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Original Research

Concentric and Eccentric Torque of the Hip Musculature in Individuals With and Without Patellofemoral Pain

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Abstract

Context: Individuals suffering from patellofemoral pain have previously been reported to have decreased isometric strength of the hip musculature; however, no researchers have investigated concentric and eccentric torque of the hip musculature in individuals with patellofemoral pain.

Objective: To compare concentric and eccentric torque of the hip musculature in individuals with and without patellofemoral pain.

Design: Case control.

Setting: Research laboratory.

Patients or Other Participants: Twenty participants with patellofemoral pain (age = 26.8 ± 4.5 years, height = 171.8 ± 8.4 cm, mass = 72.4 ± 16.8 kg) and 20 control participants (age = 25.6 ± 2.8 years, height = 169.5 ± 8.9 cm, mass = 70.0 ± 16.9 kg) were tested. Volunteers with patellofemoral pain met the following criteria: knee pain greater than or equal to 3 cm on a 10-cm visual analog scale, insidious onset of symptoms not related to trauma, pain with palpation of the patellar facets, and knee pain during 2 of the following activities: stair climbing, jumping or running, squatting, kneeling, or prolonged sitting. Control participants were excluded if they had a prior history of patellofemoral pain, knee surgery in the past 2 years, or current lower extremity injury that limited participation in physical activity.

Intervention(s): Concentric and eccentric torque of the hip musculature was measured on an isokinetic dynamometer. All volunteers performed 5 repetitions of each strength test. Separate multivariate analyses of variance were performed to compare concentric and eccentric torque of the hip extensors, abductors, and external rotators between groups.

Main Outcome Measure(s): Average and peak concentric and eccentric torque of the hip extensors, abductors, and external rotators. Torque measures were normalized to the participant's body weight multiplied by height.

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Results: The patellofemoral pain group was weaker than the control group for peak eccentric hip abduction torque ($F_{1,38} = 6.630, P = .014$), and average concentric ($F_{1,38} = 4.156, P = .048$) and eccentric ($F_{1,38} = 4.963, P = .032$) hip external rotation torque.

Conclusions: The patellofemoral pain group displayed weakness in eccentric hip abduction and hip external rotation, which may allow for increased hip adduction and internal rotation during functional movements.

Keywords: [anterior knee pain](#), [lower extremity](#), [muscle strength](#)

Michelle C. Boling, PhD, ATC, contributed to conception and design; acquisition and analysis and interpretation of the data; and drafting, critical revision, and final approval of the article. Darin A. Padua, PhD, ATC, contributed to conception and design, analysis and interpretation of the data, and drafting, critical revision, and final approval of the article. R. Alexander Creighton, MD, contributed to conception and design and drafting, critical revision, and final approval of the article.

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