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Acute Response of Different High-intensity Interval Training Protocols on Cardiac Auto-regulation.

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High-intensity interval training (HIIT) has been demonstrated as a time-efficient strategy for improving cardiac auto-regulation. Despite its popularity, it has not been fully understood whether various HIIT protocols could produce similar or differential effects on cardiac auto-regulation. **PURPOSE:** The purpose of the present study was to compare 3 different HIIT protocols with different length of work and rest times for a single session (all three had identical work-to-rest ratio and exercise intensity) with respect to cardiac auto-regulation. **METHODS:** With a randomized cross-over counterbalanced design, thirteen physically active young male adult participants (Age: 19.4 ± 0.3 [SEM] yrs, BMI: 21.9 ± 0.5 kg \cdot m⁻²) were included. The HIIT involved a warm-up of at least 5 min without resistance, followed by three protocols: 10s:50s (20 sets), 20s:100s (10 sets), and 40s:200s (5 sets), with intensity ranging from 115 to 130% Watt_{max}. The cardiac auto-regulation was measured using a non-invasive method, including heart rate variability and brachial-ankle pulse wave velocity. Repeated measures ANOVAs were used to determine significant interactive effects (group x time) on cardiac auto-regulation. **RESULTS:** Immediately after the HIIT session, the 40s:200s protocol produced the most intense stimulation in heart rate ($\Delta 52.8\%$, $p < 0.05$), R-R interval ($\Delta -33.5\%$, $p < 0.05$), $\ln LF_{\log}$ ($\Delta -42.6\%$, $p < 0.05$), $\ln HF_{\log}$ ($\Delta -73.4\%$, $p < 0.05$), and $\ln LF/HF$ ($\Delta 416.7\%$, $p < 0.05$) when compared to other protocols with 10s:50s and 20s:100s. The post-exercise hypotension in the bilateral ankle area was shown in the 40s:200s protocol only at 5 min after HIIT (Right; $\Delta -12.2\%$, $p < 0.05$; Left; $\Delta -12.6\%$, $p < 0.05$). In addition, the bilateral ankle-brachial index was decreased from the normal range to 0.97 or less in the 40s:200s HIIT protocol at 5 min after HIIT (Right; $\Delta -14.9\%$, $p < 0.05$; Left; $\Delta -15.2\%$, $p < 0.05$). **CONCLUSION:** This study confirmed that longer work time might be more potent in stimulating cardiac auto-regulation despite identical work-to-rest ratio and exercise intensity. Additional studies with 24-hr measurement of cardiac auto-regulation in response to various HIIT protocols should be warranted.

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