MAGNITUDES OF MUSCLE ACTIVATION OF SHOULDER COMPLEX AND SPINE STABILIZERS DURING THE STANDARD PUSH-UP AND PUSHING EXERCISES USING A SUSPENSION STRAP TRAINING SYSTEM

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Abstract (Limited to 300 Words)

Background and Purpose: Suspension training systems have become increasingly popular in the past few years, as they allow the use of body weight resistance with unstable conditions, eliciting a greater challenge to stabilizing muscles. The purpose of this study was to quantify muscle recruitment with surface electrode electromyographic (EMG) analysis during five push-up exercises.

Methods and Measures: Surface EMG data were collected and analyzed for 15 male and 4 female participants during five pushing exercises: standard push-up (SPU); standing incline TRX push-up (IPU); TRX feet suspended (FS); TRX feet suspended hands on ZeSa pads (FHS); TRX hand suspended (HS). Eight right-sided muscles were analyzed: serratus anterior (SA), anterior deltoid (AD), triceps brachii (T), upper erector spinae (UE), rectus abdominis (RA), external oblique (EO), internal oblique (IO), and pectoralis major (PM) at a sampling frequency of 1000 Hz. Maximal voluntary isometric contractions (MVIC) were established. Subjects completed two repetitions per exercise in random order.

Analysis: Data were compared among the five exercises using a repeated measures ANOVA. Post hoc comparisons of EMG recruitment for statistically significant ANOVAs were conducted with Bonferroni corrections.

Results and Conclusion: HS five of eight muscles generated high EMG activity (percentages relative to MVIC): PM (55.5%), AD (53.6%), TB (46.2%), EO (45.4%), SA (42%). SPU generated high EMG activity in four muscles: SA (48%), AD (55.7%), PM (50.7%), and EO (58.7%). FS generated high EMG activity in three muscles: SA (49.5%, AD (59.3%), PM (53.1%). FHS generated high EMG activity in 3 muscles: AD (50.3%), PM (54.5%), EO (44%). IPU generated low EMG activity in all eight muscles.

Implications: Hands suspended and standard push up exercises are effective ways to activate SA, AD, PM, and EO, with hands suspended being superior in activating triceps brachii.