



## Original Article

# Comparative evaluation of patellar height methods in the Brazilian population<sup>☆</sup>



Christian Behrendt, Alexandre Zaluski, Rodrigo Pires e Albuquerque\*,  
Eduardo Branco de Sousa, Naasson Cavanellas

Instituto Nacional de Traumatologia e Ortopedia, Rio de Janeiro, RJ, Brazil

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## ABSTRACT

**Objective:** The methods most used for patellar height measurement were compared with the plateau-patella angle method.

**Methods:** A cross-sectional study was conducted, in which lateral-view radiographs of the knee were evaluated using the three methods already established in the literature: Insall-Salvati (IS), Blackburne-Peel (BP) and Caton-Deschamps (CD). These were compared with the plateau-patella angle method. One hundred and ninety-six randomly selected patients were included in the sample.

**Results:** The data were initially evaluated using the chi-square test. This analysis was deemed to be positive with  $p < 0.0001$ . We compared the traditional methods with the plateau-patella angle measurement, using Fisher's exact test. In comparing the IS index with the plateau-patella angle, we did not find any statistically significant differences in relation to the proportion of altered cases between the two groups. The traditional methods were compared with the plateau-patella angle with regard to the proportions of cases of high and low patella, by means of Fisher's exact test. This analysis showed that the plateau-patella angle identified fewer cases of high patella than did the IS, BP and CD methods, but more cases of low patella. In comparing pairs, we found that the IS and CD indices were capable of identifying more cases of high patella than was the plateau-patella angle. In relation to the cases of low patella, the plateau-patella angle was capable of identifying more cases than were the other three methods.

**Conclusions:** The plateau-patella angle found more patients with low patella than did the classical methods and showed results that diverged from those of the other indices studied.

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<sup>☆</sup> Work developed in the Department of Orthopedics and Traumatology, Instituto Nacional de Traumatologia e Ortopedia, Rio de Janeiro, RJ, Brazil.

\* Corresponding author.

E-mail: [rodalbuquerque19@gmail.com](mailto:rodalbuquerque19@gmail.com) (R.P. e Albuquerque).

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## Avaliação comparativa de métodos da altura patelar na população brasileira

### R E S U M O

#### Palavras-chave:

Patela  
Radiologia  
Joelho

**Objetivo:** Comparar os métodos mais usados de medida da altura patelar, com o método do ângulo platô-patela.

**Métodos:** Foi feito um estudo transversal no qual foram avaliadas radiografias em perfil do joelho, com os três métodos já consagrados pela literatura, o Insall-Salvati (IS), o Blackburne-Peel (BP) e o Caton-Deschamps (CD) e comparando-as com o ângulo platô-patela (APP). Foram incluídos na amostra 196 seis pacientes, aleatoriamente selecionados.

**Resultados:** Inicialmente os dados foram submetidos a uma avaliação pelo teste do qui-quadrado. A análise foi positiva com  $p < 0,0001$ . Fizemos comparações entre os métodos tradicionais com a medida do APP com o uso do teste exato de Fisher. Quando comparamos o índice de IS com o APP, não encontramos diferenças estatisticamente significativas em relação à proporção de casos alterados entre os dois grupos. Os métodos tradicionais foram comparados com a medida do APP quanto à proporção de casos de patela alta e baixa pelo teste exato de Fisher. A análise demonstrou que o APP identificou menos casos de patela alta do que os métodos de IS, BP e CD, mas identificou mais casos de patela baixa. Quando comparados os pares, verificamos que os índices de IS e CD foram capazes de identificar mais casos de patela alta que o APP. Em relação aos casos de patela baixa, o APP foi capaz de identificar mais casos que os outros três métodos.

**Conclusão:** O ângulo platô-patela observou mais pacientes com patela baixa em comparação com os métodos clássicos e resultados discrepantes com os outros índices estudados.

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## Introduction

Patellar height measurement is increasingly being used as knowledge of knee biomechanics and the physiopathology of knee diseases and their respective treatments expands.<sup>1</sup>

Over the course of time, a variety of methods have been proposed as means of defining the concept of patellar knee measurement, usually through ratios between anatomical parameters obtained from radiographic examinations. Several indexes have become established in the literature, such as Insall-Salvati (IS),<sup>2</sup> Blackburne-Peel (BP)<sup>3</sup> and Caton-Deschamps (CD),<sup>4</sup> but none of them have yet achieved worldwide acceptance.

The plateau-patella angle is an optional method for evaluating patellar height that, unlike the methods established in the literature, does not use calculation of ratios and supplies whole-number values. It is therefore simpler, faster and more practical.<sup>5</sup>

The objective of this study was to compare the methods most used for measuring patellar height<sup>2-4</sup> with the plateau-patella angle method.<sup>5</sup>

## Materials and methods

This study was assessed and approved by our institution's ethics committee.

A cross-sectional study was conducted in which radiographs produced at the National Institute of Traumatology and Orthopedics (INTO) were evaluated using the three methods that have become established in the literature: Insall-Salvati

(IS),<sup>2</sup> Blackburne-Peel (BP)<sup>3</sup> and Caton-Deschamps (CD).<sup>4</sup> These were compared with the plateau-patella angle.<sup>5</sup>

The sample comprised 196 patients at the Knee Surgery Center of the National Institute of Traumatology and Orthopedics, who were randomly selected. The patients included in the study had undergone knee radiography between January 2013 and April 2014, consisting at least of the anteroposterior (AP) view under weight-bearing at full knee extension and in lateral view without weight-bearing in a semiflexed position (30°). Patients with osteoarthritis or inflammatory arthritis and those who had had previous fractures or surgery were excluded from the study.

All the patients underwent radiographic examinations in accordance with the routine established by our institution. A Shimatzu 500 mA X-ray machine was used, at 50 kV and 25 mA. A film of dimensions 30 cm × 40 cm was placed at a distance of one meter from the ampoule of the digital radiographic machine. The images for this study were then obtained.

The radiographs were evaluated by a physician who is a member of the Brazilian Society of Knee Surgery and has a doctoral degree, in order to ensure the reproducibility and reliability of the measurements obtained. These evaluations were made through the MDViewer2000® software, which enables precise digital measurements in relation to anatomical parameters that are easily identifiable and have previously been established in the literature, and minimizes the evaluator's influence in obtaining the measurements.

The Insall-Salvati index consists of the tendon length/patellar length ratio (TL/PL), in which TL is the length of the patellar tendon measured along its posterior surface or the depth from its origin at the lower pole of the

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