



Mid Atlantic Regional Chapter of the American College of Sports Medicine

Annual Scientific Meeting, November 1st – 2nd, 2019
Conference Proceedings

International Journal of Exercise Science, Volume 9, Issue 8



The Effects of the Natural and Contraceptive Menstrual Cycle on Autonomic Function in Trained Females

Lauren E. White¹, Jesse D. Krensel¹, Melissa A. Whidden¹, Melissa A. Reed¹, Evan L. Matthews² and Meghan G. Ramick¹. ¹West Chester University, West Chester, PA, ² Montclair State University, Montclair, NJ

PURPOSE: The purpose of this pilot study was to test the hypothesis that endurance trained (ET) women with natural menstrual cycles (NT) would have higher post-exercise heart rate variability (HRV) and an accelerated heart rate recovery (HRR) in the low hormone phase (LH) compared to the high hormone phase (HH) and this difference would be exaggerated compared to ET women taking oral contraceptives (OC). **METHODS:** 6 ET females participated in this study (2OC, 21.5±0.7; 4 NT, 28.5±9.0yrs). In NT subjects, menstrual phase was determined using urinary ovulation kits with the LH and HH phases defined as 4-7 days after onset of menstruation and 5-10 days after ovulation respectively. In OC subjects, menstrual phase was defined as the time period where subjects took the placebo pills (LH) and the time period in which they took the pills with the highest estradiol and/or progesterone concentration (HH). All subjects performed an incremental ramp protocol on the treadmill on an arbitrary day for determination of VO₂max. During the LH and HH testing visits, participants completed a State-trait anxiety inventory (STAI Form Y-1) to assess objective stress levels. Resting HRV was collected for 10 minutes prior to a 30-minute treadmill run at a heart rate corresponding to 80% of their VO₂max. HRV was collected for 10 minutes immediately post exercise. Participants repeated the entire protocol in the opposite phase. **RESULTS:** Participants exhibited greater autonomic activity in HH versus LH phase, indicated by the root mean square of successive differences between normal heart beats (RMSSD, HH: 6.9±0.7 vs LH:4.8±0.7ms, p<0.05) and the standard deviation of the distance of each point from the y=x axis on the Poincaré plot (SD1, HH: 4.9±0.5 vs LH: 3.4±0.5ms, p<0.05). Participants in the NT group exhibited greater sympathetic activity post exercise than the OC group based on the SD1/SD2 ratio (NT 4.2±0.15 vs OC 3.5±0.2, p < 0.05). HRR measured as % change from end exercise to 30-seconds post tended to be faster in the OC group vs NT (5.3±0.5 vs 3.7±0.3%; p=0.05). With these preliminary results, it is unclear which group/phase are causing these differences.

CONCLUSION: The hormonal fluctuations during NT and OC menstrual cycles effect autonomic activity post-exercise in trained females.