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ORIGINAL ARTICLE

The Banff Patellar Instability Instrument: validity and reliability of an Indonesian version

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Abstract

Background The Banff Patellar Instability Instrument (BPII) is a valuable scoring tool for assessing patellofemoral instability in patients suffering from patellofemoral pain syndrome (PFPS). The BPII 2.0 is a shortened version of the BPII. However, there is no Indonesian edition of BPII 2.0 that has been validated. This study aimed to determine the validity and reliability of the Indonesian version of the BPII 2.0.

Materials and methods This was a cross-sectional study that used a forward–backward translation protocol to create an Indonesian version of the BPII 2.0. Thirty patients with PFPS were given the questionnaires. The questionnaire's validity was evaluated by analyzing the correlation between score of each subscale and the overall score to the Indonesian version of the Kujala score using Pearson correlation coefficient, while the reliability was evaluated by measuring the internal consistency (Cronbach α) and test–retest reliability (intraclass correlation coefficient).

Results The Indonesian version of BPII 2.0 and the Indonesian version of Kujala score had a strong Pearson correlation coefficient for construct validity. For all subscales, Cronbach α was 0.90–0.98, indicating adequate internal consistency. The test–retest reliability was high, with intraclass correlation coefficient ranging from 0.89 to 0.98 for all subscales. There was no difference in the Indonesian version of BPII 2.0 response between the first and second administration of the questionnaire which was taken 7 days afterward.

Conclusion The Indonesian version of BPII 2.0 was determined to be valid and reliable and is therefore an objective instrument to evaluate patellofemoral instability in patients with PFPS in the Indonesian population.

Keywords Patellar instability · Indonesian · Banff Patellar Instability Instrument · Patellofemoral pain syndrome

Introduction

Patellofemoral pain syndrome (PFPS) is a non-traumatic anterior knee pain that is aggravated by increased knee joint loading, such as jumping, squatting, running, and stair climbing and descending [1]. Patellofemoral instability is one of the most common knee problems causing high rate morbidity in patients affected. Instability, pain, reduced activity level, osteoarthritis, and a lower quality of life were among the issues that the patients have to overcome [2].

Understanding how to handle patellofemoral instability could improve care and study efficiency, leading to the creation of a relevant and accurate instrument [1, 2]. Many instruments can be used to evaluate the severity of patellofemoral instability, for instances, Kujala Patellofemoral disorder score, and Banff Patellar Instability Instrument [3, 4].

The Kujala score is a collection of 13 questions designed to assess symptoms and function limitations in patients with patellofemoral problem. This scoring system has been widely used to assess patients with anterior knee pain and patellofemoral instability since its publication in 1993. In 2019, the Indonesian version of Kujala score was released, and it was used to evaluate PFPS patients at Saiful Anwar General Hospital, Malang, Indonesia [1]. However, the Kujala score only evaluated the issues with pain in adult population.

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Meanwhile, the Banff Patellar Instability Instrument (BPII) was first published in 2013 and updated in 2016 known as BPII 2.0. It now includes of 23 questions divides into five domains: symptoms and physical complaints, work-related issues, sport, leisure, and competition; lifestyle, social and emotional concerns. Hence, the BPII 2.0 is intended to evaluate patients with patellofemoral instability with a more holistic approach. Adult and pediatric patients were included in the initial validity and reliability assessments of the BPII 2.0, making it the only disease-specific PROM (Patient-Reported Outcome Measure) validated for use in the pediatric population [3, 4]. The BPII 2.0 was recently evaluates in a multi-center concurrent validation study with the Pedi-IKDC, revealing a moderate correlation ($r=0.65$) between the outcome measures, as well high test–retest reliability (ICC = 0.94), and no floor or ceiling effects [5].

The BPII 2.0 has been formally translated and validated for German speakers from Germany, Austria, and Switzerland and is currently being validation in Dutch, Spanish, Portuguese, Finnish, and French [3, 6]. There is still no Indonesian version available. As a result, the aim of this research is to develop BPII 2.0 in Indonesian version and to evaluate its validity and reliability.

