

Metabolic and cardiovascular responses during whole body vibration (WBV) exercise: a pilot study.

Amy Mark, Maureen MacDonald, Mark Rakobowchuk, Christopher Gordon*, Cameron Blimkie.

Department of Kinesiology and *Department of Radiology, McMaster University, Hamilton ON, L8S 4K1

WBV is an exercise modality touted for its improvement of neuromuscular and skeletal function. Little is known about the psychological and physiological strain of WBV exercise and their influence on exercise compliance. Acute psychological (Borg Scale of rating of perceived exertion-RPE) and physiological (minute ventilation-VE, respiratory exchange ratio-RER, heart rate-HR, oxygen uptake-VO₂, mean arterial blood pressure-MAP, doppler femoral artery diameter-FAD and flow-FAF) measures were made on 5 participants during a nine stage protocol which consisted of 5 min standing rest (baseline) and four stages of WBV on the Galileo 2000 vibration platform (3 min duration each) separated by 3 min standing rest stages. Measurements were taken 30 s before and after each stage of WBV exercise, and at the end of the final rest stage. Intensity was increased by changing vibration frequency (19.6 Hz, stages 2 & 4; 27.8 Hz, stages 1 & 3) and foot placement on the platform which altered displacement amplitude and gravitational load. RPE increased progressively (1.2, 1.7, 2.0, and 4.7) with increasing exercise intensity, demonstrating substantial inter-subject variability. VE, RER and VO₂ did not change significantly across WBV exercise stages, although VO₂ approached significance ($p=0.068$) during the final exercise stage. FAD did not change significantly across vibration exercise stages and FAF ($n=4$) increased significantly ($p=0.009$) from baseline and first rest stage during the final stage of exercise reaching a peak of 2.91 ml/min. FAF also increased significantly during the final exercise stage compared to the first two exercise stages ($p=0.02$). MAP was significantly higher at the final vibration stage compared to the first three rest stages and the final rest stage following the vibration ($p<0.05$). Together these results suggest that our WBV protocol elicited only minimal metabolic and cardiovascular strain, but quite variable effort perception among healthy non-athletic college-age females.

This research was funded by STRATEC, a Division of Orthometrix Inc. White Plains, NY