TACSM Abstract

Effects of a 28-Day Carbohydrate-Restricted Diet on Metabolic and Performance Markers in Professional Firefighters

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ABSTRACT

PURPOSE: Firefighters (FF) experience acute physiological and psychological stressors such as disturbed sleep patterns, frequent snacking, smoke exposure, and intense physical exertion, likely contributing to a significant risk for cardiovascular disease (CVD) and sudden cardiac death. Additionally, FF have high obesity prevalence rates and low cardiovascular fitness levels. Proper dietary and exercise regime interventions may decrease CVD risk. Carbohydrate-restricted diets (CRD) may benefit FF health through increased metabolic flexibility, decreased fat mass, and improved body composition, without negatively affecting the strength and aerobic performance. **METHODS:** Twenty-one healthy, male professional FF recruited from local fire departments underwent 9 testing sessions: Trials 1-3 were used as familiarizations, Trials 4-6 (15-days later) established a baseline, and Trials 7-9 were performed following a 28-day CRD. The 28-day CRD consisted of a carbohydrate (CHO) restricted (less than 25%/day), caloric ad-libitum diet protocol allowing flexibility and mimicking real-life eating patterns. FF Physical Performance Assessment (FPPA) variables (2.41-km run, pull-ups, push-ups, and sit-ups) were analyzed using dependent *t*-test. Additionally, substrate oxidation rates for fats and CHO ($g \bullet min^{-1}$) were measured during Graded Exercise Testing (GXT) at 5 timepoints and analyzed using a 2 x 5 (Treatment x Timepoint) RMANOVA. **RESULTS:** A significant difference ($p<0.05$) was observed for 2.41-km finishing run time from pre- to post-diet. However, 2.41-km finishing heart rates were not significantly different suggesting no significant differences across trials for physical exertion. Additionally, participants performed significantly more pull-ups post-CRD. No significant changes were discovered for either push-ups or sit-ups. Fat oxidation rates significantly increased from pre- to post-CRD intervention. Fat oxidation decreased significantly during the GXT. There was a significant decrease in CHO oxidation rates from pre- to post-CRD intervention. Further, timepoints 1-5 were all significantly different from each other, with CHO oxidation rates increasing during each stage ($p< 0.05$). **CONCLUSION:** The study's purpose was to examine the effects of a 28-day CRD among FF. The diet increased fat oxidation, decreased CHO oxidation during GXT, and was associated with improved FPPA 2.41-km run time and pull-ups. FF following a CRD can significantly reduce their risk for CVD and improve on-duty performance.