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A NOVEL BOTANICAL FORMULA PREVENTS DIABETES BY IMPROVING INSULIN RESISTANCE

Juntao Kan^a and Min Gui^a^aNutrillite Health Institute, China

Statement of the Problem: The prevalence of type 2 diabetes mellitus (T2DM) has increased significantly in recent decades to epidemic proportions in China. Individually, fenugreek (*Trigonella foenum graecum*) seed, mulberry (*Morus alba* L.) leaf and American ginseng (*Panax quinquefolius*) root can improve glycemia in various animal models and humans with impaired glucose metabolism and T2DM. The aim of this study was to design an optimized botanical formula containing these herbal extracts as a nutritional strategy for the prevention of insulin resistance and T2DM.

Methodology & Theoretical Orientation: Cell-free α -amylase and α -glucosidase enzyme assays were used to determine inhibitory potential of extracts. Glucose uptake was examined in differentiated human adipocytes using radiolabeled 2-deoxyglucose. Male Sprague Dawley rats were divided and glycemia balanced into 5 groups: two controls (naïve and model) and three doses of the botanical test formula. Insulin resistance and T2DM was induced by feeding animals a high fat diet and with an alloxan injection. Glucose tolerance was examined by measuring serum glucose levels following an oral glucose load.

Findings: Fenugreek seed and mulberry leaf dose dependently inhibited α -amylase ($IC_{50} = 73.2 \mu g/mL$) and α -glucosidase ($IC_{50} = 111.8 ng/mL$), respectively. All three botanical extracts improved insulin sensitivity and glucose uptake in human adipocytes, which lead to the design of an optimized botanical test formula. In a rat model of insulin resistance and T2DM, the optimized botanical test formula improved fasting serum glucose levels, fasting insulin resistance and the development of impaired glucose tolerance. The reduction in epididymal adipose tissue GLUT4 and PDK1 expression induced by high fat diet and alloxan was blunted by the botanical test formula.

Conclusion & Significance: A novel botanical formula containing standardized extracts of mulberry leaf, fenugreek seed and American ginseng prevented the development of insulin resistance, impaired glucose tolerance and T2DM. Given the rising need for effective non-drug targeting of insulin resistance and progression to T2DM, complementary and alternative nutritional strategies without intolerable side effects could have meaningful impact on metabolic health and diabetes risks.

Biography

Juntao Kan got his PhD from Fudan University with a major of cardiovascular and molecular pharmacology. After graduation, he worked in pharmaceutical companies for 2 years, and be responsible for high throughput screening assays and animal models on diabetes and metabolic disease. Then he joined Nutrillite as a senior scientist and did research and development for functional food.

juntot.kan@amway.com

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