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Comparison of Muscle Activation Across Three Straight-Legged Hinge Exercises

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The 'hinge' movement pattern includes lower body resistance training exercises that prioritize hip flexion and extension, though there are few studies to characterize their application. Hinge exercises are critical to building a balanced resistance training program in concert with 'knee-dominant' (e.g., squat, lunge) exercises. Biomechanical differences between various straight-legged hinge (SLH; minimal knee flexion and extension) exercises may alter muscle activation. For example, a Romanian deadlift (RDL) is a closed-chain SLH, while a reverse hyperextension (RH) is open-chain. Likewise, the RDL offers resistance via gravity while the similar cable pull-through (CP) offers redirected-resistance through a pulley. A deeper understanding of the potential impact of the differences between these exercises may improve their application to specific goals. **PURPOSE:** To compare muscle activity in the RDL, RH, and CP in apparently healthy males. **METHODS:** Participants initially completed repetition-maximum (RM) testing on the RDL, RH, and CP. On a follow-up visit, surface electromyography (EMG) of the longissimus, multifidus, gluteus maximus, semitendinosus, and biceps femoris, muscles that contribute to lumbar/hip extension, was measured using standard procedures. After a standardized warm-up, participants completed maximal voluntary isometric contractions (MVICs) in the 5 muscles noted. They then completed 5 slow (2s concentric, 2s eccentric) repetitions of the RDL, RH, and CP at 50% of estimated 1RM. The order of testing was randomized. A one-way ANOVA was used to compare activation (%MVIC) of each muscle across the 3 exercises. **RESULTS:** Shifting from a gravity- (RDL) to a redirected-resistance (CP) SLH decreased activation in the longissimus (-11.0%), multifidus (-14.1%), biceps femoris (-13.1%), and semitendinosus (-6.8%). Alternately, changing from a closed- (RDL) to an open-chain (RH) SLH increased activation in the gluteus maximus (+19.5%), biceps femoris (+27.9%), and semitendinosus (+18.2). **CONCLUSION:** Simple alterations in the execution of a SLH can alter the activation of muscles that impact lumbar/hip extension. Careful application of these exercises may improve the outcomes of interventions ranging in application from performance enhancement to clinical rehabilitation.