Acute Effects of Contract-Relax versus Static Stretching on Strength Loss and the Length-Tension Relationship

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ABSTRACT

Isometric knee flexion strength

Maximum isometric knee flexion contractions were measured at 90°, 70°, 50°, 30° of knee flexion before (pre) and after (post) stretching was performed. The knee flexion strength was determined at 90°, 70°, 50°, 30° of knee flexion after static stretching and contract-relax stretching. Figure 1: Rehabilitation of the knee flexion strength was displayed. The average strength loss across all knee flexion angles was greater after contract-relax stretching (11.7%) versus static stretching (3.7%). Contract-relax stretching resulted in greater strength loss than static stretching (p < 0.001) and was more apparent at short versus long muscle lengths (Time by Angle (p < 0.001)). The stretch-induced strength loss after contract-relax stretching (11.7%) versus static stretching (3.7%) was greater on the leg that subsequently underwent contract-relax stretching (Table 1). The length-tension relationship was displayed in Figure 3 (A). Stretch-induced strength loss across all angles was greater after contract-relax stretching (11.7%) versus static stretching (3.7%). The muscle length effect on strength loss (angle-torque relationship) was more apparent at short versus long muscle lengths (Table 1).

METHODS - Continued

RESULTS - Continued

Figure 2: The angle-torque relationship for maximum isometric knee flexion contractions expressed relative to torque at the angle of peak torque before (pre) and after (post) static and contract-relax stretching (Fig 3). The time by Angle (A < 0.001) indicates a rightward shift in the angle-torque relationship. This shift was not different between static stretching (Fig 3A) and contract-relax stretching (Fig 3B).

CONCLUSION

Strengthen-induced stretch effect after static stretching and contract-relax stretching was most apparent at short muscle lengths, however the average strength loss across all muscle lengths was greater after contract-relax stretching. Contract-relax stretching resulted in greater strength loss than static stretching (p < 0.001) and was more apparent at short versus long muscle lengths (Time by Angle (p < 0.001)). The stretch-induced strength loss in the length-tension relationship between static and contract-relax stretching was displayed. Figure 4: The angle-torque relationship for maximum isometric knee flexion contractions expressed relative to torque at the angle of peak torque before (pre) and after (post) static and contract-relax stretching (Fig 3). The time by Angle (A < 0.001) indicates a rightward shift in the angle-torque relationship. This shift was not different between static stretching (Fig 3A) and contract-relax stretching (Fig 3B).

References