

Cardiovascular Responses Differ Between Different Orders of Upper- and Lower-Body Resistance Exercise

SMARAN MARUPUDI, RYAN D. RUSSELL, AMANDA WHEELER, & YU LUN TAI.

Cardiovascular Dynamics Laboratory; Department of Health and Human Performance; University of Texas Rio Grande Valley; Brownsville, TX

Category: Undergraduate

Advisor / Mentor: Tai, Yu Lun (yulun.tai@utrgv.edu)

ABSTRACT

Upper-body resistance exercise (RE) induces different cardiovascular responses compared to lower-body RE. However, combination of upper- and lower-body RE with different orders on cardiovascular responses are unclear. **PURPOSE:** To evaluate the effects of different orders of upper-and lower-body RE on cardiovascular responses in active men. **METHODS:** Thirteen active men (22±2 years old) participated in the study. Heart rate (HR), systolic and diastolic blood pressure (BP), cardiac output (CO), stroke volume (SV), and total peripheral resistance (TPR) were assessed at rest, 15-20 (R1), and 25-30 (R2) minutes after performing upper- and lower-body RE (UL) or lower- and upper-body RE (LU) for 3 sets of 10 repetitions at 75% 1-repetition maximum with 90-second and 2-minute rests between sets and exercises, respectively. The upper-body RE consisted of pulldown and chest press while lower-body RE consisted of knee extension and knee flexion. A repeated measures ANOVA was used to evaluate the conditions (UL, LU) across time (rest, R1, R2) on cardiovascular responses. **RESULTS:** There were time-by-condition interactions ($p < 0.05$) for CO and SV such that CO was significantly elevated at R1 and R2 after UL and LU compared to rest while UL had higher CO compared to LU at R1 (UL: rest: 5.68±0.99 L/min; R1: 9.09±1.44 L/min; R2: 7.65±1.87 L/min; and LU: rest: 5.55±0.78 L/min; R1: 8.14±1.65 L/min; R2: 7.23±1.76 L/min). SV was significantly increased after UL at R1 compared to rest and LU (UL: rest: 85.2±16.5 ml/beat; R1: 90.9±14.3 ml/beat; R2: 81.8±18.8 ml/beat; and LU: rest: 84.7±12.7 ml/beat; R1: 83.0±13.9 ml/beat; R2: 78.6±16.2 ml/beat). TPR was significantly ($p < 0.001$) reduced at R1 and R2 compared to rest after UL and LU with greater reduction after UL compared to LU (UL: rest: 0.96±0.27 mmHg•min/L; R1: 0.53±0.16 mmHg•min/L; R2: 0.68±0.22 mmHg•min/L; and LU: rest: 1.03±0.33 mmHg•min/L; R1: 0.67±0.26 mmHg•min/L; R2: 0.77±0.26 mmHg•min/L). HR was significantly ($p < 0.001$) increased at R1 and R2 after UL and LU compared to rest. Systolic BP was significantly ($p = 0.026$) decreased after LU at R1 compared to rest and R2. However, there was no change for diastolic BP. **CONCLUSION:** These data suggest that UL significantly increases cardiac output and stroke volume than LU which means different orders of RE change cardiovascular responses.