A Comparison of High-Intensity Interval Exercise and Continuous Moderate-Intensity Exercise on Postprandial Metabolism: A Pilot Analysis.

DAVID J. BUCKLEY, BRODERICK DICKERSON, and JAMES ROWE

Human Performance Lab; Kinesiology & Health Science; Stephen F. Austin State University; Nacogdoches, TX

Category: Masters

Advisor/ Mentor: Rowe, James (rowej@sfasu.edu)

ABSTRACT

Both moderate-intensity continuous exercise (MICE) (performed for ≥ 1 hour) and high-intensity interval exercise (HIIE) (performed for ≤ 30 minutes) has been reported to reduce the magnitude of postprandial lipemia and glycemia. It is unclear if low-volume MICE and HIIE performed for a similar duration and expending similar amounts of energy would have a comparable or different effect on postprandial lipemia or glycemia. **PURPOSE:** Examine the effects of low-volume MICE and HIIE on postprandial glucose, insulin, and triglyceride (TG) concentration following a mixed meal (MM) ingested at 0.5 hours and 15.5 hours post-exercise. **METHODS**: Recreationally active men (n = 7; age = 22.2 ± 2.1 yrs; body mass = 93.7 ± 18.0 kg; body fat% = 29.2±8.1; WC = 91.3 ± 16.5) completed a 1) rest bout, 2) MICE bout, and 3) HIIE bout in a randomized order between 1500-1600 hours on the afternoon of Day1. Rest consisted of sitting quietly for 20 minutes. MICE required 20 minutes of continuous cycling at 60% maximal work rate (WR_{max}). HIIE consisted of performing 20 (15-second) cycling sprints (@ 130% WR_{max}) followed with 45 seconds of passive cycling. Thirty minutes following the completion of each trial, participants consumed a MM in the form of a milkshake providing 5.3 ± 0.7 kcal/kg BM (body mass) with a macronutrient composition of 50% carbohydrate (CHO), 15% protein, and 35% fat. Blood samples were acquired prior to each trial and at 0, 0.5, 1, and 2 hours post-MM. On the morning of Day2 (between 0730-0800 hours) following a 10-hr fast participants consumed a second MM providing 7.1 ± 0.8 kcal/kg BM. Blood samples were acquired at 0, 2, and 4 hours post-MM. Blood samples on Day1 were analyzed for glucose, insulin, and TG concentration. Blood samples on Day2 were analyzed for TG concentration. Postprandial responses were quantified via the incremental area under the curve (AUC_I) using the trapezoidal method. Significant differences ($p<.05$) between trials were determined using a one-way, repeated measures ANOVA and Bonferroni post-hoc test. **RESULTS:** The average work performed over 20 minutes was similar between MICE (120.8 ± 30.8 W) and HIIE (115.6 ± 15.7 W) (p = .63, ES = .17). The energy expenditure was similar between MICE (159.1 ± 21.7 kcal) and HIIE (166.3 ± 42.4 kcal) (p = .63, ES = .33). Glucose AUC_I on Day1 was reduced following HIIE (10.7 ± 14.8mg $\cdot dl^{-1} \cdot 2hr^{-1}$) when compared to MICE (19.1 ± 14.0mg $\cdot dl^{-1} \cdot 2hr^{-1}$) ($p$ = .029, ES = .57). HIIE was not different from Rest (17.3 ± 25.9mg $\cdot dl^{-1} \cdot 2hr^{-1}$) ($p$ = .77, ES = .45). Insulin AUC_I on Day1 was unchanged between trials, however HIIE did elicit the lowest AUC_I (32.8 ± 31.8μIU $\cdot ml^{-1} \cdot 2hr^{-1}$) compared to rest (51.6 ± 31.7μIU $\cdot ml^{-1} \cdot 2hr^{-1}$) ($p$ = .17, ES =.59) and MICE (52.4 ± 30.2μIU $\cdot ml^{-1} \cdot 2hr^{-1}$) ($p$ =.15, ES = .63). TG AUC_I on Day1 was unchanged between trials. On Day2, TG AUC_I was unchanged between trials, however both MICE (10.1 ± 11.9mg $\cdot dl^{-1} \cdot 4hr^{-1}$; p = .51, ES = .78) and HIIE (12.8 ± 12.8mg $\cdot dl^{-1} \cdot 4hr^{-1}$; p = .15, ES = .65) elicited moderate reductions when compared to Rest (25.9 ± 20.2mg $\cdot dl^{-1} \cdot 4hr^{-1}$. C**ONCLUSION:** While not significant, the results suggest that MICE and HIIE of similar volume and energy expenditure may elicit a similar effect on postprandial TG metabolism when performed the day before a mixed meal. In addition, HIIE may be advantageous over MICE when evaluating postprandial glucose and insulin metabolism when the exercise is performed shortly before a mixed meal. A larger sample size should clarify these trends as the current study included only a pilot sample of seven participants.