TACSM Abstract

Acute Effects of Static Stretching on Passive Stiffness of the Hamstrings in Healthy Young and Older Women

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ABSTRACT

Static stretching is often performed prior to exercise to increase range of motion (ROM) and reduce passive stiffness of the muscle-tendon unit. A decrease in passive stiffness after stretching is believed to reduce the risk of injury and improve athletic performance. Previous research has demonstrated that an acute bout of static stretching was effective at decreasing passive stiffness in older men. However, to our knowledge, no previous research has examined the acute effects of static stretching on passive stiffness in older women, nor have there been any studies that have compared these effects with a younger female population. **PURPOSE**: The purpose of this study was to investigate the acute effects of static stretching on passive stiffness of the hamstrings in healthy young and older women. **METHODS**: Fifteen young (23 ± 4 years) and 15 older (73 ± 5 years) healthy women underwent two passive knee extension assessments before (Pre) and after (Post) two randomized conditions that included a control treatment (quiet resting for two min) and an experimental treatment of static stretching. During the passive knee extension, participants were seated in an upright position with restraining straps placed over the shoulders and right thigh. Each knee extension assessment was administered using a calibrated isokinetic dynamometer programmed in passive mode to extend the leg at $5°\cdot s^{-1}$. All passive knee extensions were performed on the right leg to the point of discomfort but not pain as indicated by the participant, which was regarded as the maximum ROM. Once maximum ROM was reached, the leg was then immediately returned to the baseline position, which was a knee joint angle of 80° below full extension. Passive stiffness ($Nm\ ^{\circ-1}$) was calculated during each knee extension assessment as the final slope of the tangent to the angle-torque curve. For the experimental treatment, four 15-s static stretches were completed in the same manner as the passive knee extension assessments; however, when maximum ROM was reached, the leg was held at this position for 15 s. Each 15-s stretch was separated by 15 s of rest. **RESULTS**: Passive stiffness (collapsed across group) was lower ($P = 0.007$) at Post (0.63 ± 0.18 $Nm\ ^{\circ-1}$) compared to Pre (0.72 ± 0.18 $Nm\ ^{\circ-1}$) for the stretching treatment. There was no significant difference ($P > 0.999$) in passive stiffness between the Pre (0.72 ± 0.18 $Nm\ ^{\circ-1}$) and Post (0.74 ± 0.28 $Nm\ ^{\circ-1}$) time points for the control. The stretch-induced decrease in passive stiffness from Pre to Post was significantly greater ($P = 0.049$) for the old (-17%) compared to the younger (-5%) women. **CONCLUSION**: These findings showed that passive stiffness in young and older women decreased after four 15-s static stretches. The greater stretch-induced decrease in passive stiffness observed for the older women suggests that an acute bout of static stretching may be particularly beneficial for alleviating muscle tightness in the elderly. As a result, it may be advantageous for older adults to incorporate static stretching into their warm-up routine prior to exercise, as this may be used to reduce passive stiffness, which could help improve performance and reduce the risk of injury in this population.