapist based on clinical and radiological findings

- They reported anterior knee pain or retro patellar pain or at least two of six activities (prolonged siting with bent knees, squatting, and kneeling, running, hopping, jumping, and ascending or descending stairs.
- All the patients were able to read and write in Arabic
- All patients completed a general questionnaire for details of demographic and clinical characteristics
- Being conscious and ambulant.

Exclusive criteria

- Patients with diagnosis other than patellofemoral pain syndrome such as knee ligament, meniscus, and tendon injuries.
- Involvement of other joints affecting the lower extremity or back.
- Systematic inflammatory rheumatic diseases**,** neurological conditions, and psychiatric disorders.

Procedure

The following steps were followed:

1- Forward translation: translation of the original scale into Arabic (forward translation or one-way translation)

a) Scale in English will be translated to Arabic to produce two forward-translated versions of the scale (A1 and A2).
Two translators will participate in forward translation, their mother language is Arabic, but they have distinct backgrounds

- One translator is knowledgeable about health terminology and the content area of the construct of the tool in the Arabic.
- The other translator is knowledgeable about the cultural and linguistic nuances of the Arabic.

2- Development of the preliminary initial translated Arabic version. Both versions (A1 and A2) will be compared and merged by the researchers and research committee of basic science for physical therapy, Faculty of Physical Therapy will be asked for help in resolving ambiguities and discrepancies.

3- Blind back-translation (blind backward translation or blind double translation) of the preliminary initial translated version of the scale:

a) The preliminary initial translated version of the scale will be translated to English to produce two back-translated versions (B1 and B2).
b) Two translators will participate in back translation, but they have distinct backgrounds.

- One translator is knowledgeable about health terminology and the content area of the construct of the tool in the English.
- The other translator is knowledgeable about the cultural and linguistic nuances of the English.

4- Comparison of the two back-translated versions of the scale (B1 and B2). The researchers compare back-translation of the scale B1 with B2, and also compare both B1 and B2 with the original English scale regarding instructions, items, response format, wording, sentence structure, meaning and relevance to develop the pre-final Arabic version of the scale.

5- Pilot testing of the pre-final Arabic version of the scale for face and content validity.

a) The first expert panel (ten experts) will be asked to evaluate each item of the tool for clarity (face validity) and provide suggestions to improve its clarity; dichotomous questions (clear/unclear) is used regarding instruction, items and response words.
b) Then the second expert panel will be asked to evaluate each item of the pre final Arabic version of the scale for content equivalence (content-related validity) using the following scale: 1 = not relevant; 2 = unable to assess relevance; 3 = relevant but needs minor alteration; 4 = very relevant and succinct and give suggestions to improve its relevance (1 and 2 considered not relevant, 3 and 4 considered relevant).
c) After the pre-final version passes expert face and content validity tests, it was named the final version. Otherwise, changes suggested is done and tests will be repeated until it passes expert face and content validity tests.

6- Pilot test of the final Arabic version of the scale will be conducted on patients with knee pain: Patients will fill out data collection sheets which will be used to collect demographic data (name, age, sex, occupation, dominance.

7- Feasibility (ability to use on larger sample) will be evaluated by the assessment of the frequency of missing answers per item and administration time.

8- Patients will be asked to refill out the data collection sheet again after two days.

Statistical analysis

SPSS computer program (version 20) was used for data analysis:

- Face validity was tested by clarity index and expert proportion of clearance.
- Content validity was tested by index of content validity (CVI) and expert proportion of relevance.
- Descriptive statistics of patients and sheets were made using mean, median, standard deviation (SD), mode, minimum (min) and maximum (max).
- Feasibility index was calculated using missed item index and time taken to fill the questionnaire.
- Internal consistency reliability was measured using Cronbach's coefficient alpha.
- Test retest reliability was measured using mean scores and Spearman's rank Correlation.

RESULTS

Nine experts and 46 patients with anterior knee pain were included in this study. The scale index of clarity equaled 89%, while the mean of proportion of clearance (clear responses) equaled 89% (Table.1). In addition, The S-CVI equaled 86.5% and the mean of the proportion of relevance (relevant responses) equaled 88.2% (Table.2). With regard to internal consistency, the Cronbach's alpha equaled 0.598 (range from 0.487 to 0.660). In addition, Correlations between test and retest results were statistically significant (P =0.01), Spearman's rank correlations were calculated as shown in Table.3.

Table 1. Expert proportion of clearance of the final version

Expert number	Number of experts' agreement (clear responses)	Proportion of clearance
1	13	100%
2	13	100%
3	13	100%
4	13	100%
5	0	0%
6	13	100%
7	13	100%
8	13	100%
9	13	100%
Mean	11.56	89%

Table 2. Expert proportion of relevance of the final version

Expert No	Number of very Relevant responses	Proportion of very relevant
1	9	69%
2	5	56%
3	9	69%
4	13	100%
5	13	100%
6	13	100%
7	13	100%
8	13	100%
9	13	100%
Mean	11.2	88.2%

Table 5. Spearman's rank correlations coefficients

Item No	R value	Correlation strength	Results of test regarding association between pre- and post-test
1	0.19	Weak	Non-significant
2	0.52	Moderate	Significant correlation
3	0.54	Moderate	Significant correlation
4	0.33	Weak	Non-significant
5	0.47	Moderate	Significant correlation
6	0.798	Strong	Significant correlation
7	0.50	Moderate	Significant correlation
8	0.52	Moderate	Significant correlation
9	0.374	Weak	Significant correlation
10	0.55	Moderate	Significant correlation
11	0.73	Strong	Significant correlation
12	0.23	Weak	Non-significant
13	0.61	Strong	Significant correlation

