



Original article

Q-angle in patellofemoral pain: relationship with dynamic knee valgus, hip abductor torque, pain and function[☆]



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ABSTRACT

Objective: To investigate the relationship between the q-angle and anterior knee pain severity, functional capacity, dynamic knee valgus and hip abductor torque in women with patellofemoral pain syndrome (PFPS).

Methods: This study included 22 women with PFPS. The q-angle was assessed using goniometry: the participants were positioned in dorsal decubitus with the knee and hip extended, and the hip and foot in neutral rotation. Anterior knee pain severity was assessed using a visual analog scale, and functional capacity was assessed using the anterior knee pain scale. Dynamic valgus was evaluated using the frontal plane projection angle (FPPA) of the knee, which was recorded using a digital camera during step down, and hip abductor peak torque was recorded using a handheld dynamometer.

Results: The q-angle did not present any significant correlation with severity of knee pain ($r = -0.29$; $p = 0.19$), functional capacity ($r = -0.08$; $p = 0.72$), FPPA ($r = -0.28$; $p = 0.19$) or isometric peak torque of the abductor muscles ($r = -0.21$; $p = 0.35$).

Conclusion: The q-angle did not present any relationship with pain intensity, functional capacity, FPPA, or hip abductor peak torque in the patients with PFPS.

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Ângulo-q na dor patelofemoral: relação com valgo dinâmico de joelho, torque abdutor do quadril, dor e função

R E S U M O

Palavras-chave:

Joelho

Síndrome da dor patelofemoral

Dinamômetro de força manual

Objetivo: Investigar a relação entre o ângulo-q e intensidade da dor anterior no joelho, capacidade funcional, valgo dinâmico de joelho e torque abdutor do quadril em mulheres com síndrome da dor patelofemoral (SDPF).

Métodos: Participaram do estudo 22 mulheres com SDPF. O ângulo-q foi avaliado pela goniometria, as participantes foram posicionadas em decúbito dorsal com joelho e quadril estendido e quadril e pé em rotação neutra. A intensidade da dor anterior do joelho foi avaliada pela escala visual analógica de dor e a capacidade funcional com a escala de dor anterior no joelho. O valgo dinâmico foi avaliado pelo ângulo de projeção no plano frontal do joelho (APPF), registrado com câmera digital durante *step down*, e o pico de torque dos abdutores do quadril com dinamômetro manual.

Resultados: O ângulo-q não apresentou correlação significativa com a intensidade da dor no joelho ($r = -0,29$; $p = 0,19$), capacidade funcional ($r = -0,08$; $p = 0,72$), ângulo de projeção no plano frontal do joelho ($r = -0,28$; $p = 0,19$) e pico de torque isométrico dos músculos abdutores ($r = -0,21$; $p = 0,35$).

Conclusão: O ângulo-q não apresentou relação com a intensidade da dor, capacidade funcional, ângulo de projeção no plano frontal do joelho e pico de torque dos abdutores do quadril em pacientes com SDPF.

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Introduction

The q-angle was first described by Brattstroem.¹ This angle is formed by the intersection of two lines that cross at the center of the patella: one going from the anterosuperior iliac spine (ASIS) to the center of the patella and the other from the anterior tuberosity of the tibia to the center of the patella; and the other from the anterior tuberosity of the tibia to the center of the patella.¹ The q-angle is widely used for evaluating patients with knee problems, especially patellofemoral pain syndrome (PFPS). The larger the q-angle is, the greater the lateralization force on the patella, which increases the retropatellar pressure between the lateral facet of the patella and the lateral femoral condyle.² The continuous compressive forces between these structures may give rise to PFPS and, over the long term, cause degeneration of the joint cartilage of the patella.^{2,3} Huberti and Hayes⁴ reported that a 10% increase in the q-angle increased the stress on the patellofemoral joint by 45%.

However, there are divergences in the literature regarding the relationship between the q-angle and PFPS in case-control studies.^{5,6} Moreover, prospective studies have not supported the hypothesis that greater q-angles are a risk factor for development of PFPS.⁷⁻⁹

Not only does the q-angle affect the static alignment of the lower limb in the frontal plane, but also the lever-arm distance between the centers of the hip and knee joints alters the capacity of the hip abductor muscles to generate torque.¹⁰ However, it is questionable whether the static valgus (q-angle) affects the dynamic valgus of the knee and the peak isometric torque of the hip abductor muscles. Furthermore, few

studies have correlated the q-angle with knee pain intensity and functional capacity among women with PFPS.^{11,12}

Thus, the objective of this study was to ascertain the relationship of the q-angle with knee pain intensity, functional capacity, projection angle in the frontal plane and peak isometric torque of the hip abductor muscles, among women with patellofemoral pain. Our hypothesis was that the q-angle would have positive correlations with the dynamic valgus of the knee and with the intensity of anterior knee pain; and that it would present negative correlations with the peak isometric torque of hip abduction and with functional capacity, among women with PFPS.

Materials and methods

Participants

A cross-sectional study was conducted on 22 women with PFPS, of ages 19–45 years. Women were selected for this study because of the high incidence of PFPS in this population, in comparison with men, and because of the structural, strength-related and kinematic differences in the hips between the two sexes. The age group was chosen so as to exclude possible degenerative alterations to the knee and hip.¹³ The participants were recruited by means of personal communication, through orthopedic clinics and through leaflets disseminated within our university.

The present study was approved by the research ethics committee and all participants signed a free and informed consent statement.

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