The effects of whole-body vibration on upper- and lower-body EMG during static and dynamic contractions.

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Whole-body vibration (WBV) training uses a vertically oscillating platform and reports suggest that this perturbation elicits reflexive muscle contractions that augment muscle activity and contribute to increased strength. No WBV study has measured both upper- and lower-body muscle activation. The purpose of this study was to determine the optimal WBV stimulus (frequency x amplitude) to increase electromyography (EMG) in upper- and lower-body muscles for three distinctive unloaded actions: isometric semi-squat, dynamic leg squats, and static and dynamic bilateral bicep curls. Surface EMG was measured for the vastus lateralis (VL), biceps femoris (BF), biceps brachii (BB), and triceps brachii (TB) in 10 recreationally active male university students (24.4+/-2.0 years; mean+/-SD) when WBV was administered at 2 and 4 mm and at 25, 30, 35, 40, and 45 Hz. EMG changes are reported as the difference between WBV and no WBV EMG root mean square expressed as a percentage of maximum voluntary exertion (%MVE). In static semi-squat, WBV increased muscle activity 2.9%-6.7% in the VL and 0.8%-1.2% in the BF. During dynamic squatting, WBV increased muscle activity in the VL by 3.7%-8.7% and in the BF by 0.4%-2.0%. In a static biceps curl, WBV had no effect on BB EMG, but did increase TB activity 0.3%-0.7%. During dynamic biceps curls, WBV increased BB EMG activity by 0.6%-0.8% and TB activity by 0.2%-1.0%. The higher WBV amplitude (4 mm) and frequencies (35, 40, 45 Hz) resulted in the greatest increases in EMG activity.

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