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The role of Australian pork in improving thiamine status, heart disease risk factors and glucose control in people with type 2 diabetes

Background

The rising prevalence of obesity and type 2 diabetes (T2D) has seen increased interest in the use of higher protein, lower carbohydrate (HP) diets for weight and diabetes management. However, HP diets have been typically associated with increased red meat consumption, of which there is some evidence albeit inconclusive that higher red meat consumption may increase the risk of developing cardiovascular disease (CVD) and T2D and iron intake may be related to the development of T2D. Preliminary evidence suggests thiamine deficiency maybe associated with micro-vascular complications and low thiamine concentrations have been reported in diabetes and thiamine intake is lower on low carbohydrate diets. Hence, incorporation of pork protein into a HP dietary plan maybe a valuable alternative option to optimise thiamine intake and status in T2D. In addition, studies to date have evaluated the effects of a HP diet without the incorporation of exercise training as a comprehensive lifestyle plan. This clinical trial assessed the efficacy of a comprehensive 16-week weight reduction program high in pork with resistance exercise (EX) in improving thiamine concentrations, diabetes control and markers of CVD risk.

Design

83 men and women with T2D (age 56.12 ± 7.53 yrs, BMI 35.4 ± 4.6 kg/m²) were randomly assigned to an isocaloric, energy restricted diet ($\sim 6-7$ MJ/day) of either high carbohydrate (HC; carbohydrate:protein:fat, 55:20:25) or high protein, high pork (HP; 40:35:25), with or without Ex (3 d/wk). Body weight and composition, cardiometabolic markers and erythrocyte thiamine pyrophosphate (ETP) were assessed pre- and post-intervention.

Outcomes

59 participants completed the study. There was a significant time x group effect ($P \leq 0.04$) for body weight, fat mass and WC such that the HP+EX had the greatest reduction for these parameters; weight (HC -8.61 ± 4.61 kg, HP -8.98 ± 4.82 kg, HC+Ex -10.52 ± 5.10 , HP+Ex -13.79 ± 5.98), fat mass (HC -6.35 ± 3.44 kg, HP -6.65 ± 4.0 kg, HC+Ex -7.91 ± 3.73 kg, HP+Ex -11.05 ± 3.71 kg) and WC (HC -8.2 ± 4.6 cm, HP -8.9 ± 3.9 cm, HC+Ex -11.3 ± 4.6 cm, HP+Ex -13.7 ± 4.6 cm). Across the groups there was an overall reduction ($P < 0.001$) in lean mass (-2.0 ± 2.3 kg), blood pressure ($-15/8 \pm 10/6$ mmHg), fasting glucose (-2.1 ± 2.2 mmol/L), insulin (-4.7 ± 5.4 uM/L), HbA1c (-1.25 ± 0.94 %), triglycerides (-0.47 ± 0.81 mmol/L) total cholesterol (-0.67 ± 0.69 mmol/L) and LDL-cholesterol (-0.37 ± 0.53 mmol/L) with no significant difference between groups ($P^3 0.17$, time x group interaction). Overall, compared to the HC diet, the HP had greater improvement in ETP levels (HC -25 ± 53 nmol/L vs HP 4 ± 50 nmol/L, $P = 0.04$).

Conclusion

A higher intake of lean pork as part of a high protein dietary plan lifestyle program, when combined with resistance exercise training may provide advantages for weight loss and improvements in body composition in overweight and obese patients with type 2 diabetes. It also provides evidence that a lifestyle program that indicates pork may offer additional nutritional advantages for promoting thiamine status over a HC diet. This evidence suggests lean pork is a valuable alternative source of protein with higher protein lifestyle patterns for weight management in type 2 diabetes.