

STRETCHING OF ACTIVE MUSCLE EVOKES GREATER ACUTE INCREASES IN PLANTARFLEXOR RANGE OF MOTION THAN STATIC STRETCHING

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Introduction

Increases in joint range of motion (ROM) in athletic and clinical populations are normally achieved through static stretching. However, substantially greater increases in ROM were recently reported after a 6-week exercise programme when stretch was imposed on active muscle (Kay et al., 2016), although acute effects remain unknown. Therefore, the present study compared the effects of acute and repeated bouts of active muscle stretching and static stretching of the plantarflexors.

Methods

Using a randomised, crossover design, 18 recreationally active subjects completed four trials under two experimental conditions (static stretch [SS1, SS2]; active muscle stretch [AMS1, AMS2]), with each trial separated by 48-72 h. SS trials comprised 5 sets of 30-s static stretches whilst AMS trials comprised 5 sets of 10 repetitions of 3-s stretches imposed on maximally contracted muscle (total loading in each trial = 150 s). Before and after each set, dorsiflexion ROM and passive plantarflexor moment were recorded on an isokinetic dynamometer, electromyographic (EMG) activity of the soleus and ultrasound imaging of Achilles tendon and medial gastrocnemius fascicle elongation were simultaneously recorded.

Results

A significantly ($P < 0.05$) greater increase in ROM was observed in AMS (5.9° - 7.7°) than SS (2.2 - 3.0°) trials, with ROM significantly greater after AMS2 than all other trials ($+3.3$ - 5.8°). Furthermore, a significant increase in ROM was already detected after the first set in AMS trials (2.2 - 3.1°), and this was similar to the magnitude of change after 5 sets of stretches in SS trials. Similar decreases in the passive moment slope occurred after SS (7.3% - 11.7%) and AMS (10.1% - 15.3%) trials, however significant increases in peak passive moment (30.7 - 34.7%) and elastic energy storage (54.3 - 68.2%) occurred only after AMS. A significant reduction in maximal isometric (i.e. active) moment occurred only after SS1 (6.5%).

Discussion

These data have important practical implications as similar increases in ROM were achieved after a single set of AMS compared with multiple static stretches (i.e. current practice), without a reduction in active muscle force. Furthermore, when time under loading was identical, AMS resulted in a more than twofold greater increase in ROM, indicating that it is more effective and efficient than current stretching practices. The significantly greater ROM after the second AMS trial indicates a repeated bout effect that may explain the previously reported greater long-term adaptations in ROM.

References

Kay AD, Richmond D, Talbot C, Mina MA, Baross AW, Blazeovich AJ. (2016). Stretching of active muscle elicits chronic changes in multiple strain risk factors. *Med Sci Sport Exer*, 48, 1388-96.

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