Materials and methods

Study design and sample

This was a descriptive cross sectional study of PFPS patients. This study was performed in line with the Standards for Quality Improvement Reporting Excellence (SQUIRE) criteria [7]. Thirty patients with PFPS from our hospitals' orthopedic outpatient clinic were included; no patients were lost to follow up in this study. Inclusion criteria including patients with anterior knee pain, aged 10 to 60 years old, and fluent in Indonesian language. The diagnosis of PFPS was established by an orthopedic surgeon in our hospital after taking a medical history and performing physical examination. The diagnostic criteria of PFPS consist of anterior knee pain aggravated by squatting and persisted for more than 2 weeks. Exclusion criteria were patients younger than 10 years old or older than 60 years and those with known knee disorders besides patellar instability. Data were collected from June 2020 to October 2020. This study had been reviewed by our institutional review board and received ethical clearance number KE/FK/1088/EC/2020.

Development of the Indonesian version of the Banff Patellar Instability Instruments 2.0

We received permission to translate BPII 2.0 from the original author. The translation process was done using a forward–backward translation protocol. There were two independent translators worked on the project: an orthopedic specialist and another person who was not in the medical field. To resolve any discrepancies, the two versions were compared and discussed. Another senior orthopedic student and a non-health care worker then translated the finding back into English (different from the one who conducted the forward translation). The final result was then checked for similarities to the original English version.

Research procedure

The Indonesian version of BPII 2.0 and the Indonesian version of Kujala score were used in tandem. The BPII was first published in 2013 and consisted of 32 questions divided into 5 domains including symptoms and physical problem, work-related issues, leisure, and competition; lifestyle, social and emotional. After that in 2016 the revision was made. The BPII 2.0 which consists of 23 questions was published [3, 4].

The BPII was graded on a scale of 1 to 100. The VAS outputs are summed and calculated in millimeters for each question. After that, the total sum was divided by the number of questions answered. The total number of the VAS measurement is 2300 mm; if all questions are answered at 100 mm, the BPII score will be 2300/23 = 100/100 [4].

The Kujala score was created to assess symptoms and functional impairment in patellofemoral disorder patients. The scoring system consists of 13 questions regarding functional aspects, including limping, support, walking, stair descending and ascending, squatting, running, jumping, prolonged sitting with knees flexed, pain, swelling, kneecap movement, thigh atrophy, and flexion deficiency. A higher score indicates a better result, with a perfect score of 100 indicating a better result [1].

Statistical analysis

Correlating the outcome of the Indonesian version of BPII 2.0 with the result of the Indonesian version of Kujala score was used to determine the validity of the Indonesia versions of BPII 2.0. The Pearson correlation test was used to evaluate the correlation statistically. If the P value was less than 0.05, the result was considered statistically significant.

The reliability of the Indonesian BPII 2.0 was determined by evaluating the internal consistency and test–retest reliability. The Cronbach alpha was used to determine internal consistency, while the interclass correlation coefficient (ICC) was used to assess test–retest reliability. The test and retest procedure was performed seven days apart. Since the clinical effects of patients with PFPS do not improve in such a short period of time, this interval was chosen. During the 7-day break, the patients received oral medication and physiotherapy care. All statistical analysis was performed via SPSS.

Table 1 Demographic characteristics of the patients

Demographic characteristics of the patients ($N=30$)	
Age, years (mean ± SD, range)	27.53 ± 5.54, 21–43
BMI (mean ± SD, range)	24.70 ± 2.16, 22–31
Sex M:F	19 (63.3%): 11 (36.7%)
Affected Side R:L	22 (73.3%): 8 (26.67%)

Table 2 Validity test of the Indonesian version of the Banff Patellar Instability Instruments 2.0 (BPII 2.0)

Kujala patellofemoral questionnaire in knee pain patients		
BPII 2.0 subscale	Pearson correlation coefficient	*P* value
Symptoms and physical complaints	0.85	< 0.001
Work and/or school-related concerns	0.77	< 0.001
Recreation/sport/activity	0.87	< 0.001
Lifestyle	0.91	< 0.001
Social and emotional	0.66	< 0.001

Pearson correlation coefficients between 0.1 and 0.3, between 0.3 and 0.5, and > 0.5 indicate weak, moderate, and strong validity, respectively

Results

All patients in this study had anterior knee pain and had been diagnosed with PFPS by an orthopedic surgeon after a thorough history and physical examination. Pharmacologic agents (analgesics) and physical therapy were used to treat all of the patients non-operatively.

There were 19 (63.3%) males and 11 (36.7%) females among the 30 study subject described in Table 1.

