

Very-low dose pre-meal whey protein microgels reduce postprandial glucose in type 2 diabetes: a randomised, placebo-controlled crossover study

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Background and aims: Whey protein (WP) is found in dairy products, and are rich in branched chain amino acids and bioactive peptides that stimulate secretion of incretin peptides and insulin. Its applicability in routine nutraceutical clinical use has however been limited by 1) requiring a relatively high dose with a high caloric content, and 2) the need to take it well in advance of a meal. New technologies allowing for a more rapid absorption could enable use of a lower WP-dose, as well as allow to take the WP closer to the meal.

Materials and methods: In this single-intervention crossover study in individuals with drug-naïve or metformin-treated type 2 diabetes, we studied the effects of 10g WP (40 kcal) prepared with novel technology to enhance absorption (micelle-technology [WPM]), or placebo (0 kcal), provided as a 125 mL shot 15 min ahead of a 250 g pizza meal (622 kcal [29.0 g protein, 22.6 g fat, 72.6 g carbohydrates]). Postprandial (PP) glucose response over 4 hours, and incretin response (intact glucagon-like peptide [GLP]-1, peptide-YY [PYY], glucose-dependent insulinotropic polypeptide [GIP]) over 2 hours were assessed in blood, and the difference between WPM and placebo were assessed by comparing incremental areas under the curve (iAUC) between the two interventions.

Results: In total 26 individuals (14 females, mean [standard deviation] age 62.0 [8.3] years, baseline HbA1c 58 [12] mmol/mol /7.5% [1.1], eGFR 96.6 [25.7] ml/min/1.73m², BMI 29.2 [4.8] kg/m²) completed both sequences. The pre-meal WPM shot significantly altered the early PP glucose trajectory, reducing the 2h iAUC by 22% (mean [95% CI] difference iAUC_{30min-120min} WPM vs placebo -29.43 [-55.45, -3.40] mg/dLxh, p=0.0283). The iAUC_{30min-180min} was similar (-31.58 [-68.43, 5.26], p=0.0896). A 66% increase in GLP-1 iAUC_{30min-120min} was observed (4.80 [2.19, 7.40] pmol/Lxh, p=0.0009), while responses for both PYY and GIP were similar between WPM and placebo (respectively, 5.21 [-1.14, 11.56] pmol/Lxh, p=0.1035, and 8.52 [-15.27, 32.31] pmol/Lxh, p=0.4668).

Conclusion: In sum, 10g WPM significantly reduces the early glycaemic response and significantly augments the GLP-1 response to a mixed meal in subjects with type 2 diabetes. These results support its use as a convenient pre-meal shot to improve PP metabolic profile.