ABSTRACT

Introduction and objective: Many instruments have been proposed for the knee assessment, making its choice often difficult. Among these instruments, we can mention the Knee Injury and Osteoarthritis Outcome Score (KOS) and the International Knee Documentation Committee (IKDC) scales; however, it is unclear which of them would be better to evaluate the knee of subjects with patellofemoral pain syndrome (PFPS). The objective of this study was to compare the KOS and IKDC scales evaluation to verify which of them would be more appropriate to identify impairment in patients with PFPS. Methods: The study included 31 PFPS subjects, aged between 18 and 39 years (24.29 ± 4.09); 27 subjects were female and 4 were male. All subjects were submitted to KOS and IKDC scales on the two occasions. The second application served as reliability evidence (PKOS and PCIKDC). The analysis of statistical correlation between the scales was done with the Spearman and Wilcoxon tests, considering significant p < 0.05. Results: The Spearman correlation test presented strong correlation between KOS and PKOS (r = 0.99, p < 0.001) and IKDC and PCIKDC (r = 0.96, p < 0.001). There was a weak correlation between KOS and IKDC (r = 0.46, p < 0.01) and PKOS and PCIKDC (r = 0.55, p < 0.002). The Wilcoxon test revealed differences between KOS and IKDC (p < 0.001) and between PKOS and PCIKDC (p < 0.001). There was equality between KOS and PKOS (p > 0.10) and difference between IKDC and PCIKDC (p < 0.02). Conclusion: The KOS and IKDC scales were reliable during the application in patients with PFPS, where the KOS received greater reliability when compared to the IKDC.

Keywords: knee joint, scales, activity of daily living.

INTRODUCTION

Patellofemoral pain syndrome (PFPS) is known as one of the main causes for knee pain, both in orthopedic clinics, and sports practice, as in running and in young athletes. Its beginning is subtle, and it is especially more common in young women, adolescents and athletes of both sexes, reaching one out of four people. Although some authors define it as anterior or retropatellar pain in the knee joint, in the absence of other conditions, its etiology is multifactorial, which makes its definition complex. Knee anterior pain may be a result of many factors such as inflammation of the synovial membrane and/or fat pad, retinacular neuromas, intra-bone pressure and increase of bone metabolism. These pathophysiological processes are derived from disorders in the femoropatellar joint, which can show local proximal or distal generating factors.

This scenario results in important functional limitations such as climbing up and down steps, squatting or kneeling, remaining seated for prolonged time. Moreover, inflammation and pain may generate arthrogenic muscular inhibition aggravating the irritation process in the joint, with consequent increase of functional limitations, regardless of the radiological and arthroscopic findings.

Many instruments have been proposed to facilitate functional diagnosis and better characterize functional limitations in patients with knee injuries; however, not all of them include necessary items for suitably evaluating alterations in the femoropatellar joint. The results of a functional scale may contribute to the evaluation of strategies of therapeutic intervention. When the functional activities such as climbing up and down stairs, sitting, standing up and squatting are assessed in the application of the functional scale, it may reveal the level of compromising as well as the level of efficiency of the proposed interventions.

Many instruments were tested and validated for the knee assessment; however, part of these instruments was built to evaluate the knee in a broader scope and another part specifically to a specific dysfunction, and even for a specific population. Thus, there is great diversity of instruments, making the choice of the best one many times difficult, especially from the functional point of view.

Many investigations have been carried out in an attempt to verify the best instrument for the knee evaluation, including concerning the post-surgery period of cartilage defects. The IKDC scale (International Knee Documentation Committee) designed by the AOSSM committee (American Orthopedic Society for Sports Medicine) and the ESKSA (European Society for Knee Surgery and Arthroscopy) in 1987 and later revised in 1997. The IKDC scale has also been the most recommended to the orthopedic community, including in femoropatellar disorders; although the Knee Injury and Osteoarthritis Outcome Score (KOOS) scale has also...
been recommended when considering osteoarthritis\textsuperscript{20,23,24}. The IKDC is composed of 10 objective questions subdivided in seven questions about symptoms, two questions about sports activities and two questions about pre and post-functionality.

On the other hand, the KOS (Knee Outcome Survey) scale produced in 1998 by Irrgang et al.\textsuperscript{13} also presents the evaluation of relevant aspects concerning functional limitations in the daily living\textsuperscript{20,24}, which may be very useful in the evaluation of PFPS patients\textsuperscript{2,24,25}. This questionnaire is composed of two separate scales, the Activities of Daily Living Scale (ADLS) to evaluate the symptoms and functional limitations during the activities of daily living, and the Sports Activities Scale (SAS) to evaluate the symptoms and functional limitations during sports activities\textsuperscript{26}.

