

Hemodynamic Differentials Between Sexes After Different Orders of Upper- and Lower-Body Resistance Exercise

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ABSTRACT

Diversifying upper- and lower-body resistance exercise (RE) sequences has been demonstrated to elicit various hemodynamic responses. However, the effects of various upper- and lower-body RE orders on hemodynamics between sexes remains unexplored. **PURPOSE:** To assess how the sequence of upper- and lower-body resistance exercises impacts hemodynamics between sexes. **METHODS:** Eleven men and ten women (23 ± 3 vs. 22 ± 2 years old) volunteered the study. Hemodynamic measurements, including mean arterial pressure (MAP), heart rate (HR), stroke volume (SV), cardiac output (CO), and total peripheral resistance (TPR) were assessed at rest, 15-20 (R1), and 25-30 (R2) minutes after either upper- and lower-body RE (UL) or lower- and upper-body RE (LU). Latissimus dorsi pulldown and incline chest press were used for upper-body RE while knee extension and knee flexion were selected for lower-body RE. All RE included 3 sets of 10 repetitions at 75% 1-repetition maximum with 90-second and 2-minute rests between sets and exercises, respectively. A three-way mixed ANOVA was used to determine the effect of the sex across conditions and time on hemodynamics. **RESULTS:** HR and CO were significantly ($p<0.05$) increased at R1 and R2 after UL and LU compared to rest in both sexes while LU induced higher HR in men compared to women at R1 and R2 (Men: UL: rest: 59 ± 8 ; R1: 92 ± 13 ; R2: 83 ± 13 ; LU: rest: 60 ± 8 ; R1: 94 ± 11 ; R2: 89 ± 13 ; Women: UL: rest: 63 ± 7 ; R1: 81 ± 12 ; R2: 76 ± 9 ; LU: rest: 64 ± 9 ; R1: 79 ± 12 ; R2: 73 ± 11 bpm). SV was significantly lower after LU at R1 and R2 in men compared to rest, UL, and women (Men: UL: rest: 90 ± 20 ; R1: 95 ± 13 ; R2: 92 ± 17 ; LU: rest: 92 ± 14 ; R1: 85 ± 12 ; R2: 83 ± 16 ; Women: UL: rest: 105 ± 14 ; R1: 96 ± 8 ; R2: 96 ± 12 ; LU: rest: 107 ± 17 ; R1: 99 ± 13 ; R2: 101 ± 17 ml/beat). TPR was significantly ($p<0.05$) lower in women compared to men at rest and significantly reduced at R1 and R2 compared to rest after UL and LU in both men and women (Men: UL: rest: 1.14 ± 0.34 ; R1: 0.66 ± 0.23 ; R2: 0.78 ± 0.26 ; LU: rest: 1.14 ± 0.34 ; R1: 0.76 ± 0.20 ; R2: 0.82 ± 0.26 ; Women: UL: rest: 0.80 ± 0.27 ; R1: 0.63 ± 0.18 ; R2: 0.73 ± 0.18 ; LU: rest: 0.83 ± 0.18 ; R1: 0.69 ± 0.23 ; R2: 0.76 ± 0.22 mmHg•min/L). However, there was no change for MAP. **CONCLUSION:** These data suggest that LU significantly increases HR and decreases SV in men compared to women, leading to similar the CO between sexes. Men have significantly higher resting TPR due to significantly higher resting CO compared to women.