TACSM Abstract

Heart Rate Variability Responses to Exercise in Mid-Spectrum Chronic Kidney Disease

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ABSTRACT

Heart rate variability (HRV) is a measure of autonomic nervous system (ANS) activity, and decreased HRV is associated with many cardiovascular conditions. Chronic kidney disease (CKD) is characterized by a decrease in renal function and may be associated with ANS imbalances in the renal vasculature. Low HRV is associated with CKD incidence. Exercise is able to alter HRV by modulating the ANS. The effect of exercise on HRV in mid-spectrum CKD patients remains understudied. **PURPOSE**: To determine the effect of steady-state exercise (SSE) and high-intensity interval exercise (HIIE) on post-exercise HRV in patients with stage 3 or 4 CKD. **METHODS**: Twenty participants with stage 3 or 4 CKD (n = 6 men; n = 14 women; age 62.0 ± 9.9 yr; weight 80.9 ± 16.2 kg; body fat 37.3 ± 8.5% of weight; VO2max 19.4 ± 4.7 ml/kg/min, eGFR 51.5 ± 6.82). On separate days, each participant completed 30 minutes of aerobic exercise on the treadmill with exercise intensities set at 65% VO2reserve for SSE and 90% and 20% of VO2reserve in 3:2 min ratio for HIIE in a randomized crossover design. Both conditions averaged ~ 65% VO2reserve. HRV was measured at baseline, immediately post-exercise (IPE), 1-hr post-exercise, and 24-hr post-exercise. HRV was measured for 5 mins in the supine position using an elastic belt and Bluetooth monitor (Polar H7). CardioMood software was used to process HRV variables high frequency (HF), low frequency (LF), and standard deviation of all NN intervals (SDNN). Data were analyzed using 2 (condition) by 4 (time) repeated-measures ANOVAs. Data violated normality and were natural log (ln) transformed prior to analysis. Significant main effects were followed up using pairwise comparisons using a Bonferroni adjustment for multiple comparisons. All analyses were performed using SPSS (v.26). **RESULTS**: For ln LF/HF there were no significant main effects for exercise condition, time, or their interaction ($p > 0.05$). For ln HF ($F = 3.507$, $p < 0.05$, $\eta_p^2 = 0.156$), ln LF ($F = 3.093$, $p < 0.05$, $\eta_p^2 = 0.140$), and ln SDNN ($F = 3.761$, $p < 0.05$, $\eta_p^2 = 0.165$) there was a significant main effect for time. Post-hoc comparisons revealed that HF, LF, and SDNN were lower IPE than for all other time points. **CONCLUSION**: Thirty minutes of aerobic exercise transiently decreases HRV in mid-spectrum CKD patients. This response was not modified by exercise condition.