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Title: Improvement in Running Economy After 8 Weeks of Whole-body Vibration Training

Brief running head: Effect of Whole-body Vibration on Running Economy

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## **ABSTRACT:**

The purpose of this study was to investigate the effects of 8-week whole-body vibration (BodyGreen WBV) training on running economy (RE) and power performance. Twenty-four male collegiate athletes were recruited and randomly assigned to experimental (WBV) and placebo (PL) groups. The WBV subjects performed semi-squat vibration training (30 Hz, ± 1-2 mm, 3 times per week), while PL subjects performed identical training without vibration. The isometric maximum voluntary contraction tests were used to evaluate maximal isometric force (Fmax) and rate of force development (RFD) of lower extremities, before and after the intervention, and RE was measured on a level treadmill at 3 velocities (2.68, 3.13, and 3.58 m·s-1). The Fmax of the lower leg (plantar flexion, from 80.8  $\pm$  24.5 to 99.0  $\pm$  33.9 N·m, p < 0.05,  $\eta$ 2 = 0.567; dorsiflexion, from 38.1  $\pm$  6.5 to  $43.0 \pm 7.7 \text{ N·m}$ , p < 0.05), and the RFD of 0-200 ms during plantar flexion (from 186.0  $\pm$  69.2 to 264.6  $\pm$  87.2 N·m·s-1, p < 0.05,  $\eta$ 2 =0.184) were significantly increased in the WBV group after training. The averaged RE values for the 3 running velocities were significantly improved after WBV training (pre- vs. post-training, 4.31  $\pm$  0.33 vs. 4.65  $\pm$  0.34 m·ml-1·kg-1, p = 0.001,  $\eta 2 = 0.654$ ); however, nosignificant differences were found in the PL group (pre- vs. post-training, 4.18  $\pm$  0.26 vs. 4.26 $\pm$  0.44 m·ml-1·kg-1, p = 0.476). The WBV training significantly improved RE at selected speeds ( $\sim$ 5.0–8.5 %, p < 0.05). These results indicated that short-term WBV training could be an effective stimulus to enhance RE and lower extremity power performance in competitive Effect of Whole-body Vibration on Running Economy 3 athletes.

**Key Words:** muscular strength; muscular power; oxygen consumption