

The Influence of Handgrip and Pedal Cadence During Sustained Cycling Power Outputs

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In cycling performance, there has been interest in contribution the upper body (i.e. handgrip) provides during cycling efforts as well as power output during varying cadences. Little has been done pertaining to cardiovascular responses with the aforementioned during sustained power. **PURPOSE:** To determine the cardiovascular reactions to isometric hand-grip and different pedal cadences during sustained cycling efforts. **METHODS:** Subjects were nine (n=9) experienced cyclists. Each signed a medical-health and physical readiness questionnaire, and IRB approved informed consent. Resting values of heart rate ($b \cdot \text{min}^{-1}$), blood pressure (mmHg), height (cm), weight (kg) and age (years) were assessed. A MonarkTM bicycle ergometer was used for testing. Grip was substantiated through the use of a hand grip dynamometer at 20 kg of tension. An exercise test of 20 minutes at 150 Watts was performed four times with random assignment through a Latin Squares Design. Protocols were distinguished by grip/no grip; 50/100 RPM; 3kp/1.5kp resistance. During the 20 minute exercise test, heart rate, blood pressure and calculated Rate Pressure Product ($\text{HR} \cdot \text{SBP} \cdot 100^{-1}$) were recorded every minute. Statistical measures included group means (SD) between protocols and use of a Repeated Measures ANOVA to examine variable differences between grip/ no-grip and cadence/resistance protocols. Significance was set at $p \leq 0.05$. **RESULTS:** Statistically significant differences were reported for the variables of heart rate, systolic blood pressure and work of the heart for the following protocols: high cadence/low resistance-grip HR=147.72 (3.24); SBP= 164.59 (6.42); WH=242.58 (23.99) and high cadence/low resistance-no grip HR=150.83 (6.49); SBP=166.05 (5.60); WH=245.57 (25.70). The following protocols showed no significant differences: low cadence/high resistance-grip HR=132.50 (3.24); SBP=160.29 (4.95); WH=211.54 (12.22) and low cadence/high resistance-no grip HR=130.51 (3.36); SBP=156.66 (5.17); WH=204.63 (11.45). **Conclusion:** This research demonstrated that grip appears to be a transient influence during sustained work. Cadence was a more influential factor on cardiovascular responses during sustained cycling performance.