Effect of stretching on agonist–antagonist muscle activity and muscle force output during single and multiple joint isometric contractions

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Abstract

Eight moderately active male subjects where tested for peak force in an isometric knee extension test and peak force and rate of force development in an isometric squat test. Both tests where performed at a 100° knee angle and average integrated electromyography (IEMG) was measured from the vastus medialis (VM), vastus lateralis (VL) and biceps femoris (BF) muscles. Subjects performed the two conditions, stretching (S) or control (C) in a randomized order. Subjects where tested for baseline strength measures in both the isometric knee extension and isometric squat and then either stretched or sat quietly for 10 min. Following S or C subjects where then tested at six time points. Following S peak force in the isometric knee extension was significantly ($P \leq 0.05$) less than C at 1, 2, 8 and 16 min post. No significant difference in peak force was found between S and C in the isometric squat. However, following S the rate of force development in the isometric squat was significantly less than C at immediately post. No significant differences where observed in IEMG of the VM or VL between S and C in either the isometric knee extension or isometric squat. However, IEMG significantly decreased in the BF at 1 min post after S in comparison with C in both the isometric knee extension and isometric squat. Stretching appears to decrease muscle force output in a single joint isometric

contraction and rate of force development in a multiple joint isometric contraction. Possible changes in agonist–antagonist muscle activity patterns need to be further examined.