Proceedings of the Nutrition Society (2024), **83 (OCE2)**, E221 doi:10.1017/S0029665124004452

Winter Conference 2023, 5-6 December 2023, Diet and lifestyle strategies for prevention and management of multimorbidity

Role of gastrointestinal appetite hormones in the success of body mass loss during interventions based on exercise combined with restricted energy intake diets with different fat and carbohydrate content

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Restriction of energy intake is an effective strategy for achieving body mass loss[1]. However, it leads to gastrointestinal appetite hormonal changes, which are expected to enhance hunger, reduce satiety, and possibly impair the ability to comply with prescribed intervention[2]. Exercise interventions, on the other hand, did not modify gastrointestinal appetite hormones[3] and there is some evidence that postprandial appetite hormone responses after a low carbohydrate-high fat meal (LCHF) are more favorable than after high carbohydrate-low fat meal (HCLF) meal [4]. This study investigated how energy-restricted diets based on LCHF and HCLF meals and combined with exercise affect body weight, and gastrointestinal appetite hormones and explored the relationship between body mass changes and changes in gastrointestinal appetite hormones.

Twenty-seven overweight and obese females (age: 35 ± 9.35 years, BMI: 31.64 ± 5.08 kg/m^2) completed a randomized parallel design study and underwent a 4-week intervention consisting of brisk walking combined with either consumption of calorie-restricted HCLF or LCHF diet. Participants underwent a 5-hour experimental trial before and after the interventions, which included body weight measurements and fasting and postprandial blood sample collection for gastrointestinal appetite hormone measurements.

Both interventions significantly reduced body mass (HCLF group, −2.1 ± 1.7 Kg: LCHF group, -1.7 ± 1.7 Kg, $P < 0.05$ for both groups), but changes between the groups were not significant ($P>0.05$). Body mass changes were individual and ranged from -0.4 kg to −5.3 kg and from +1 kg to −4.4 kg in the HCLF and LCHF groups, respectively. The interventions had no impact on mean values of time- averaged postprandial concentrations of ghrelin, PYY, and GLP-1 but there was large individual variability in changes of these hormones. Results combined from both groups revealed that changes in ghrelin ranged from +549.3 to -407.7 pg/ml, in PYY from −132.5 to + 96.4 pg/ml and in GLP-1 from −6.6 to +19.5 pg/ml. Correlation, investigated on the data from both groups combined, between changes in body mass and changes in ghrelin ($r = -0.18$, $P= 0.41$), PYY ($r = -0.04$, $P =0.87$), and GLP-1 ($r = 0.11$, $P = 0.64$) were not significant.

In conclusion, the extent of body mass loss during interventions based on restricted energy intake diets combined with exercise is not related to the carbohydrate and fat content of the diet. Our findings also suggest that the success of body mass loss cannot be predicted by changes in postprandial concentrations of gastrointestinal appetite hormones.

References

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