

LOWER EXTREMITY MUSCLE ACTIVATION AMPLITUDES DURING INTRINSIC AND EXTRINSIC PERTURBATIONS ON AN UNSTABLE SURFACE

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ABSTRACT

Background: Therapeutic exercise, reactive neuromuscular training, and sensorimotor training are utilized by physical therapists to improve strength, balance recovery, proprioception, and neuromuscular activity. The Posturomed® balance device (Haider Bioswing, Germany) provides transverse plane instability for closed chain exercise to improve a patients' ability to react to internal and external perturbations over unstable surfaces. **Purpose:** The purpose of this study was to quantify electromyography (EMG) activation amplitudes of lower extremity muscles while maintaining postural stability on the Posturomed. **Study Design:** This was a pilot descriptive cross-sectional study performed on healthy young adults. **Methods:** After IRB approval, participants performed standing balance activities under five different conditions off and on the Posturomed with varying perturbations. Data was collected using Noraxon® surface EMG on eight lower extremity muscles of the non-dominant leg. **Results:** All conditions caused varying levels of muscle activation. The muscles with the highest activation for most conditions were the tibialis anterior (28.7-62.5% MVIC) and gluteus medius (23.9-53.2% MVIC). Condition 4, TheraBand® resisted kicks on the Posturomed, had the highest level of muscle activation compared to all other conditions (up to 62.5% MVIC). Furthermore, standing on the Posturomed resulted in more muscle activation compared to over ground activities. **Discussion/Conclusion:** The Posturomed may be used as an intervention for reactive

neuromuscular and sensorimotor training to facilitate high levels of lower extremity muscle activation during transverse plane closed chain exercises. Further research with expanded populations and sample size is needed to determine the best protocol for balance training using the Posturomed. Future research is needed on differing population with larger sample sizes to determine specific parameters for using the Posturomed in a balance training program.

IRB Approval: Franciscan Missionaries of Our Lady University

Keywords: Sensorimotor Training, Balance Training, Perturbation, EMG