

Dose Effect of Whey Protein on Gut Hormone Responses in Pre-Diabetics and Type 2 Diabetics

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Category: Doctoral

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ABSTRACT

GLP-1 and GIP have been shown to increase following a 50 g dose of whey protein prior to a high glycemic load in type 2 diabetics. However, this increase is reduced in diabetics compared to healthy individuals. Pancreatic polypeptide (PP) and peptide tyrosine tyrosine (PYY) also increase, while ghrelin decreases after the consumption of whey protein; however, it is not known if a similar hormone response occurs with a lower dose of whey protein prior to a glycemic load or if there is a dose effect. Our hypothesis was that 20 g and 30 g of whey protein would increase GLP-1, GIP, PP, and PYY and decrease ghrelin in a dose dependent manner.

PURPOSE: The purpose of this study was to examine the effect of two different doses of whey protein ingested 30 min prior to a 50 g OGTT on gut hormone and incretin response.

METHODS: Nine diabetic and pre-diabetic participants (n=9, mean \pm SD; age: 64.3 \pm 8.1 yrs.; BMI: 29.4 \pm 6.0 kg/m²; HbA1c: 6.4 \pm 0.6%) completed three trials. The randomly assigned trials consisted of: ingestion of 250ml of water (CON); 250 ml of water + 20 g whey (20g); 250ml of water + 30 g whey (30g), prior to completing a 50 g OGTT. Blood was collected at -30, 0, 15, 30, 60, 90, 120, and 150 min for the measurement of GIP, GLP-1, ghrelin, PP, and PYY. The whey protein was administered immediately following the -30 min and the 50 g OGTT began immediately after the 0 min blood draw. Metabolites were measured using multiplex fluorescent detection. One-way repeated measure ANOVA was used for statistical analysis for each dependent variable ($P < 0.05$). **RESULTS:** 20g and 30g of whey protein significantly increased incremental area under the curve (AUC) of GIP 32% and 38% compared to CON. 30g significantly decreased ghrelin AUC -13.9% and -20% compared to 20g and CON. 30g significantly increased PP AUC 28% compared to CON only. There were no differences in ghrelin and PP AUC between 20g and CON. There were no significant differences for GLP-1 and PYY between all trials. **CONCLUSION:** 30 g of whey protein prior to a glucose challenge increased secretion of GIP and PP and decreased ghrelin in type 2 and pre-diabetics. There seems to be a dose effect relationship between whey, ghrelin, and PP. 30 g of whey preload may induce insulinotropic and satiety effects from GIP, PP, and ghrelin responses in type 2 and pre-diabetics.