TACSM Abstract

The Influence of Dietary Sugars and Acute Exercise on Postprandial Triglyceride and Glucose Concentration

JAMES R. ROWE[1], KYLE D. BIGGERSTAFF[1], VIC BEN-EZRA[1], and NANCY DIMARCO[2]

[1] Exercise Physiology Laboratory; Department of Kinesiology; Texas Woman's University; Denton, TX

[2] Institute for Women's Health; Texas Woman's University; Denton, TX

Category: Doctoral

ABSTRACT

Purpose: Examine the effects of prior aerobic exercise on postprandial triglyceride (PPTG) and glucose concentration following a mixed liquid meal (LM) made with either glucose or fructose sugars. Methods: Sedentary pre-menopausal women (n=16; age=28.2±6.1yrs; Wt. = 61.2±10.5kg; BMI= 23.2±2.9 kg/m2; VO2 max =30.8±4.2 ml/kg/min) completed four trials in random order: 1) Control-Fructose, 2) Control-Glucose, 3) Exercise-Fructose, 4) Exercise-Glucose. Exercise consisted of treadmill walking at 65% VO2 max expending 500 calories. Control consisted of resting in the laboratory for approximately 1 hour. Trials were completed 15 hours prior to the LM. The morning after each trial, a fasting (12hr) blood sample was collected followed by the consumption of the LM providing approximately 20 kcal/kg fat-free mass with a macronutrient composition of 55% carbohydrate, 15% protein, and 30% fat. The LM was blended with whole milk and ice cream plus a glucose or fructose powder. The glucose and fructose powder accounted for half of the total carbohydrate content within the LM. Blood was collected again at 0.5, 1, 1.5, 2, 3, 4, 5, and 6 hours post-LM and analyzed for TG and glucose concentration. The areas under the curve (AUC) were calculated for both TG and glucose concentration using the trapezoidal method. A repeated measures ANOVA was used to determine statistical significance ($p<0.05$). A Bonferroni post hoc test was used identify significant differences between trials. Results: The PPTG AUC was lower ($p < .05$) following the Exercise-Glucose trial (709.7±239.0 mg•dl^{-1}•6hr^{-1}) when compared to the three other trials (Rest-Fructose: 856.5±309.9 mg•dl^{-1}•6hr^{-1}, Exercise-Fructose: 838.0±324.5 mg•dl^{-1}•6hr^{-1}, and Rest-Glucose: 862.1±339.4 mg•dl^{-1}•6hr^{-1}), respectively. No differences in the TG AUC were reported between the other three trials. Glucose AUC was unchanged between the trials ($p = .19$; Control-Fructose = 660.4 ± 67.2 mg•dl^{-1}•6hr^{-1}; Exercise-Fructose = 636.3 ± 74.8 mg•dl^{-1}•6hr^{-1}; Control-Glucose = 633.3 ± 91.4 mg•dl^{-1}•6hr^{-1}; Exercise-Glucose = 633.3 ± 72.6 mg•dl^{-1}•6hr^{-1}). Discussion: The PPTG AUC was smaller following the Exercise-Glucose trial only. Investigations have reported that glucose supplemented into a meal lowers PPTG AUC when compared to fructose. Acute exercise has been reported to lower PPTG AUC following the ingestion of an extremely high-fat or high-carbohydrate meal. Most postprandial investigations using mixed meals have reported no change in glucose AUC following acute exercise. This study was funded by Texas Woman's University and the Texas Chapter of the American College of Sports Medicine.