The effects of whole body vibration on dynamic stability in individuals with anterior cruciate ligament reconstruction

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BACKGROUND

• Individuals with Anterior Cruciate Ligament Reconstruction (ACLR) have an increased risk for secondary ACL injury⁶.
• Individuals with ACLR have also displayed quadiceps dysfunction and dynamic postural control deficits¹⁷,¹⁸.
• Postural control at the knee can be assessed by time to stabilization (TTS) or the time it takes for the ground reaction forces to become stable after a jump.
• Poor postural control displayed in jump-landing tasks as measured by TTS may be related to increased risk of second ACL injury²⁸,³⁶.
• Previous research has found TTS to be worse in those with ACLR⁷.
• Whole body vibration (WBV) has been associated with an overall increase in neuromuscular function and improved quadiceps function in ACLR individuals¹⁴,⁴⁸.
• It remains unknown how WBV might affect TTS as a measure of postural control in single leg (SL) jump-landing tasks among ACLR individuals to decrease risk of secondary ACL injury.

PURPOSE

Purpose: To analyze the effects of WBV on TTS for SL jump-landing tasks in ACLR individuals.

Hypothesis: WBV will result in decreased TTS in SL jump-landing tasks compared to control.

METHODS

Study Design
• This study consisted of two sessions, at least one week apart, where participants received the control intervention in one session and WBV in the other.
• A counterbalancing scheme determined intervention order.

Participants
• Thirty-four individuals between age of 18 and 35 (20.9 ± 3.5)years and 6 months to 5 years (2.63 ± 1.25) post-unilateral ACLR participated.

Time to Stabilization
• Participants completed 3 SL jump-landing trials for both the involved and uninvolved limbs upon an embedded force plate (Bertec) from a 30 cm high box located half their height away and held their balance for ten seconds upon landing (Figure 1).
• Time to stabilization measures focused on medial-lateral (ML), antero-posterior (AP) (Figures 2 and 3).

Statistics
• Analysis included separate 2x2 (condition x time) repeated measures ANCOVA controlling for time since ACLR to evaluate ML, AP, and DPSI time to stabilization measures with both the involved (INV) and uninvolved (UNINV) limbs.
• The interaction effect was evaluated with SL ML TTS, SL AP TTS for both the INV and UNINV limbs separately.
• Statistical significance was set a priori at P value ≤ 0.05.

RESULTS

• No significant interaction effects were found for any TTS measures for either limb (P = 0.134 - 0.953).

DISCUSSION

• This study determined that WBV did not influence TTS during SL jump-landing tasks in those with ACLR.
• However, this does not rule out the possible utility of WBV in to decrease risk of second ACL injury as other variables effect this risk.
• This study solely examined the effects of an acute intervention of WBV on one variable, TTS, affecting secondary ACL injury risk.
• Future studies should examine the effect of longitudinal or repeated WBV treatments on TTS as well as other variables affecting secondary injury risk among ACLR individuals.

REFERENCES