Proceedings of the Nutrition Society (2020), **79 (OCE2)**, E677 doi:10.1017/S0029665120006266

The 13th European Nutrition Conference, FENS 2019, was held at the Dublin Convention Centre, 15–18 October 2019

The effect of a low carbohydrate high fat diet on apolipoproteins and cardiovascular risk

Deaglan McCullough[1,2], Tanja Harrison[1], Katie Lane[1], Lynne Boddy[2], Farzad Amirabdollahian[3], Michael Schmidt[4], Kevin Enright[1], Claire Stewart[2] and Ian Davies[1]

[1]*School of Sport Studies, Leisure and Nutrition, Liverpool John Moores University, Liverpool, United Kingdom,*
[2]*School of Sports and Exercise Sciences, Liverpool John Moores University, Liverpool, United Kingdom,*
[3]*School of Health Sciences, Liverpool Hope University, Liverpool, United Kingdom and*
[4]*Advanced Pattern Analysis and Countermeasures Group, Research Innovation Centre, Fort Collins, USA*

Abstract

Apolipoproteins (apo) regulate lipoprotein characteristics and lipid metabolism. ApoC-III is a regulator of triglyceride-rich lipoprotein (TRL) metabolism and apolipoproteins are important biomarkers for cardiovascular disease (CVD) risk prediction. A low carbohydrate high fat (LCHF) diet improves cardiometabolic risk, especially via reduction of TRL. However, few studies have compared a LCHF vs. a high carbohydrate (HC), lower fat diet under *ad libitum* conditions on apoC-III levels. The objectives of this investigation were to measure the effect of a LCHF vs. a HC diet on apoC-III, apoA1, apoB and apoB/apoA1 in 16 healthy Caucasian adults aged 19–64. Ethical approval: Liverpool John Moores University Research Ethics Committee (16/ELS/029); registered with ClinicalTrials.gov (Ref. NCT03257085). Participants randomly assigned to a HC diet (UK Eatwell guidelines; ≥ 50% of energy from carbohydrates) (n = 8), or a LCHF diet (consume < 50 g/day of carbohydrates) (n = 8) provided plasma samples at 0, 4 and 8 weeks. ApoA1 and apoB were analysed by an automated chemistry analyser (Daytona, Randox Laboratories Ltd, UK). ApoC-III was analysed via ELISA (Thermo Fisher Ltd, USA). Factorial 2×3 ANOVA and ANCOVA (IBM SPSS 25®) were undertaken to investigate significant differences and to control for variables influenced by baseline measures and visceral adipose tissue (VAT). Results show 0, 4, and 8 weeks respectively: ApoC-III (LCHF: 19.12 ± 9.14, 16.05 ± 7.95, 15.11 ± 3.17 mg/dl; HC: 22.13 ± 8.38, 28.22 ± 13.85, 22.22 ± 7.7 mg/dl) showed no significant ($P = 0.319$) change. No significant ($P = 0.23$) change was also observed in ApoB (LCHF: 107.25 ± 20.35, 111.38 ± 24.81, 111.43 ± 19.93 mg/dl; HC: 94.38 ± 20.79, 105.00 ± 20.13, 99.00 ± 29.09 mg/dl). Similarly apoA1 (LCHF: 158.71 ± 14.27, 166.50 ± 23.09, 173.00 ± 29.42 mg/dl; HC: 164.71 ± 30.25, 172.50 ± 29.44, 174.00 ± 32.83 mg/dl) showed no significant change ($P = 0.76$). This resulted in a relatively unchanged apoB/A1 throughout the study in both diets ($P = 0.30$). No significant ($P > 0.05$) differences were found after 4 weeks or between groups also. ANCOVA revealed a trend ($P = 0.06$) in apoC-III for a difference between groups (LCHF: Δ-6.6 mg/dl vs. HC: Δ1.2 mg/dl) after 8 weeks but no significant ($P > 0.05$) changes in other apolipoproteins were detected. These preliminary data reveal that a LCHF diet does not improve the apolipoprotein profile; however, when accounting for other metabolic risk factors (i.e. VAT) there was a trend towards lowering apoC-III levels ($P = 0.06$). Modulation of apoC-III may lead to improved lipid metabolism, but higher-powered studies are warranted before any improvement on CVD risk can be inferred.

Conflict of Interest

There is no conflict of interest.