

27. SWACSM Abstract

Electromyographic Examination of Hip and Knee Extension Hex Bar Exercises Varied by Starting Knee and Torso Angles

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ABSTRACT

Variations of the deadlift can be executed using the hexagonal (hex) bar by altering, for instance, the knee and torso angles while maintaining a constant hip angle at the start position. **PURPOSE:** To examine muscle activation patterns of the biceps femoris, rectus femoris, and erector spinae during three deadlift variations using the hex bar. **METHODS:** Twenty resistance-trained male and female subjects performed hex bar deadlift variations in three different starting knee flexion positions: $128.4 \pm 8.5^\circ$ (elevated Romanian Deadlift), $111.9 \pm 8.7^\circ$ (conventional elevated deadlift), and $98.3 \pm 6.5^\circ$ (conventional hexagonal bar deadlift). Subjects performed three repetitions at 75% of their three-repetition maximum. Electromyography sensors were placed on the dominant biceps femoris, rectus femoris, and lumbar erector spinae. A one-way repeated measures ANOVA was used to detect differences in mean and peak EMG values normalized to maximum voluntary isometric contraction (MVIC) ($p < 0.05$). **RESULTS:** As knee flexion increased at the starting position, mean activation of the rectus femoris increased ($24.7 \pm 21.5 \rightarrow 35.5 \pm 25.4 \rightarrow 62.1 \pm 31.3\%$ MVIC, $p < 0.001$), while biceps femoris ($40.6 \pm 17.9 \rightarrow 34.0 \pm 16.4 \rightarrow 28.1 \pm 14.5\%$ MVIC, $p = 0.003$) and erector spinae ($73.0 \pm 27.6 \rightarrow 65.9 \pm 34.4 \rightarrow 54.9 \pm 32.5\%$ MVIC, $p = 0.009$) activation decreased. Peak activation of the rectus femoris increased ($46.9 \pm 33.0 \rightarrow 60.9 \pm 38.7 \rightarrow 99.3 \pm 41.6\%$ MVIC, $p < 0.001$) while decreasing in the erector spinae ($118.6 \pm 47.1 \rightarrow 105.9 \pm 49.4 \rightarrow 89.1 \pm 40.1\%$ MVIC, $p = 0.008$). The rectus femoris experienced the greatest mean differences of the three muscles. **CONCLUSIONS:** Practitioners should consider the muscular goals when adjusting the starting position of a hex bar deadlift as posterior chain recruitment diminished and quadriceps activation increased as knee flexion increased.