

Kinematic Changes to the Landing Phase of the Vertical Jump Pre and Post Foam Rolling

KRISTEN ROLES, PAUL LUNDGREN, and BRADLEY BOWSER

Biomechanics Laboratory; Health and Nutritional Sciences; South Dakota State University; Brookings, SD

Category: Graduate

Advisor / Mentor: Bowser, Bradley (bradley.bowser@sdstate.edu)

ABSTRACT

Including foam rolling (FR) in pre-activity warm-ups has become increasingly popular. Evidence indicates that FR can increase range of motion (ROM), decrease muscle tension, and has limited impact on performance. However, increased ROM and decreased muscle stiffness may result in altered movement mechanics during the landing phase of a maximum vertical jump. **PURPOSE:** To determine the kinematic differences of the landing phase of a maximum vertical jump pre and post foam rolling. **METHODS:** Nine healthy volunteers (5 male, 4 female) participated in this study. High speed motion capture (200Hz) was used to collect kinematic data for 10 maximal vertical jumps (5 pre and 5 post FR). Two 1 minute cycles of FR were performed on the quadriceps and hamstring muscle groups with consistent pressure (body weight) and rhythm (6 second count in each direction). Paired sample t-tests ($\alpha = 0.05$) and effect sizes were calculated to determine pre to post differences for the variables of interest found in Table 1. **RESULTS:** During the landing phase of the vertical jump, all variables of interest post FR displayed significantly greater flexion with the exception of right ankle dorsiflexion. These differences were associated with a large effect size (Table 1). Maximum vertical jump height was unchanged. **CONCLUSION:** Data from this study suggests that FR may increase joint flexion during the landing phase of a maximum vertical jump. Increased joint flexion during drop jumps has been reported to decrease vertical loading and reduce injury risk to the lower extremity. Consistent with previous research FR appears to have no effect on performance, but may display a potential for decreasing injury risk.

Table 1: Mean(SD) and Effect Size (*d*) of all variables of interest.

Variable	PRE FR	POST FR	<i>p</i> -value	Cohen's <i>d</i>
Peak Hip Flexion (°) - Right Leg	-38.29(24.3)	-44.64(23.3)	0.010*	1.25
Peak Hip Flexion (°) - Left Leg	-38.19(23.8)	-45.12(23.8)	0.010*	1.25
Peak Knee Flexion(°) - Right Leg	-68.28(15.6)	-75.45(12.5)	0.008*	1.16
Peak Knee Flexion (°) - Left Leg	-70.11(17.3)	-77.78(13.8)	0.016*	1.02
Peak Ankle Dorsiflexion(°) - Right Leg	-87.64(5.54)	-89.83(4.91)	0.067	0.71
Peak Ankle Dorsiflexion (°) - Left Leg	-89.89(4.73)	-92.97(3.08)	0.011*	1.11