

Comparison of Isometric Squat-derived Concentric and Eccentric Force and Inter-limb Asymmetry between Athletic and Non-athletic Individuals Three Months after ACL Reconstruction

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ABSTRACT

Introduction: Anterior Cruciate Ligament Reconstruction (ACLR) alters the biomechanics of lower limbs, causing inter-limb asymmetries. Squat assessment is one of the crucial tests to examine asymmetry and the force produced in post-ACLR patients.

Aim: This study aims to examine and compare forces of the ascent phase (concentric force) and descent phase (eccentric force) along with their inter-limb asymmetries during a 90-degree isometric squat between ACLR athletes and ACLR non-athletes.

Materials and Methods: For this retrospective study, 25 subjects were divided into two groups: 14 athletes and 11 non-athletes. Patients were aged between 20 and 35 years old. Squat assessment was performed 3 months after surgery. ACL reconstructed patients with or without meniscectomy were included. They performed a 90-degree isometric squat on a dual force plate of ForceDecks 3 months post-ACL reconstruction. Squat assessment was done to

measure concentric peak force (N) with inter-limb asymmetry (%) and eccentric peak force (N) with associated inter-limb asymmetry (%). After obtaining descriptive statistics of the two groups, an Independent t-test was performed to compare the two groups using SPSS software.

Results: Concentric force asymmetry $p < 0.05$: $t(23) = -3.58$, $p = 0.004$ and eccentric force asymmetry $p < 0.05$: $t(23) = -3.992$, $p = 0.001$ were significantly higher for ACLR non-athlete group. There was no significant difference for concentric peak force $p > 0.5$: $t(23) = 1.107$, $p = 0.280$ and eccentric peak force $p > 0.5$: $t(23) = 1.001$, $p = 0.327$ between the two groups.

Conclusion: Three months post-ACLR, inter-limb symmetry (%) of both concentric and eccentric force remains impaired. This suggests that the neuromuscular deficit remains after 3 months of surgery.

Keywords: Anterior cruciate ligament, Asymmetry, Concentric force, Eccentric force, Isometric Squat.

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