However, there is no consensus on which of these scales (IKDC or KOS) could better evaluate the PFPS patients, since no articles approaching this theme have been found in the literature, nor comparative studies between these two scales have been performed with this population. Therefore, the aim of this study was to compare the functional evaluation scales KOS and IKDC and verify which one would be more appropriate in the identification of the level of compromising of the PFPS patients. The identification and improvement of the evaluation scales may contribute in the early and more accurate identification of knee disorders, favoring prevention of degenerative injuries and evaluation of the proposed interventions, either surgical or rehabilitation, favoring sports performance.

**METHODOLOGY**

**Subjects**

The subjects were recruited in the Department of Orthopedics and Traumatology of the Clinics Hospital of Uberlândia (UFU). They were 31 PFPS patients, aged between 18 and 39 years (mean 24.29 ± 4.09), with 27 subjects were female and four were male. All subjects were submitted to the KOS and IKDC scales after having signed the Free and Clarified Consent Form approved by the Ethics in Research Committee of the University Center of the Triângulo (Protocol number 668.338/2008).

In order to be included in the study, the subjects should present clinical symptoms of femoropatellar pain and be without any evidence of any other specific alteration on the knee, diagnosed by an orthopedist of the service. The subjects presented at least two of the following pain conditions in the femoropatellar region: 1) during prolonged sitting time, squatting, running, kneeling, hopping and jumping; 2) onset which was not related to any specific trauma accident; 3) in the palpation of at least one of the patellar facets or during squating using lower limbs.

Exclusion criteria were: to have any other intra-articular disease, including menisci, ligament, tissue or patellar tendon laxity, iliotibial band, goose foot tendonitis, evidence of knee effusion or referred pain in the low back or hip region, history of patellar dislocation, previous surgery in the femoropatellar joint. The subjects older than 40 years were also excluded to reduce the possibility of degenerative disease as cause for the pain.

**Procedure**

The subjects recruited in the present study were submitted to the KOS scale\textsuperscript{14} and the IKDC questionnaire of knee subjective evaluation\textsuperscript{15}. The two scales were applied on the same day, and after two days, they were reapplied for confidence proof. The main premise for valid appreciation of the confidence proof is that the secondary condition measured by the instrument remained stable between repeated measurements. All subjects were able to follow the instructions.

**Data processing**

The recordings on the Scale of Activities of Daily Living were calculated as described by Irrgang et al.\textsuperscript{15}, resulting in punctuation from 0 to 100. Punctuation 100 indicates that the individual did not present symptoms or functional limitations related to the knee. Concerning the IKDC scale, the responses of each item were punctuated according to description by Irrgang et al.\textsuperscript{15}, resulting in punctuation ranging from 0 to 100. Punctuation of 100 indicates that the individual did not present any limitation with activities of daily living or sports activities and absence of symptoms.

**Statistical analysis**

All data were fed to a database for computer analysis. Statistical analyses were performed with the version 5.0 of the Statistica for Windows (Statsoft, Inc.) statistical program. The Shapiro-Wilk test revealed that data were not modeled in normal distribution; hence, the Wilcoxon test was chosen to compare the scales. Spearman correlation test was applied for correlation between the KOS and IKDC scales as well as respective confidence proof.

**RESULTS**

The questionnaires correlation between the first and second administration, the so-called confidence proof (CP) may be observed in figure 1. The result of the Spearman correlation test reveals strong correlation between KOS and PCKOS ($r = 0.99; p < 0.001$) and IKDC and PCIKDC ($r = 0.96; p < 0.001$). On the other hand, there was moderate correlation between KOS and IKDC ($r = 0.46; p < 0.01$) and PCKOS and PCIKDC ($r = 0.55; p < 0.002$). Subsequently, in the comparison between scales, the Wilcoxon test revealed difference between KOS and IKDC ($p < 0.001$) and between PCKOS and PCIKDC ($p < 0.001$). On the other hand, there was equality between KOS and PCKOS ($p > 0.10$) and difference between IKDC and PCIKDC ($p < 0.02$).

**DISCUSSION**

According to Dixit et al.\textsuperscript{27}, there is still need of functional assessment in the filing of knee conditions, with special attention to the PFPS context. It is a constant process the search for measuring instruments which translate more accurately the functional and subjective consequences of the knee situation\textsuperscript{28}. The measurement properties should be clear and correlate with the specific goal\textsuperscript{8}.

Therefore, strong statistic correlation between the scales and the confidence proof was obtained (KOS x PCKOS; IKDC x PCIKDC). Nigri et al.\textsuperscript{18} also applied the KOS for validation in 53
The KOS and IKDC scales present reliability during their application in PFPS patients and the KOS received higher confidence proof when compared with the IKDC. All authors have declared there is not any potential conflict of interests concerning this article.
REFERENCES


