TACSM Abstract

Effects of Vibration Training on Reducing Risk of Falls among Young Adults with Obesity

Munoz J, Kim J, Sanchez M, and Yang F

Stanley E. Fulton Biomechanics and Motor Behavior Laboratory; Department of Kinesiology; University of Texas at El Paso; El Paso, Texas

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Advisor / Mentor: Yang, Feng (fyang@utep.edu)

ABSTRACT

Obesity is a major concern around the world. One of the major concerns associated with obesity is that it leads to increased risk of falls. High risk of falls among obese individuals has been related to several factors such as abnormal body mass distribution, muscle weakness, and postural instability. A significant portion of obese individuals are unable or unwilling to comply or manage conventional training regimens requiring high intensity and long duration. Therefore, alternative training methods are in high demand. Controlled whole-body vibration (CWBV) training has been proven to reduce the risk of falls among older adults. No study has yet investigated the potential effect of CWBV training on reducing falls among obese populations. The purpose of this study was to systematically examine the overall effectiveness and feasibility of CWBV training in reducing the risk of falls among individuals with obesity. Particular interest was placed in studying the impact of 6-week CWBV training on reducing body fat percentage, improving muscular strength, and enhancing dynamic gait stability. The institutional Review Board approved all procedures and subjects provided written consent. Five young healthy adults (age: 26.2 ± 9.04 years; height: 172.16 ± 4.43 cm; mass: 100.18 ± 6.28 kg; 2 females) with obesity participated in the experiment. Obesity was determined based on the body mass index (BMI ≥ 30 kg/m^2) and body fat percentage ≥30%. All subjects received CWBV training 3 days a week for 6 weeks. A vibration platform was used to administer the training in an intermittent way: each 1-minute vibration was followed by a 1-minute rest for 10 minutes when subjects stood on the platform. The vibration frequency was 25 Hz and the amplitude 7.8 mm. Prior to and following the 6-week training, subjects were evaluated for their risk of falls quantified in terms of body fat percentage, muscle strength, and dynamic gait stability. The body fat percentage was measured by a bioelectrical impedance analysis machine. Maximum knee extensor strength under isometric condition was assessed via an isokinetic dynamometer at right side. The dynamic gait stability was computed, at both touchdown (TD) and liftoff (LO) within a gait cycle, from the full body kinematics gathered by a motion capture system. Paired *t*-test results indicated that the body fat percentage did not vary between the two evaluations (37.45% ± 7.40% vs 37.45% ± 7.65%, $p > 0.05$). However, the knee extensor strength increased from 1.66 ± 0.28 Nm/kg in pre-training evaluation to 1.83 ± 0.23 Nm/kg in the post-training evaluation ($p < 0.05$). Subjects were more stable during the post-training test than in the pre-training one. At TD (LO), the dynamic stability increased to 0.70 ± 0.05 (0.40 ± 0.03) post training from 0.61 ± 0.02 (0.32 ± 0.06) prior to the training ($p < 0.01$ for TD and $p < 0.05$ for LO).