

The Effects of Single-Leg Bridges versus Bulgarian Split Squats on Hip Extension Strength and Jump -Landing Mechanics

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INTRODUCTION: Gluteal weakness is correlated with abnormal movement patterns that can lead to patellofemoral pain, low back pain, sacroiliac joint pain, and many other pathologies. Gluteal muscles assist in the alignment of the pelvis and femur during jump-landings and gait. The single-leg bridge and Bulgarian split squat elicit moderate-to-high electromyographic activity of the gluteus maximus. However, there is little research showing the effects of these specific exercises on hip extension strength and landing mechanics.

PURPOSE: The purpose of this study was to compare the effects of single-leg bridge and Bulgarian split squat fatigue protocols on hip extension strength and jump-landing mechanics, including peak hip flexion, knee flexion, and knee valgus.

METHODS: University students ($n = 24$; mean age 22.33 ± 2.93 years) were randomly assigned to perform either single-leg bridges or Bulgarian split squats to fatigue or five minutes, whichever came first, for a cross-sectional study. Before and after the exercises, participants' hip extension strength was tested using a handheld dynamometer, and their single-leg jump-landing mechanics including peak hip flexion, knee flexion, and knee valgus were tested using the Dartfish Express smartphone app.

RESULTS: There was a statistically significant difference between baseline and post-intervention measurements of peak hip flexion overall ($p = 0.001$) with a mean difference of 8.91 ± 11.44 degrees, but no significant difference in peak hip flexion when comparing participants of the single-leg bridge group to those in the Bulgarian split squat group ($p = 0.29$). Gluteal strength, peak knee flexion, and peak knee valgus measurements were not statistically different before and after the exercises ($p = 0.074-0.155$) or between groups ($p = 0.29-0.66$).

CONCLUSION: Hip strength, in particular hip extension strength, may be a consideration in individuals that display increased frontal plane motion of the hip and trunk in dynamic tasks. These results are relevant to athletes involved in jumping, potentially for training or rehabilitative purposes.