

Changes in the antagonist muscle co-activation after damaging the agonist muscle with isokinetic exercise

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Abstract

Statement of the Problem: It is well known that a single bout of damaging exercise induces acute strength deficit and sometimes a myoelectric compensation in a muscle. Here we hypothesized that after a damaging exercise, the strength as well as muscle electric activity changes in the agonist and antagonist muscles are joint angle specific.

Methodology & Theoretical Orientation

We tested thirteen participants with maximal voluntary knee extensions on a dynamometer. Participants performed isometric contractions at 70, 50, and 30 degrees of knee joint angle. After this, a dynamometric exercise bout was executed with 4x15 full effort eccentric-concentric contractions to provoke muscle damage and pain. The test contractions were repeated 24h after the acute exercise. Quadriceps and hamstring EMG activity was measured during the strength tests.

Findings

Participants reported significant soreness 24h after the exercise. A tendency for the strength deficit was seen to increase with decreasing knee joint angle. There was no change in quadriceps femoris activity in any angle conditions. However, hamstring co-activation increased significantly at every angle, without any difference among angle conditions.

Conclusion & Significance

We conclude that with the same neural drive to the quadriceps, the damaged fibers were irresponsive, inducing strength deficit. The non-uniform changes in quadriceps and hamstring EMG activity after the damaging exercise suggest that knee joint stability is altered.

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