The final score the Indonesian version of the BPII 2.0 and the Indonesian version of Kujala score had a strong correlation ($r=0.98$) according to the Pearson correlation test. The validity test results, as presented by the BPII 2.0 subscale, are shown in Table 2. The results of the study revealed a significant positive correlation between the scores on each subscale and the Kujala's overall performance. All Pearson correlation coefficient was found to be greater than 0.50, suggesting a strong correlation.

The Cronbach alpha was used to determine the internal consistency. With a Cronbach alpha of 0.98, the internal consistency was fine. The ICC, which was 0.97, was used to determine test–retest reliability. Furthermore, there were no floor or ceiling effects in the final score, as no patient received a score of zero or score of 100. The lowest score ($n=1$) was 4.7, and the highest score ($n=1$) was 96.5. Table 3 shows the results of the reliability evaluation, as presented by the BPII 2.0 subscale. Cronbach alpha values were > 0.70 for all questionnaire subscales, indicating adequate internal consistency as defined in the methods section. The majority of ICC were > 0.90 in the test–retest reliability analysis, indicating high reliability as described in the methods section.

Figure 1 shows mean scores for each BPII 2.0 subscale at the 2 administrations of the questionnaire. The results of the paired *t* test showed mostly no significant differences in the mean scores between the first and the second administrations for each subscale. Only one subscale work and/or school-related concerns showed significant with p value < 0.05, but overall there were no substantial differences in mean score for the Indonesian version of BPII 2.0 ($p > 0.05$).

Discussion

The BPII 2.0 has shown content validity, excellent test–retest reliability, and very stable score through a very modest standardized error of measurement [3]. Until recently, there were only a few studies that looked into the validity of the BPII 2.0 score, namely the development of the BPII score in German version, the study of concurrent validation between BPII and Kujala score and the study in adolescent population using comparison with Pedi-IKDC subjective knee form that results, the BPII 2.0 is a valid, reliable, and disease-specific patient-reported outcome measure that can be used with an adolescent population with Pearson *r* correlation coefficient

Table 3 Reliability test of the Indonesian version of the Banff Patellar Instability Instruments 2.0 (BPII 2.0)

BPII 2.0 subscale	Internal consistency cronbach α	Test–retest reliability intraclass correlation coefficient (CI)
Symptoms and physical complaints	0.94	0.94 (0.88–0.97)
Work and/or school-related concerns	0.96	0.95 (0.90–0.98)
Recreation/sport/activity	0.90	0.89 (0.77–0.95)
Lifestyle	0.98	0.98 (0.96–0.99)
Social and emotional	0.95	0.96 (0.91–0.98)

Cronbach $\alpha > 0.70$ denotes adequate internal consistency. Intraclass correlation coefficients < 0.50, between 0.50 and 0.75, between 0.75 and 0.90, and > 0.90 indicate poor, moderate, good, and excellent reliability, respectively