R: Spearman's rank correlation

DISCUSSION

The Arabic version of Kujala scale has excellent face validity as scale index of clarity equaled 89%, and the mean of proportion of clearance (clear responses) equaled 89%, also it has excellent content validity as S-CVI equaled 86.5%, and the mean of the proportion of very relevance (very relevant responses) equaled 88.2%%. The results of the current study came in agreement with (Polit and Beck, 2006) who stated that a scale to be judged as having excellent content validity, it would be composed of items with item indexes of content validity (I-CVI) that meet the following criteria (I-CVI of 1.00 with three to five experts and a minimum I-CVI of .78 for 6 to 10 experts). The recommended standards may necessitate two rounds of expert review if the initial assessment suggests the need for substantial item improvements. Also, this came in agreement with (Waltz *et al.,* 2005) who stated that S-CVI/Ave of 0.90 or above is the minimum acceptable index, and items that do not achieve the minimum acceptable indices are revised and re-evaluated.

Internal consistency and test retest reliability of the Arabic version of Kujala scale: The Arabic version of Kujala scale has good internal consistency and good test retest reliability as Cronbach's alpha equaled0.598 (ranged from 0.487 to 0.660). However, Spearman's rank correlation coefficients between test and retest results were statistically significant (item 1: 0.19, item 2: 0.52, item 3: 0.54, item 4: 0.33, item 5: 0.47, item 6: 0.789, item 7: 0.50, item 8: 0.52, item 9: 0.37, item 10, 0.55, item 11: 0.73, item: 12: 0.23, item 13: 0.11). According to (George and Mallery, 2003) α between 0.7 and 0.9 is referred as good internal consistency, also Spearman's rank correlation coefficient between 0.7 and 0.9 is referred as good test retest reliability and Spearman's rank correlation coefficient between 0.6 and 0.7 is referred as acceptable test retest reliability. Compared to previous studies, Cheung *et al.*, 2012 translated and validated the Kujala scale into Chinese version, with a total of 64 patients. The study showed that the Chinese Kujala scale had excellent reliability ($ICC = 0.968$, $p < 0.001$). Cronbach's α of individual questions and its overall value were above 0.7. Strong correlation was found between the Chinese Kujala scale and the WOMAC Osteoarthritis Index ($rho = -0.708$, $p < 0.001$). Dammerer *et al.* 2018 translated and validated the Kujala score in German-speaking patients with patella instability and the assessed its measurement characteristics. The study reported high reliability in terms of internal consistency for the Kujala score (Cronbach's alpha = 0.87). Discriminant validity in terms of correlation with the SF-12 mental component summary Score was satisfactory (r= 0.14). The authors concluded that the German version of the Kujala score proved to be a reliable and valid instrument in the

setting of a typical patellofemoral disease treated with a standard patellofemoral procedure. Kievit *et al.*, 2013 validated the Dutch version of Kujala Anterior Knee Pain Scale in patients who had undergone total knee arthroplasty (TKA) or unicompartmental knee arthroplasty (UKA). The internal reliability of the Kujala Anterior Knee Pain Scale was acceptable with a Cronbach's α of 0.81 in patients after TKA or UKA. A high correlation was found between the Kujala Anterior Knee Pain Scale and the Oxford 12-item questionnaire ($R = 0.81$). Moderate correlations were found with the visual analogue score month ($R = 0.63$), Hospital for Special Surgery patella score ($R = 0.51$) and SF-36 subscales physical functioning ($R = 0.59$), role-physical ($R = 0.59$), bodily pain ($R = 0.57$). Other correlations were poor, therefore indicating a good convergent and divergent validity. Dutch version was also validated by Ummels *et al.* 2017. The study reported that internal consistency was 0.78 for the first assessment and 0.80 for the second assessment.

The ICC between the first and second assessments was 0.98. Additionally, these results accord with Gil-Gámez *et al.* 2016 who translated the patellofemoral disorder questionnaire "Kujala Score" into Spanish and adapted it for Spanish culture. The Spanish "Kujala Score" had high internal consistency (Cronbach $\alpha = 0.8$; if an item was deleted, Cronbach $\alpha = 0.77$–0.80), excellent reliability and agreement (interclass correlation coefficient = 0.99), and good construct validity that was significantly correlated with the outcome of the Spanish VISA-P (Spearman rho = 0.7; $P < 0.001$).Thai version was also validate by Sakunkaruna *et al.*, 2015 who conducted a cross-cultural adaptation and determined the test-retest reliability of the Thai version of the Kujala Patellofemoral questionnaire. Thirteen questions indicated strong reliability, ranging from ICC2, 0.8 to 1.0 and the total score was ICC2, 0.98. Kuru *et al.*, 2010 evaluated the validity of the Turkish version of the Kujala patellofemoral score in patients with patellofemoral pain syndrome. The study reported that Cronbach's alpha calculated for internal consistency of the Kujala patellofemoral score was 0.84. Correlation coefficients of the items to estimate test-retest reliability ranged from 0.613 (p=0.004) to 1.000 (p=0.000), with the mean correlation coefficient of 0.944 (p=0.000).

Conclusion

The Arabic KPS is a valid and reliable tool and is comparable to the original English version and other translated versions.

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