

PRO1620: Acute Human Feeding Trials to Define the Minimum Effective Dose for Reduction of Post Prandial Blood Glucose by Two Common Market Varieties of Canadian Lentil

Pulse Canada is interested in obtaining regulatory approval of a health claim for lentils and blood glucose reduction. Critical evidence is needed to define the minimum effective dose of lentils required to significantly reduce blood glucose response following a meal. This has been established by Health Canada as a 20% reduction. The present study sought to address this gap by comparing the blood glucose response elicited by either $\frac{1}{2}$ or $\frac{1}{4}$ cup serving of 2 commonly consumed market varieties of lentil to that caused by matched amounts of commonly eaten starchy foods (white potato (potato), macaroni, white rice (rice), and corn). A secondary objective was to understand the mechanism by which lentils reduce blood glucose through structure-function studies.

After obtaining research ethics board approval a randomized cross-over acute human trial was conducted with two levels of treatment. In Study #1, 24 healthy volunteers consumed $\frac{1}{4}$ cup of two types of cooked lentils or starchy foods in random order. Study #2 was similar to study 1, except participants consumed $\frac{1}{2}$ cup of lentils. Finger prick blood samples were obtained for measurement of glucose which was used to calculate the overall blood glucose response following the test meals. Additional blood samples were collected in Study #2 to examine insulin response.

Results show that blood glucose response was significantly lower following consumption of $\frac{1}{2}$ cup of red and green lentils compared to macaroni, potato, and rice, but not corn. At this dose insulin response was significantly lower following consumption of green lentils compared to potato and rice, but not corn and for red lentils compared to macaroni. Maximum blood glucose concentration (Cmax) was significantly lower following consumption of $\frac{1}{2}$ cup of green and red lentils compared to all starchy foods. At the $\frac{1}{4}$ cup serving, green lentils produced significantly lower blood glucose response than red lentils, potato, and rice ($p=0.04$), but not corn or macaroni. Blood glucose Cmax was also significantly lower following consumption of the $\frac{1}{4}$ cup serving of green and red lentils compared to corn, potato, and rice, and to macaroni for green but not red lentils. Predictors of insulin response were explored by examining food macronutrient structure in the $\frac{1}{2}$ cup servings ($n=6$). As expected, insulin response was strongly influenced by blood glucose response ($p<0.005$) however, it was interesting that it was not influenced by either total carbohydrate nor glycemic carbohydrate content, and yet, significant inverse relationships were observed between insulin AUC with both dietary fibre and protein content increased ($p=0.04$ and $p=0.06$ respectively).

These results provide evidence for consumption of lentils for type 2 diabetes prevention and information required by Health Canada to support a lentil health claim for reduced glycemic response.