TACSM Abstract

Effects of Practical Durations of Stretching on Hamstrings Range of Motion and Strength

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ABSTRACT

Stretching is often performed prior to exercise with the intent to improve range of motion (ROM) and athletic performance. However, stretching-induced strength loss has been extensively reported and is believed to be influenced by several factors, including the time under stretch. The majority of previous studies showing stretching-induced strength declines have used stretching routines for durations (8-30 min) considerably longer than those commonly applied in the field. Fewer studies have examined the effects of shorter, more practical durations (≤2 min) of stretching on ROM and muscle strength. **PURPOSE**: To examine the acute effects of practical stretching durations on hamstrings ROM and muscle strength. **METHODS**: Eighteen young, healthy females (age = 21±2 years) volunteered for this investigation. Participants visited the laboratory 5 times, separated by 2-7 days at approximately the same time of day (±2 hours). The first visit was a familiarization trial, and the next 4 visits were experimental trials in a randomized order: ((a) control condition and stretching treatment conditions for (b) 30 s, (c) 1 min, and (d) 2 min). For each experimental trial, participants completed 2 passive straight-leg raises (SLRs) and isometric maximal voluntary contractions (MVCs) before and after the treatment condition using an isokinetic dynamometer. The control condition consisted of quiet resting for 5 min. For the SLR assessments, the dynamometer lever arm passively moved the right leg toward the head at 5° $\cdot s^{-1}$ until the maximal tolerable torque threshold was achieved, which was regarded as the maximum ROM, at which point the leg was immediately returned to the baseline position. For each MVC, participants laid supine and were instructed to extend the right thigh "as hard and fast as possible" for 3-4 s. Isometric MVC peak torque (PT) was determined as the highest mean 500 ms epoch during the entire 3-4 s MVC plateau. The stretching treatments were performed in the same fashion as the SLR assessments; however, when the maximal tolerable torque threshold was reached, it was sustained for 30 s and then released for 20 s. Each stretch was repeated until the specific time under stretch was completed for each condition. **RESULTS**: ROM increased from pre- to post-stretching for the 30 s (100±21° to 108±22°; $P < 0.001$), 1 min (100±23° to 109±19°; $P < 0.001$), and 2 min (103±22° to 113±22°; $P < 0.001$) conditions but not for the control condition (101± 25° to 102± 25°; $P = 0.389$). PT decreased from pre- to post-stretching for all conditions (collapsed across condition: 231±54Nm to 224±54Nm; $P = 0.038$). **CONCLUSION**: These findings demonstrated that the stretching durations of 30 s, 1 min, and 2 min resulted in significant increases (8-10%) in ROM. The similar decreases (1-4%) in PT between conditions indicated that these stretching durations for the hamstrings did not alter muscle strength when compared to the control condition. Because stretching routines for long durations of ≥8 min have been shown to elicit significant reductions (>10%) in muscle strength, it may be advantageous for practitioners who are using pre-exercise stretches as a warm-up, to perform them on their athletes for shorter durations similar to those used in the present study (≤2 min).