

ORIGINAL RESEARCH

MUSCLE ACTIVATION PATTERNS DURING SUSPENSION TRAINING EXERCISES

Sean Harris, PT, DPT¹Elise Ruffin, PT, DPT, CSCS¹Wayne Brewer, PT, PhD, MPH, OCS, CSCS¹Alexis Ortiz, PT, PhD, SCS, CSCS, FACSM¹

ABSTRACT

Background: Suspension training (ST) has been utilized over exercises performed on a stable surface to train multiple muscle groups simultaneously to increase muscle activation and joint stability.

Hypothesis/Purpose: The purpose of this study was to determine whether ST augments muscle activation compared to similar exercises performed on a stable surface.

Study Design: Cross-sectional study

Methods: Twenty-five healthy adults (male: 16; women: 9; BMI: 23.50 ± 2.48 kg/m²) had 16 pre-amplified wireless surface EMG electrodes placed bilaterally on: the pectoralis major (PM), middle deltoid (MD), serratus anterior (SA), obliques (OB), rectus abdominis (RA), gluteus maximus (GM), erector spinae (ES), and middle trapezius/rhomboids (MT). Each participant performed reference isometric exercises (Sorensen test, push-up, sit-up, and inverted row) to establish a baseline muscle contraction. Muscle activation was assessed during the following exercises: ST bridge, ST push-up, ST inverted row, ST plank, floor bridge, floor push-up, floor row, and floor plank. The root mean square (RMS) of each side for every muscle was averaged for data analysis. Multivariate analyses of variance (MANOVA) for each exercise with post-hoc comparisons were performed to compare muscle activation between each ST exercise and its stable surface counterpart.

Results: MANOVAs for all exercise comparisons showed statistically significant greater muscle activation in at least one muscle group during the ST condition. Post-hoc analyses revealed a statistically significant increase in muscle activation for the following muscles during the plank: OB ($p=0.021$); Push-up: PM ($p=0.002$), RA ($p<0.0001$), OB ($p=0.019$), MT ($p<0.0001$), and ES ($p=0.006$); Row: MD ($p=0.016$), RA ($p=0.059$), and OB ($p=0.027$); and Bridge: RA ($p=0.013$) and ES ($p<0.0001$).

Conclusions: Performing ST exercises increases muscle activation of selected muscles when compared to exercises performed on a stable surface.

Level of Evidence: 1b

Key words: Electromyography, muscle activation, stable surface exercise, suspension training exercise

CORRESPONDING AUTHOR

Alexis Ortiz, PT, PhD, SCS, CSCS, FACSM
School of Physical Therapy
Texas Woman's University
6700 Fannin St.
Houston, TX 77030
E-mail: Aortiz10@twu.edu
Office: 713-794-2077
Mobile: 281-928-8200

¹ School of Physical Therapy, Texas Woman's University,
Houston, TX, USA

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