

Exaggerated Pulsatility During Exercise is Associated with Reduced Muscle Strength and Quality in Elderly Hypertensives

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ABSTRACT

It is well-established that hypertensive individuals have an exaggerated systolic blood pressure in response to exercise. Leg muscle weakness is related to greater left ventricular (LV) mass in hypertensive individuals via exaggerated increases in blood pressure during aerobic exercise. Pulse pressure (PP) is an indicator of LV pulsatile hemodynamic load. Increased PP is associated with LV hypertrophy and dysfunction in older adults. **PURPOSE:** To determine differences in PP responses to resistance exercise in normotensive versus hypertensive older adults and the influence of lean mass and strength on these responses. **METHODS:** Nine normotensive (NTN) and 11 hypertensive (HTN) older adults (NTN aged 66 ± 3 , HTN aged 68 ± 5) performed plantar flexion exercise at progressively increasing intensities (5, 15 and 30% of estimated calf flexion 1RM). During exercise, blood pressure was recorded in the right arm using an automated oscillometric device. Body composition was measured using dual-energy x-ray absorptiometry. Leg strength was measured using the leg press 10 repetition maximum (10RM). Leg muscle quality (LMQ) was calculated as leg strength (kg)/leg lean mass (kg). **RESULTS:** PP response to plantar flexion exercise at 30% of 1RM was significantly greater in the HTN (15 ± 1 mmHg) compared to NTN (6 ± 4 mmHg, $p = .02$). LMQ was significantly greater in the NTN ($5.85 \pm .75$ kg/kg) compared to the HTN (5.00 ± 1.0 kg/kg, $p = .05$). Leg lean mass was not significantly different between groups. PP response at 30% was negatively correlated with LMQ ($r = -.570$, $p = .009$) and leg strength ($r = -.465$, $p = .039$). **CONCLUSIONS:** Hypertensive older adults have a greater pulse pressure response to calf flexion exercise when compared to normotensives. Reduced leg muscle strength and quality, but not mass, may contribute to the exaggerated pulse pressure response to calf flexion exercise in older adults with hypertension.