

Heart Rate and Postural Stability Recovery are Similar after Aerobic and Anaerobic Exercise

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Postural stability (PS) assessment is an important component of sideline concussion testing and fatigue may influence PS independent of neurological insult. While studies found that PS is disrupted after both anaerobic (ANA) and aerobic (AER) exercise, the relationship between heart rate (HR) and PS recovery following exercise has not been determined.

PURPOSE: To compare PS and HR following maximal ANA and AER exercise using a cross-over study design.

METHODS: Physically active subjects (M=8, F=5, 23.5±3.5 yrs, 173.7±9.5 cm, 72.7±15.0 kg) participated in two test sessions, where PS and HR were assessed utilizing a single-leg balance task prior to and following ANA or AER exercise every 2-min for 20 min. Dominant-leg balance was measured with eyes open while standing on a foam pad on top of a force plate. A Wingate cycle power test induced ANA fatigue and a graded treadmill exercise test induced AER fatigue. Separate one-way repeated measures ANOVA with simple contrast compared standard deviations of ground reaction forces in the anterior-posterior (AP), medial-lateral (ML) and vertical (V) directions during post-fatigue time intervals to baseline in order to determine PS recovery for each condition ($\alpha=0.05$). Paired t-tests compared % of max HR achieved during ANA and AER (%HR_{max}) between conditions at each post-fatigue time interval; adjustment for multiple comparisons set $\alpha=0.0045$.

RESULTS: AP was greater than baseline up to 8-min post-fatigue for ANA (7.2±2.9 vs 5.5±2.0 N) and AER (6.8±2.3 vs 5.5±2.1 N); ML and V were greater than baseline at 0-min post-fatigue for ANA (ML: 6.1±2.9 vs 4.0±1.4 N, V: 23.3±22.2 vs 11.0±5.2 N) and AER (ML: 6.8±3.1 vs 3.7±1.2 N, V: 24.3±17.5 vs 12.1±3.4 N) ($p<0.05$). While max HR achieved during AER was significantly greater than ANA (193.4±10.6 vs 174.8±17.6 bpm, $p<0.001$), no significant differences in %HR_{max} were found between ANA and AER at any post-fatigue time interval ($p>0.0045$).

CONCLUSION: PS and HR recovered similarly following ANA and AER fatigue. Since PS recovered by 10-min post-fatigue with %HR_{max} at ~52.7%, future research should investigate the potential of using %HR_{max} to determine when fatigue may be ruled out as a confounding factor during sideline concussion PS assessment following intense sporting activities.

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