Effect of Acute Exposure to Whole-Body-Vibration on Vertical Jump in Senior Athlete Volleyball Players

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Abstract

Prior research has shown that acute exposure to low frequency whole-body-vibration (WBV) can improve isometric knee extension strength and vertical jump in college-aged subjects. To date, no studies have observed the acute effect of WBV exposure on vertical jump performance in active elderly subjects (senior athletes).

PURPOSE: The purpose of this study was to investigate the effect of 60-seconds of WBV exposure on vertical jump in male senior volleyball athletes.

METHODS: 38 male senior volleyball players (mean age 60 ± 6.0 yrs) participating in the Huntsman World Senior Games were used for this study. Subjects were randomly assigned to one of two groups (control (sham vibration) and vibration). Following warm-up, subjects were pre-tested for both counter movement jump and step-jump height using a "just jump" mat, calculating airtime and vertical jump height. Subjects in the vibration group were then exposed to two bouts of 30-second WBV on a Galileo 2000 (Orthometrix, Inc.) at 26 Hz, with 1-minute rest between bouts. Two minutes following vibration, subjects were again tested for both counter-movement and step-jump vertical height in block order. Subjects in the control group underwent the same procedure except the vibration unit was never turned on. The best jump of the three trials (pre and post-jumping periods) was used for analysis.

RESULTS: No significant difference was found in the counter-movement jumps for either group (F=.243, p=.625), but a significant difference existed for post-jump measures for the step-jump in the vibration group (F=29.76, p=.0001). No differences were found in the control group.

CONCLUSION: Sixty seconds of vibration exposure facilitates an increase in step-jump height but does not change counter-movement jump height in male senior volleyball athletes. Further research is needed to compare other power and strength variables to show how WBV can affect performance in senior athletes.

WBV Background

Whole body vibration (WBV) studies and platforms are becoming more widespread. WBV is typically an oscillatory motion generated through a standing platform. The intensity of the vibration is determined by the amplitude and frequency[1]. Current studies have varied in the use of amplitude, frequency and duration of vibration exposure and results of such studies have also varied. Whole-body vibration has been shown to improve strength and performance in trained populations,[4-8] as well as untrained,[3,9] and older adults.[2,12] Whole-body vibration showed acute enhancement of vertical jump, mechanical power in healthy individuals, improved force-velocity and power-velocity curves in volleyball players.[5,6] Still, other studies have not shown improved enhancement of performance after whole-body vibration.[10,11]

Whole-body vibration studies in the elderly reported to increase muscle strength and speed of movement,[2] and to be feasible for improvement of balance and mobility.[12] In a patient population, WBV studies have even shown improvement in coordination and gait in patient's with Parkinson's,[13,14] and improvements in both sensory organization tests and the timed get-up-and-go test in multiple sclerosis patients.[15]

Purpose

No study exists observing the effect of acute vibration exposure on muscle power output as measured by the vertical jump in senior athletes, and due to age-related physiological changes, it is not possible to extrapolate the findings in the younger population. Therefore the purpose of this pilot study is to see if vibration has an acute effect on muscular power as measured by the vertical jump in senior athletes (volleyball players) participating in the world senior games.

Vertical Jump Testing + Vibration

38 male senior volleyball players (mean age 60 ± 6.0 yrs) participating in the Huntsman World Senior Games volunteered for this study. Subjects were randomly assigned to one of two groups (control (sham vibration) and vibration). Subjects were instructed on performance of the counter-movement-jump (CMJ) and allowed to perform 5-7 jumps to get used to the motion. Subjects were also instructed on performance of the step-jump (SJ) and told to jump as if at the net for a block (which allowed them to use their arms). The Subjects were also allowed to practice this jump 5-7 times. The "just jump" mat (Probotics, Inc., Huntsville, AL), was placed in front of a volleyball net to simulate game jumping conditions.

Vibraflex

Following warm-up, subjects were pre-tested for both counter movement jump and step-jump height using the "just jump" mat, calculating airtime and vertical jump height (in inches). Subjects in the vibration group were then exposed to two bouts of 30-second WBV on a Galileo 2000 (Orthometrix, Inc., it is now currently marketed as the Vibraflex) at 26 Hz, and 4 mm, with 1-minute rest between bouts. Two minutes following vibration, subjects were again tested for both counter-movement and step-jump vertical height in block order. Subjects in the control group underwent the same procedure (including maintaining a ¼ squat position) except the vibration unit was never turned on, but . The best jump height of the three trials (pre and post-jumping periods) was used for analysis. Average results for each group are shown in table 1. Results are reported in the abstract.

	Control (inches)	**Vibration** (inches)
CMJ pre	14.7±2.0	15.4±3.2
CMJ post	14.8±2.0	15.4±2.7
Step J pre	17.8±2.3	18.7±4.2
Step J post	17.9±2.2	19.7±4.2

Table 1- Average jump heights ± standard deviation for the pre and post counter-movement and step-jumps for each group.

Take Home

Two 30-second bouts of vibration exposure facilitates an increase in step-jump height but does not change counter-movement jump height in male senior volleyball athletes. Further research is needed to compare WBV dosage & training on other power and strength variables to show how WBV can affect performance in senior athletes.

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Men do not quit playing because they grow old; they grow old because they quit playing. ~Oliver Wendell Holmes