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Acute suppression of spontaneous food intake following dairy calcium and vitamin D

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Background – Obesity is the result of subtle but long term perturbations in both energy expenditure and energy intake. Calcium and vitamin D have long been known for their health benefits, but their potential role in energy balance is yet to be elucidated.

Objective – To compare the postprandial effects of calcium and vitamin D on (1) subjective feelings of hunger and satiety, and (2) subsequent food intake in humans.

Design – 11 subjects (mean \pm SEM, age 54 ± 1.2 yr, weight 84.6 ± 5.4 kg, and BMI 31 ± 2.4 kg/m²) participated in a single blind, cross over study with a sequential-meal design. Volunteers were randomised to high dairy calcium, high vitamin D breakfast (HCB – 543 mg calcium & 349 IU vitamin D) or low dairy calcium, low vitamin D breakfast (LCB – 248 mg calcium & 12 IU vitamin D). Both breakfasts were followed by a very low calcium, low vitamin D standard lunch (SL – 48 mg calcium & 25 IU vitamin D). Both breakfasts had similar energy and macronutrient profiles, and were identical in volume. Visual analogue scale (VAS) questionnaires were used to track changes in subjective feelings of hunger and satiety in the postprandial period. Palatability questionnaires were used to determine acceptance of each test meal served. Ad libitum food intake at a buffet meal was noted and free-living food intake over the following 30h was recorded using a food diary. Data was analysed as a 2x2 repeated measures design, for diet effects (HCB vs. LCB), meal effects (breakfast vs. lunch) and diet x meal interaction.

Outcomes – There were no statistical differences in the postprandial VAS responses. Overall, subjects preferred the lunch following LCB ($P=0.03$), as they perceived it as less oily ($P=0.02$). There was a trend for food intake at buffet meal to be lower by 444 kJ following the HCB diet. This effect widened to 765 kJ at the evening meal. Reported 24h food intake on the following day was significantly lower following the HCB diet (8484 ± 699 kJ vs. 7143 ± 435 kJ, $P<0.02$). Lower 24h food intake was mainly due to reductions in the intake of fat (9.6 g/d) and carbohydrate (53 g/d).

Conclusions – A high dairy calcium and vitamin D diet did not affect subjective sensations of hunger and satiety in the immediate postprandial period. However, spontaneous food intake over the subsequent 24h period was significantly suppressed.

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