Original Article

Translation and validation of the new version of the Knee Society Score – The 2011 KS Score – into Brazilian Portuguese[☆]

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ABSTRACT

Objective: Translation, cultural adaptation, and validation of the new version of the Knee Society Score – The 2011 KS Score – into Brazilian Portuguese and verification of its measurement properties, reproducibility, and validity. In 2012, the new version of the Knee Society Score was developed and validated. This scale comprises four separate subscales: (a) objective knee score (seven items: 100 points); (b) patient satisfaction score (five items: 40 points); (c) patient expectations score (three items: 15 points); and (d) functional activity score (19 items: 100 points).

Method: A total of 90 patients aged 55–85 years were evaluated in a clinical cross-sectional study. The pre-operative translated version was applied to patients with TKA referral, and the post-operative translated version was applied to patients who underwent TKA. Each patient answered the same questionnaire twice and was evaluated by two experts in orthopedic knee surgery. Evaluations were performed pre-operatively and three, six, or 12 months post-operatively. The reliability of the questionnaire was evaluated using the intraclass correlation coefficient (ICC) between the two applications. Internal consistency was evaluated using Cronbach's alpha.

Results: The ICC found no difference between the means of the pre-operative, three-month, and six-month post-operative evaluations between sub-scale items.

Conclusion: The Brazilian Portuguese version of The 2011 KS Score is a valid and reliable instrument for objective and subjective evaluation of the functionality of Brazilian patients who undergo TKA and revision TKA.

Tradução e validação da nova versão da escala *Knee Society Score – The 2011 KS Score* – para a língua portuguesa

RESUMO

Objetivo: Traduzir, adaptar culturalmente e validar a nova versão da escala *Knee Society Score – The 2011 KS Score* – para a língua portuguesa e verificar suas propriedades de medida, reprodutibilidade e validade. Em 2012, a nova versão do *Knee Society Score* foi desenvolvida e validada, com quatro subescalas: a) avaliação objetiva do joelho (sete itens: 100 pontos); b) satisfação do paciente (cinco itens: 40 pontos); c) expectativa do paciente (três itens: 15 pontos); e d) atividade funcional (19 itens: 100 pontos).

Método: Foram avaliados 90 pacientes entre 55 e 85 anos em estudo clínico transversal. A versão traduzida pré-operatória foi aplicada em pacientes com indicação de ATJ e a versão traduzida pós-operatória foi aplicada em pacientes submetidos a ATJ. Cada paciente respondeu o mesmo questionário duas vezes, foram avaliados por dois ortopedistas especialistas em cirurgia do joelho. Foram feitas avaliações pré-operatórias com três, seis ou 12 meses de pós-operatório. A confiabilidade do questionário foi avaliada através do coeficiente de correlação intraclasse (CCI) entre as duas aplicações. A consistência interna foi avaliada através do alfa de Cronbach.

Resultados: O índice do coeficiente de correlação intraclasse não detectou diferença entre as médias das avaliações no pré-operatório, com três meses e seis meses de pós-operatório entre os subitens da escala.

Conclusão: A versão brasileira do *The 2011 KS Score* mostrou-se um instrumento válido e confiável para avaliação objetiva e subjetiva da função de pacientes brasileiros submetidos a ATJ e revisão de ATJ.

Introduction

In evidence-based medicine, it is necessary to use standardized and validated scales to assess treatment results. Specific scales have been designed for individuals with knee injuries, allowing a reproducible standardized assessment.[1]

The use of questionnaires as an assessment parameter is useful, since it allows the standardization and reproducibility of the proposed measurements.[2] The choice of an evaluation tool should prioritize the following aspects: clear components that allow simple application, ease of understanding, and proper application time.[3] When a questionnaire is prepared, its properties need to be tested and validated in a group of patients so that they can subsequently be used in population groups.[4]

The standardization of translation and cultural adaptation methods allowed an instrument developed for use in one language and culture to also be used in another language and cultural context, with adequate correspondence and reliability.[5,6]

Knee osteoarthrosis is a common pathology; in its later stages, it can be surgically treated with total knee arthroplasty (TKA).[7,8] Due to the high prevalence of joint replacement procedures, various evaluation systems have been developed to quantify the results of such surgeries.[7]

The Knee Society Score combines subjective and objective information and separates the knee score (pain, stability, range of motion) from the patient's functional score (ability to walk and climb up and down stairs).[9]

Recently, Scuderi et al.[10] developed and validated a new version of the Knee Society Score, consisting of four separate subscales: (A) objective knee score (seven items: 100 points); (B) patient satisfaction score (five items: 40 points); (C) patient expectation score (three items: 15 points), and (D) functional activity score (19 items: 100 points).

This study aimed to translate, culturally adapt, and validate the new version of the Knee Society Score (2011 KS Score) into Brazilian Portuguese and assess its measurement, reproduction, and validity properties, so it can be used as a specific instrument for postoperative assessment of TKA.

