Sex Differences in Hemodynamic Response to High Intensity Interval Exercise (HIIE)

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ABSTRACT

There are sex differences in the cardiorespiratory and hemodynamic response to exercise due to inherent differences in heart size, blood volume, and hemoglobin mass that elicit a higher VO$_2$ max in men versus women. These alterations in cardiac structure and function may mediate changes in VO$_2$ max per the Fick Equation. However, existing data are inconclusive on whether sex differences in training responsiveness exist. **PURPOSE:** The purpose of this study is to investigate potential sex differences in the hemodynamic response to HIIE. If men and women reveal discrepant cardiovascular responses to HIIE, this may partially mediate sex differences in VO$_2$ max response to HIIT reported. **METHODS:** Subjects were habitually active men (n=7, age 28 ± 4 yr) and women (n=7, age 23 ± 3 yr). In this randomized, within-subjects crossover design, VO$_2$ max was initially tested followed by three subsequent sessions consisting of different HIIE paradigms. **RESULTS:** Results show a main effect of sex in peak absolute VO$_2$ 4x4, VO$_2$ 10x1 and VO$_2$REHIT (p = 0.022, p = 0.009 and p = 0.005 respectively) and a significant difference in peak VO$_2$ (%VO$_2$ max) between REHIT and 4x4 (p = 0.008) and 10x1 (p = 0.001). Results show a main effect of sex in peak absolute SV 4x4 and SV$_{REHIT}$ (p = 0.008 and p = 0.006) and a significant difference in peak absolute SV and SV (%SV max) between REHIT and 4x4 (p = 0.002 and p = 0.002). Results also show a main effect of sex in peak absolute CO$_{REHIT}$ (p = 0.042) and a main effect of protocol in peak absolute and relative CO between REHIT and 4x4 (p = 0.022 and p = 0.017). Results show a main effect of sex in mean absolute VO$_2$ 4x4, VO$_2$ 10x1 and VO$_2$REHIT (p = 0.013, p = 0.014 and p = 0.006) and a significant difference in mean absolute VO$_2$ between REHIT and 4x4 (p = 0.018) and 10x1 (p = 0.019). A similar significant difference between REHIT and 4x4, and 10x1 is found when expressed as %VO$_2$ max (p = 0.016 and p = 0.010). Results show men reveal higher mean SV 4x4, SV$_{10x1}$ and SV$_{REHIT}$ values than women (p = 0.004, p = 0.019, p = 0.045) and higher CO$_{10x1}$ values than women (p = 0.046). **CONCLUSION:** Other than the well-known differences in SV and CO between men and women, our data show no sex differences in acute hemodynamic response to three unique regimens of HIIE. This suggests that reported sex differences in the VO$_2$ max adaptation to exercise are not due to a difference in acute cardiac response.