

# THE EFFECTS OF 24 WEEKS WHOLE BODY VIBRATION TRAINING ON POSTURAL CONTROL IN THE ELDERLY

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## *Introduction:*

The aim of the present study was to assess the effect of whole body vibration training (WBV) on postural control in elderly ladies. A WBV apparatus generates vibrations that activate sensory receptors in the body (most likely muscle spindles), that in turn provoke reflexive muscle contractions in leg and trunk muscles (tonic vibration reflex). As both sensory and motor pathways are strongly stimulated during WBV training, it is hypothesised that 24 weeks of training might result in improved postural control.

## *Methods:*

A total of 47 elderly ladies with no known neuromuscular deficits participated in this study. The WBV group (N=26, age=65.8,  $\pm$  3.5 yr) performed static and dynamic exercises on a vibration platform (Power Plate®) for a period of 24 weeks, 3 times a week. No specific balance training exercises were performed. The control group (N=21, age=65.4,  $\pm$  3.5 yr) did not participate in any training during this period. Postural sway was measured before and after the 24 week period using a Bertec force plate connected to a CED Micro 1401 data acquisition system and using spike2 software. Postural sway of each subject was tested under 4 conditions: quiet stance with vision, quiet stance with vision occluded by means of liquid-cristal goggles, quiet stance following a perturbation by a brief voluntary abduction of the arms to horizontal, quiet stance following a brief anteflexion of the arms to horizontal. Statistical analysis was conducted by means of repeated measures ANOVA.

## *Results:*

The postural sway (rms and peak-to-peak amplitude) during unperturbed stance with or without vision did not change due to WBV training. Following a fast, brief abduction of the arms, the peak-to-peak amplitude of sway in anterior-posterior direction was significantly decreased due to 24 weeks WBV training ( $F(1,25)=6.64$ ,  $p<0.05$ ). Similarly, following a brief anteflexion of the arms, the peak-to-peak amplitude of sway in medio-lateral direction was decreased significantly due to WBV training ( $F(1,25)=4.06$ ,  $p=0.05$ ). For the control group, none of the variables changed across the 24 weeks ( $p>0.05$ )

## *Discussion and Conclusions:*

WBV training for 24 weeks did not alter the postural sway during quiet unperturbed stance in elderly ladies. However, following a volitional perturbation (abduction or anteflexion of the arms), and thus in a more difficult situation, the postural sway improved significantly due to WBV training. The latter suggests that WBV training - or thus sensory stimulation together with reflexive muscle contractions - might result in better anticipatory postural control [1,2]. Previous research has shown that exercise programs that significantly increase strength, or improve balance and flexibility, will decrease the number of falls in the elderly [3]. As in the present study WBV training in elderly resulted both in a significant increase in strength (not reported here) and in an improved (anticipatory) postural control, it might be useful in fall prevention training in the elderly population.

## *References*

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2. Hodges PW, Creswell AG, Thorstensson A. Exp. Brain Res. 1999; 124:69-79
3. Spirduso W. Physical dimensions of aging 1995.