Patients and methods

The study was approved by the Research Ethics Committee of this institution; all patients received and signed an informed consent form.

In a cross-sectional study, 90 patients (68 women and 22 men) aged 55–85 years old (mean of 64.65) were assessed, followed by the Knee Surgery Group with an indication for TKA or who had undergone TKA.

The inclusion criteria were: (a) age between 55 and 85 years; (b) both genders; (c) indication for TKA or revision TKA; and (d) had undergone TKA or revision TKA.

The exclusion criteria were: (a) individuals who refused to answer the questionnaire; (b) neurological disorder that led to cognitive alterations; and (c) muscle, nerve, and/or fracture injuries in the lower limbs.

The Knee Society, responsible for the original scale, authorized the translation and cultural adaptation of the score.

The new version of the KSS consists of a patient classification system and four separate subscales: (A) objective knee score (seven items: 100 points); (B) patient satisfaction score (five items: 40 points); (C) patient expectation score (three items: 15 points) and (D) functional activity score (19 items: 100 points). The classification system separates patients into three categories, depending on their medical status: (A) unilateral or bilateral (contralateral knee operated successfully); (B) unilateral – symptomatic contralateral knee; (C) multiple arthritis.

The new version of the KSS was translated in accordance to the translation, cultural adaptation, and validation protocol proposed by Guillemin et al.:

1. *Translation*: The items of the new version of KSS were initially translated from English into Brazilian Portuguese by two independent Brazilian sworn translators who were aware of the translation objectives; more than the literal translation, the conceptual translation was emphasized. The two translations were compared by the translators, researchers, and research advisor, and a consensus was reached on a Brazilian Portuguese version.
2. *Assessment of the initial translation*: the Brazilian Portuguese version, called "Escore da Sociedade do Joelho," was back-translated into English by a native teacher who did not participate in the translation; the result was compared to the original instrument by the research participants.
3. *Revision*: the translations were compared by a multidisciplinary team to resolve the discrepancies.
   This process resulted in the final Brazilian Portuguese version.
4. *Pre-test*: Ten patients were submitted to the Brazilian Portuguese questionnaire final version, followed by an interview with the evaluators, who asked the patients about theirs doubts during the score assessment. Sample size was calculated with 95% confidence, 80% power, and 40% of standard deviation.
5. *Validation*: the questionnaire was applied by two independent evaluators with an interval of 30 min between them; the data were analyzed for inter- and intraobserver reproducibility. The evaluations were done preoperatively, and at 3, 6, or 12 months postoperatively.

The new version of the KSS (preoperative) was applied for individuals with indication for TKA or revision TKA by evaluator 1 and, after 30 min, by evaluator 2. The new version of the KSS (postoperative) scale was applied in subjects submitted to TKA or revision TKA after 3, 6, or 12 months of the surgical procedure in the same way by the same evaluators. The evaluators used the method described by Scuderi et al.[10]

The observed values of the variables considered in the study were summarized in descriptive statistics as mean, standard deviation (SD), minimum, median, and maximum.

The reproducibility and interobserver agreement for the objective subscale and the interperiod for the subjective subscales (symptoms, satisfaction, expectations, and activities) were assessed using the intraclass correlation coefficient (ICC).

Table 1 – Preoperative patient data.

	Number of patients	Percentage
Preoperative period	43 patients	
Gender		
Female	35	81.40%
Male	8	18.60%
Side		
Right	21	48.80%
Left	22	51.20%
Ethnicity		
White	33	76.70%
Black	4	9.30%
Mixed-race	6	14.00%
Surgery		
Primary	40	93%
Revision	3	7%
Charnley classification		
A	3	7%
B1	34	79.10%
B2	5	11.60%
C3	1	2.30%
	Mean	Minimum	Maximum
Age (years)	63.6	55	85
Height (m)	1.604	1.4	1.9
Weight (kg)	78.12	56	118

The internal consistency between the subscales was evaluated using Cronbach's alpha index.

Results

Table 1 presents the data regarding gender, side, ethnicity, type of surgery, Charnley classification, age, height, and weight of patients with TKA indication assessed using the preoperative version of the score.

Table 2 presents the data regarding gender, side, ethnicity, type of surgery, Charnley classification, age, height, and weight of the patients submitted to TKA assessed by the postoperative version of the score.

Table 3 presents the ICC values according to the evaluation period and the sub-items of the scale (objective, symptoms, satisfaction, expectation, and activities).

Table 4 shows the Cronbach's alpha coefficient values according to the evaluation period and the sub-items of the scale (objective, symptoms, satisfaction, expectation, and activities).

Discussion

Joint replacement procedures have become very frequent due to the increased incidence of osteoarthritis, which is responsible for labor inability in 15% of the adult population worldwide.[7] Scores for the treatment result on patients with osteoarthritis or who have undergone arthroplasty are necessary, as they are a standardized, reproducible, and consistent method for the presentation and evaluation of therapeutic

Table 2 – Data from patients in the postoperative group.

