

STRENGTH GAIN FOLLOWING 12 WEEKS OF WHOLE BODY VIBRATION TRAINING

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Introduction: In Whole Body Vibration (WBV) a person stands or moves on a vibration platform. The vibrations are transmitted to the body and stimulate sensory receptors. This results in an activation of α -motoneurons and consequently muscle contractions are initiated. Recent studies found an increase in isometric strength, in force-velocity characteristics and in vertical jump performance immediately after one WBV-session (Bosco 1999 and 2000, Torvinen 2002). The aim of this study was to investigate and compare the effect of a 12 week period of WBV-training and high resistance training (HR) on knee-extensor strength.

Methods: Sixty-seven sedentary females ($21,4 \pm 1,8$ yr) participated in the study. The WBV group (N=20) and the placebo (PLA) group (N=21) performed static and dynamic exercises on a vibration (35-40 Hz) and a placebo platform (Power Plate®). The HR group (N=20) trained knee-extensors by dynamic leg press and leg extension exercises. All training groups exercised 3 times weekly during 12 weeks. Subjects of the control group (CO, N=13) did not participate in any training. Pre- and post isometric knee-extensor strength was measured by means of a dynamometer (REV9000, Technogym®). Treatment effects were evaluated using 2-way analyses of variance (treatment x time) that was covariate adjusted for the baseline values. When appropriate post hoc tests were applied. Significance level was set on $p < 0.05$.

Results: Following 12 weeks of training, isometric knee-extensor strength increased significantly ($p < 0.001$) in both the WBV-group ($16,6 \pm 10,8\%$) and in the HR-group ($14,4 \pm 5,3\%$). No significant changes in strength were found in the PL-group ($3,8 \pm 11,4\%$) nor in the CO-group ($-7,3\% \pm 15,9$). ANCOVA showed a significant treatment effect ($F(3)=17.7$, $P < 0.05$). Post hoc tests revealed that HR and WBV differed significantly from CO and PL. The PL-group and the CO-group differed significantly from all other groups.

Conclusions: The sensory stimulation provoked by WBV, followed by an increased EMG-activity, has the potential to induce a significant strength gain in knee-extensors and this to the same extent as regular high resistance training. The strength gain following WBV-training in this study may not be considered as an acute effect as there was a 72 hour-delay between the post tests and the last training session. The changes in strength are clearly linked to the vibratory stimulus, as there is no effect in the placebo condition. Most likely the strength gain is mainly the result of specific neural adaptations resulting in a more efficient use of sensory information. Further investigations are needed to explore the underlying mechanisms of muscle activation and neuromuscular adaptations by means of WBV-training.

References

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