

Plasma Glucose and Lipid Profiles Following High-Fat Diet and Acute Aerobic Exercise

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ABSTRACT

PURPOSE: To examine the effects of a 3-week high-fat (HF) diet on plasma glucose, lipids, and lipoproteins following an acute bout of aerobic exercise in middle-aged men. **METHODS:** Physically active (non-elite, competitive marathon runners), male participants (N=8, age=39.5±9.9 years) volunteered for the study. Participants maintained their habitual high-carbohydrate (HC) diet (60-70% caloric intake from carbohydrate) prior to switching to the HF diet (70% caloric intake from fat, not exceeding 50g of carbohydrates) for 3 weeks. At the end of each diet trial, participants performed an acute bout of aerobic exercise, which consisted of running at varying paces (personal race paces) on a treadmill for 50 minutes (split into 5, 10-minute periods with 2 minutes of rest in between). Following a 20-minute recovery from the treadmill exercise, participants additionally ran a 5-km time trial (average run time = 23.69±2.41 minutes) on an outdoor road course. Overnight fasting blood samples were collected before and 24 hours after exercise for the HC and HF diet trial to analyze glucose, triglyceride (TG), total cholesterol (TC), high-density lipoprotein-cholesterol (HDL-C), lipoprotein(a), very low-density lipoprotein cholesterol (VLDL-C), low-density lipoprotein-cholesterol (LDL-C). The data were analyzed using a two-way ANOVA [2 (diet: HC and HF) X 2 (time: pre and post-exercise)]. Any significant interactions were further analyzed using a Tukey's post-hoc test. A p-value was set at < 0.05. **RESULTS:** A glucose level was higher (p=0.046) in the HC diet (96.81±2.45 mg/dL) than the HF diet (89.6±2.45 mg/dL). As compared with the HC diet, the HF diet showed a higher level of TC (142.58±4.75 vs. 171.71±4.75 mg/dL, p=0.001), HDL-C (49.26±3.01 vs. 58.58±3.01 mg/dL, p=0.037), and LDL-C (91.51±4.91 vs. 111.20±4.91 mg/dL, p=0.008), respectively. TG significantly decreased (p=0.03) from 65.68±5.93 to 38.46±5.93 mg/dL at 24 hours of post-exercise. **CONCLUSION:** The 3-weeks of HF diet modestly increased plasma lipids and lipoproteins within the desirable range. Implementing a relatively short-term HF diet does not appear to significantly elicit negative cardiovascular disease risk markers in non-elite, healthy middle-aged male runners. However, it is strongly recommended for future studies to investigate the safety and beneficial effects of a long-term HF diet on cardiovascular disease risk factors in a variety of population including the untrained.