

Heart Rate Variability Threshold Evaluation During Arm and Leg Cycling

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ABSTRACT

Background: The Heart Rate Variability Threshold (HRVT) is a point of deflection in heart rate variability assessed during incremental exercise to exhaustion. This threshold is thought to represent a shift in the autonomic balance. **Purpose:** The purpose of this study was to evaluate (HRVT) during arm (AC) and leg cycling (LC). **Methods:** There were twenty-three participants (age: 23.3±4.7 years; height: 168.6±7.5 cm; weight 66.8±8.9 kg). Participants did two graded exercise tests, one for AC and one for LC on different days. They wore a heart rate monitor which recorded R-R intervals. The test performed was a graded exercise test to exhaustion (GXT) using a ramp protocol. The root mean square of successive differences between normal heartbeats (RMSSD) of the R-R intervals during the GXT was calculated using specialized software. A time-varying moving average (64 second window and 3 second shift) was used. A piecewise fitting function consisting of two linear functions was used to detect time and RMSSD at HRVT. The time (as percentage of the total time to exhaustion) at which HRVT occurred was also calculated. A paired t-test was run for the outcomes of interest. Mean and standard deviations were reported and an alpha value of $p < .05$ was used to assume significant differences. **Results:** Log transformation was performed on the RMSSD and percentage at HRVT. There was no significant difference in time at HRVT ($p=0.36$) between AC (4.2 ± 1.0 minutes) and LC (3.9 ± 1.6 minutes) or percentage at threshold ($p=0.85$) between AC ($49.3 \pm 11.9\%$) and LC ($50.4 \pm 20.1\%$). There was also no significant difference in RMSSD at HRVT ($p=0.93$) between arm (1.3 ± 0.36 ms) and leg cycling (1.3 ± 0.54 ms). **Conclusion:** Time, RMSSD, and percentage at HRVT were not different between exercise modes. Autonomic balance, as measured by heart rate variability threshold, does not seem to be influenced by exercise modality.