	Number of patients	Percentage
Postoperative period	47 patients	
Gender		
Female	33	70.20%
Male	14	29.80%
Side		
Right	28	59.60%
Left	19	40.40%
Ethnicity		
Asian	1	2.10%
White	28	59.60%
Black	3	6.40%
Mixed-race	15	31.90%
Surgery		
Primary	47	100%
Revision	—	—
Charnley classification		
A	5	10.60%
B1	26	55.30%
B2	15	31.90%
C1	1	2.10%

	Mean	Minimum	Maximum
Age (years)	65.71	55	85
Height (m)	1.61	1.47	1.82
Weight (kg)	78.3	51	117

Table 3 – ICC results according to the evaluation period and the sub-items of the scale.

	Preoperative period	Postoperative period
Objective	0.931	0.839
	(95% CI 0.877–0.962)	(95% CI 0.729–0.907)
Symptoms	0.807	0.957
	(95% CI 0.672–0.891)	(95% CI 0.924–0.976)
Satisfation	0.879	0.967
	(95% CI 0.787–0.932)	(95% CI 0.941–0.981)
Expectation	0.949	0.906
	(95% CI 0.905–0.972)	(95% CI 0.838–0.946)
Activities	0.966	0.969
	(95% CI 0.937–0.981)	(95% CI 0.945–0.983)

Table 4 – Results of Cronbach's alpha coefficient according to the evaluation period and the sub-items of the scale.

	Preoperative period	Postoperative period
Objective	0.663	0.435
Symptoms	0.312	0.762
Satisfaction	0.791	0.844
Expectation	0.728	0.854
Activity	0.508	0.78

results.[1] One of the most widely used score for this evaluation is the KSS.

The validation of the original KSS[11] demonstrated how socio-cultural adaptations are paramount, in order to avail every question of the tool in the assessment of TKA, to help monitor and treat post-operative conditions. Both the old and new scores attempt to quantify the patient's outcome after TKA surgery, through a score of 100 points for pain, alignment, stability, and range of motion, and a score of 100 points for function. The main differences between both scores are the activities that contribute to the function score, the weighting of each activity, and the new scales for patient expectation and satisfaction. The new score is not intended to be numerically related to the old score. Therefore, although the first version of KSS had been translated and validated, the authors considered it necessary to validate the new version. This new version of the scale has already been adapted to French.[12]

The translation process followed the guidelines recommended by Guillemin et al.,[6] which are widely used in the process of translation and cultural adaptation of scores, including the earlier version of KSS. This methodology made the Brazilian Portuguese version of the new KSS fit for use in Brazilian patients and can thus measure clinical outcomes and treatments in a given moment or along follow-up.

Regarding the semantic validity, the translation and cultural adaptation of the new version of the KSS showed excellent semantic and conceptual equivalence according to the results of the interobserver analysis; the entire process was based on studies by Guillemin et al.,[6] Duarte et al.,[13] Nigri et al.,[14] and Ciconelli.[15]

The pre-operative and postoperative ICC, 0.931 and 0.839, respectively, demonstrate that the understanding of this subscale by the surgeons was similar and adequate, therefore being reproducible for other surgeons. The pre- and postoperative subjective subscales (symptoms, satisfaction, expectations and activities) also showed a good inter-period correlation, with lowest and highest ICC values of 0.807 and 0.969, respectively. That is, patients had a similar understanding of the questionnaire on the two occasions they answered to it.

As observed in validation studies, it is important to perform, in addition to the translation, a socio-cultural adaptation (in this case, to Brazilian Portuguese), so that the scale can be better evaluated in the country.

In the translation and validation of the new version of KSS no changes were made apart from the translation itself.

Reliability was assessed by internal consistency, estimated by Cronbach's alpha coefficient, for each evaluation period and each sub-item of the scale. The contribution of each item to the reliability of the domains was evaluated. This index can range from 0 to 1; the higher this value, the greater the reliability of the scale.[16] All correlations between the items in the periods were positive and significantly different from zero, which indicates that it is reasonable to compose a scale with these items because they measure the same attribute: self-efficacy.

The inter-observer reliability is shown in Table 3, in which the applications of the scale by the different evaluators were compared. There is a clear indication that the correlation between the two observers was high (>80% in all items).

The translation and validation of the new version of the KSS (2011 KS Score) into Portuguese for use in Brazil, considering the socio-cultural adaptations, are of fundamental importance so that all items of the tool can be used to analyze the TKA procedure; being useful in post-operative follow-up and treatment.

Conclusion

The Brazilian version of the 2011 KS Score was shown to be an easily understood and applied tool, valid and reliable for objective and subjective assessment of the function of Brazilian patients undergoing primary and revision TKA, aiding in better monitoring and evolution of this surgical procedure.

Conflicts of interest

The authors declare no conflicts of interest.

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