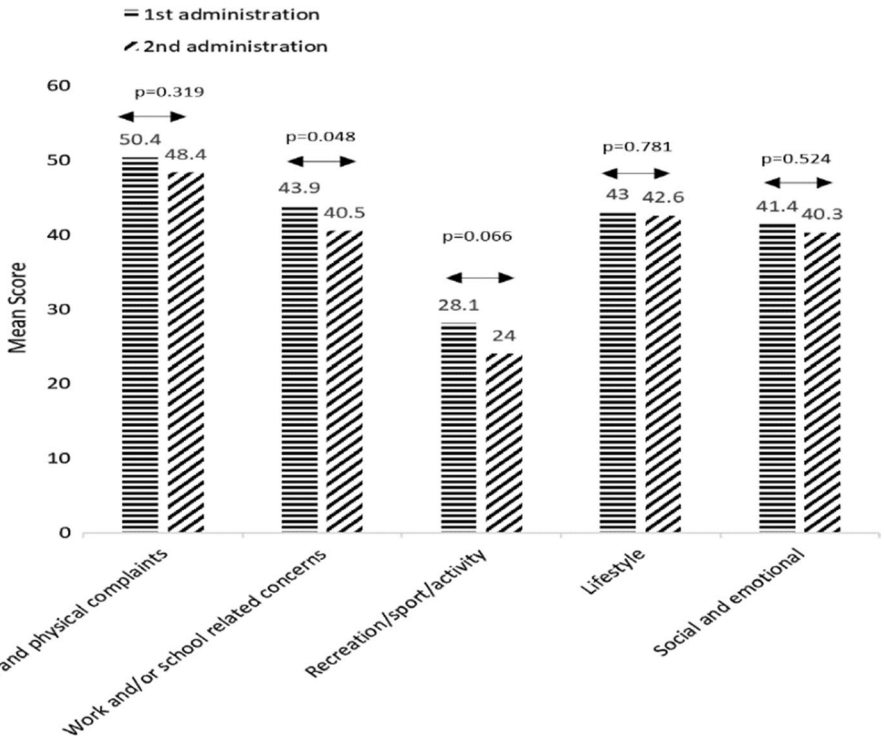

Fig. 1 Comparison of mean subscale scores between the first and the second administrations of the Indonesian version of the Banff Patellar Instability Instruments 2.0 (BPII 2.0)

between the BPII 2.0 and IKDC baseline scores taken at the initial consultation was 0.65 ($P < 0.001$; 95% confidence interval, 0.94–0.97) [4]. Therefore, it can be used for adult and adolescent population.

The construct validity of an of Indonesian version of the BPII 2.0 revealed a strong positive correlation between the scores of each Indonesian version of BPII 2.0 subscale and the overall Indonesian version of Kujala patellafemoral disorder score in our study. All of P values were less than 0.001, and all of the Pearson correlation coefficient was greater than 0.50, suggesting a good correlation, As a result, the findings verified the questionnaire's validity. The Kujala score was created to diagnose a pain-related syndrome, so this result is understandable. While there was only one question on the Kujala score that was specific for patellar instability, a study conducted by Becher et al. to adjust BPII 2.0 for German-speaking people also found a Pearson correlation coefficient of more than 0.5 between German version of BPII 2.0 and the Kujala patellofemoral score. Hiemstra et al. also discovered a $r = 0.5$ correlation between BPII 2.0 and Kujala score. These results suggest that patients with patellofemoral pain syndrome and patellar dysfunction have overlapping symptom severity and physical limitations [3, 4]. Despite the fact that the BPII 2.0 and Kujala scores do not test the same construct and have different aims and focuses, they both tend to be useful in assessing patients with patellar instability.

The reliability results of the Indonesian version of the BPII 2.0 were verified by the internal quality and test–retest reliability results. On the Indonesian version of the BPII 2.0, we discovered that all of the subscales have adequate internal accuracy, with all Cronbach alpha values > 0.70 (range, 0.90–0.98). These figures are similar to those found in the German version (Cronbach alpha values range, 0.93–0.95) [8]. Our test–retest reliability review revealed that the Indonesian version of the BPII 2.0 is highly reliable, with most ICC values exceeding 90 (range 0.89–0.98). Our findings are better than the German version's (ICC range, 0.77–0.87).

The results obtained from the present study regarding validation were similar to the findings previously reported from the development of the BPII score in German version, the study in adolescent population, and the study of concurrent validation between BPII and Kujala score [5, 7]. Finally, there were no substantial differences in mean score for the Indonesian version of BPII 2.0 obtained at two timepoints within a 7-day period ($p > 0.05$).

There are a few drawbacks to remember. The comparison of the current findings was limited due to a lack of adaptation studies of the BPII 2.0 to other languages also lack of Indonesian version score to measure quality of life for patients who have patellofemoral instability. Since patellofemoral instability has a wide variety of patient specific features, the study's results may not be representative. Also a drawback of this study is that we only evaluate preoperative patients and the demographic data of research subject is less heterogenous, where the adolescent population is still small and other variables such as education level, ethnicity, and so on have not been decided. As we all know, Indonesia is a large country with many ethnic group and cultures,

so these finding might not be applicable to all Indonesian speaking population due to linguistic differences in different area caused by cultural factors. More study is needed with a larger and more evenly distributed sample of people from various places. Nevertheless, this is first research to validate a method for assessing patellofemoral pain syndrome in Indonesian patients.

Conclusion

The Indonesian version of the BPII 2.0 has adequate internal consistency, high test–retest reliability, and good construct validity, making it an objective method for assessing patellofemoral instability in Indonesian population. Additional adaptation and validation of studies of similar instruments, on the other hand, are needed.

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Declarations

Conflict of interest The authors declare no conflict of interest.

Consent Written informed consents have been obtained from the patient for publication of this study. A copy of written consent is available for review by Editor-in-Chief of this journal on request.

Ethical approval The study had been approved by ethical committee from our institution with number KE/FK/1088/EC/2020.

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