Phenolics in Palm Fruit Juice for Alleviating Diabetic Symptoms

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Technology description

Palm fruit juice (PFJ) is the water-soluble by-product remaining after oil extraction during the milling process in the manufacturing of palm oils - currently the world's number one edible oil by volume. It is a natural source high in "oil palm phenolics" (OPP). The invention is the use of OPP in PFJ as prophylactic and therapeutic interventions in the diets of human and animals to control elevated blood glucose and lipid levels. Regular consumption over a period of weeks lowers LDL/VLDL levels in blood, reduces glucose absorption from the intestine, improves insulin sensitivity and enhances insulin secretionin vivo. The ingredient has flexible oral delivery in solid, powder, gel and liquid formulations. Numerous recent studies have suggested the regular consumption of plant-derived bioactive phytochemicals may be able to delay or prevent serious metabolic and cardiovascular diseases through their anti-inflammatory and antioxidant effects. Palm fruit juice (PFJ), the water-soluble by-product after oil extraction from the fruit during the milling process, is surprisingly a natural source rich in phytochemicals, in particular bioactive phenolic compounds (“oil palm phenolics” or OPP).

Our invention is the novel use of OPP from PFJ as prophylactic and therapeutic dietary supplements in humans and animals. We have discovered OPP possess anti-hyperglycemic and anti-hyperlipemic properties when provided in the regular diets of animals genetically-prone to developing type II diabetes. [1] Following 12-weeks of consumption, diets supplemented with PFJ lowered fasting blood glucose levels ~5.4 fold in older diabetic animals (i.e. 650 mg/dL vs. 120 mg/dL) and resulted in overall levels near those of their non-diabetic controls fed either water or PFJ (i.e. <100 mg/dL). Similarly, these diabetic animals had severely elevated triglycerides, high VLDL levels and low HDL levels while those in the diabetic group given PFJ had plasma lipid profiles essentially normal and nearly identical to their non-diabetic controls. At necropsy, additional differences in organs, such as increased kidney size, increased liver size and the wasting of fat deposits associated with advanced diabetes, were observed in the diabetic animals given water. However, these changes were not observed in the diabetic group fed PFJ which had organs and fat deposits similar to those in the non-diabetic control group. Regular long term consumption of PFJ over a 9-month period also prevented the onset of diabetes in healthy young animals with normal blood glucose levels. Regular PFJ consumption does not have any detrimental effects in normal animals. This is not surprising as extracts from boiled palm fruit in theElaeisgenus have long been regularly consumed by African populations, resulting in an OPP intake on the order of ~300 mg/d, predominantly added as an ingredient for soups and stews. [2]

References:
1. Bolsinger, Julia et al. Anti-diabetic effects of PFJ in the Nile rat (Arvicanthis Niloticus). J Nutri Sci; 2014; 3:e5. doi:10.17/jns.2014.3.
2. Nti CA. Household dietary practices and family nutritional status in rural Ghana. Nutr Res Prac;2008; 2, 35–40

Summary

PFJ is a cost-effective source of dietary phenolics including cinnamate and benzoate derivatives
Proven effective in reducing blood glucose and lipid levels when tested in the Nile rat model
Reduces glucose absorption, improves insulin sensitivity and enhances insulin secretion in vivo
Shows no ill effects in animals and tested in a Phase I clinical trial by Malaysian Palm Oil Board
Darker brown in color with a sweet yet slightly bitter taste easily masked by sweetening agents
Easily incorporated as a functional ingredient to health and wellness nutraceutical, food and drink products for promoting anti-hyperglycemic metabolism in humans, pets and farm animals
Bolsinger, Julia et al. Anti-diabetic effects of PFJ in the Nile rat (Arvicanthis Niloticus). J Nutri Sci; 2014; 3:e5. doi:10.17/jns.2014.3.

Application area

Brandeis Innovation is seeking licensing partners to commercialize this technology. The indications for proposed marketing label claims include methods for treating diabetes mellitus (type 1, type 1.5 and type 2), gestational diabetes, genetic defects of β-cell function or insulin action, pre-diabetes and metabolic syndrome.

Advantages

Green technology generated as a by-product of palm oil production - the world's No. 1 edible oil
Abundant, low cost sourcing by concentrating OPP from water waste created during oil milling
Versatile nutraceutical / pharmaceutical delivery options in pill, powder, gel or liquid formulations

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