Postprandial lipid responses after long-term intake of dairy products varying in fatty acid composition

[Abstract]

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Impact of chronic consumption of dairy products varying in fatty acid composition on postprandial lipid responses: preliminary insights from the RESET study. By O. Markey1,2,5, D. Vasilopoulou1,2, C.C. Fagan2, K.E. Kliem3, S.Todd4 D.J. Humphries3, K.G. Jackson1,2, D.I. Givens3 and J.A. Lovegrove1,2, 1Hugh Sinclair Unit of Human Nutrition and Institute for Cardiovascular and Metabolic Research, 2Department of Food and Nutritional Sciences, 3Institute for Food, Nutrition and Health, University of Reading 4Department of Mathematics and Statistics, University of Reading, Reading, RG6 6AP and 5School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, LE11 3TU.

Partial replacement of milk saturated fatty acids (SFA) with unsaturated fatty acids (FA) is feasible through supplementation of the bovine diet with plant oil or oilseeds(1). Consumption of modified dairy products with a SFA-reduced, monounsaturated fat (MUFA)-enriched content may have a beneficial impact on the fasting lipid profile(1) but their influence on postprandial triacylglycerol (TAG) concentrations, an independent risk factor for CVD(2), requires investigation. We examined whether consumption of FA-modified dairy products improved postprandial lipid, glucose and insulin responses, when compared to dairy products with a FA composition typical of retail products (control).

We conducted a 12-week, randomised, crossover, double-blinded controlled dietary intervention in fifty-two adults at moderate CVD risk (31 men, 21 women; age 53 (SE 2) years; BMI 25.9 (SE 0.5) kg/m2) (REplacement of SaturatEd fat in dairy on Total cholesterol (RESET) study; ClinicalTrials.gov: NCT02089035). A flexible food-exchange model was used to implement each iso-energetic high-fat (38 %TE), high-dairy diet that contained UHT milk, cheese and butter: control (dietary target: 19 %TE SFA; 11 %TE MUFA) and modified (16 %TE SFA; 14 %TE MUFA). Before and after each intervention period, participants underwent a sequential two-meal postprandial investigation in which blood samples were collected at regular intervals following a test breakfast (50 g fat) and lunch (30 g fat) rich in control or modified dairy products, given at 0 and 330 min respectively. Changes from the baseline study visit in postprandial serum TAG, glucose, apolipoprotein B (apoB) and non-esterified FAs (NEFA) and plasma insulin response were reported as incremental area under the curve (iAUC; Fig. 1.). Data were analysed using mixed models, with baseline values of the assessed variable, period, treatment, age, gender and BMI included as fixed effects.

When compared to control dairy products, the iAUC apoB response was lower and changed in the opposite direction following the modified diet (P = 0.004). No significant differences in iAUC for the TAG, glucose, NEFA or insulin responses were evident. Chronic consumption of SFA-reduced, MUFA-enriched dairy products decreased the postprandial apoB response suggesting an impact of the FA-modified dairy on the metabolism of TAG-rich lipoproteins, which warrants further investigation.

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