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STEVIA - CAN IT BE THE SOLUTION FOR THE AMERICA'S OBESITY AND DIABETIC CRISIS?

Introduction

Stevia Rebaudiana is the traditional name for the plant of a non-caloric sweetener which has recently been gaining popularity as part of a holistic approach in combatting diseases such as and relating to metabolic syndrome and obesity[1]. The plant originated in northeast Paraguay, Brazil, and Argentina[2]. Several species of the plant exist; however, the most commonly used species is *S. rebaudiana*[2]. This species is popular because of its highly concentrated, sweet taste. For centuries the people of Paraguay have used the sweetener in teas and food for medicinal purposes. Natives believed these leaves helped lower blood pressure and reduce obesity[2]. Up until 1995, stevia was banned by FDA because there was not enough information demonstrating its safety and toxicology[1]. The ban was lifted that year and stevia was approved as a dietary supplement and for use in skin care products after investigation[1]. Several components of the stevia leaves are thought to have positive health benefits. The plant includes terpenes, tannins, sterols, volatile acids, vitamins, carotenes, flavonoids, enzymes, organic acids, polysaccharides, hormones, and microelements which are beneficial to patients' health[3]. The only FDA approved extract is rebaudioside A[1]. In 2008, this extract was approved as a food additive sweetener[1]. Since then, the product is now available in stores under the brand names PureVia®, TruVia®, and Sweet Leaf®[2]. The stevia extract as also been added to products such as Vitamin Water Zero, Steaz, Crystal Light Pure, Blue Sky Free Soda, and Odwalla[2]. With increasing research and popularity, the extract continues to become increasingly prevalent in everyday products.

Hypoglycemic Effect

Stevia extracts, stevioside and chlorogenic acid, may be beneficial in diabetic patients due to its effects on blood glucose metabolism by enhancing receptors impacting glucose and lipid metabolism in the pancreas, liver, and muscles. One mechanism of producing antihyperglycemic effects is by upregulating GLUT4 and AMPK in the skeletal muscles, therefore allowing more glucose uptake into the muscle [4]. Pancreatic alpha-cells may also be suppressed so that glucagon is not released, and energy can be better used by the muscles [3]. Stevia increases endogenous antioxidants in muscles such as SOD, CAT and GPx enzymes that may be depleted in diabetic patients [4] and increase in PPARγ by stevia will enhance insulin sensitivity while increased levels of insulin mRNA increases the amount of insulin released from pancreatic beta-cells [5]. According to the Natural Medicine data base, stevia is likely to be safe, but does not have enough evidence to rate its efficacy in diabetes. The database does reference one study in which a single dose of stevia leaf extract 1000 mg containing 91% stevioside is compared with starch and reduced patients' postprandial glucose by 18% [1]. Through above mentioned multiple mechanisms, stevia may help in controlling blood glucose of diabetic patients.

Obesity

Natural sweeteners are in high demand due to the nation's obesity epidemic. Sweetener such as white sugar, turbinado, fructose, honey

and corn syrup may all be considered natural, but they are all high in caloric value as well[6]. Stevia contains the extracts stevioside and the rebaudiosides which are 200-300 times sweeter than sugar without any added calories[6]. Rebaudioside A are of better quality and more stable than other popular, calorie-free sweetener such as aspartame and neotame[7]. Stevioside glycosides are metabolized in the colon where gut bacteria removes glucose units and transform the molecule into steviol[9]. Once in a more basic form the compound is metabolized by the liver and renally excreted[9]. Stevia does not accumulate in the body and the energy produced by the glucose units is very small[9]. Through this process, stevia's metabolism produces little energy so that it may be considered zero calories.

One concern of non-caloric sweeteners is the potential of consumers to compensate for the lack of calories by consuming more food during their meals. A study of 19 healthy and 12 obese patients were tested regarding their satiety after meals in comparison to how many calories they were consuming. Patients' satiety was recorded after eating food sweetened with aspartame, sugar, or stevia[8]. The study concluded that patients eating foods with less calories sweetened by aspartame or stevia reported similar levels of satiety when compared to eating foods sweetened by sugar[8]. Since the participants were able to maintain adequate portion control with less caloric intake in the stevia-experiment group, the participants were put at greater chance of weight loss[8]. At the end of the 10-week period, those in the sucrose control group experienced a 1.6 kg weight gain, while those in the artificially sweetened food group resulted in a 1 kg weight loss[8].

Other Benefits

Stevia is thought to have other health benefits aside from its glucose lowering abilities. According to the Natural Medicine data base, stevia is beneficial in reducing hypertension, heartburn, and uric acid levels, and as a cardiotonic and diuretic. These uses have far less research but are still important in stevia's overall holistic effect. One article supports the effects of stevia on blood pressure through six randomized clinical trials. The studies show that stevia had no effect on participants with normal blood pressure. Participants with high blood pressure did see some moderate blood pressure lowering effects. The studies were mainly used to successfully exam the safety of the compound; therefore further investigation is warranted to support stevia as a true blood pressure lowering agent.

There is a strong correlation between sugar and dental health. Sugar increases the production of plaque on teeth and increases the growth of streptococcus mutans that accumulate in plaque. Stevia is not only an up and coming substitute for sugar itself but may also have some antimicrobial properties as well. The studies concluded potential benefits for dental care when compared to sucrose sweeteners. More long-term studies are needed to be conducted in order to support this claim.

Non-Carcinogenic

The connection between cancer and the increasing number of artificial sweeteners being used in today's food industry deters many people away from stevia. Stevia is different from other sweeteners because it is natural and non-toxic[11]. Several toxicity studies with Stevia have demonstrated lack of toxicity[11]. Researchers even go as far to claim that stevia has "no abnormalities in weight change, food intake, cell or membrane characteristics, enzyme and substrate utilization, or chromosome characteristics." [11] Joint FAO/WHO Expert Committee on Food Additives established that stevia has no carcinogenic effects on humans or animals

when used within their recommended dosages[12]. The best example of stevia's safety is demonstrated through the use of the plant as a medicine and food additive for the indigenous people of South America. The natives use the plant for several health treatments as well as for a preventative measure for cancer. Stevia has not only proven itself as a safe, non-toxic herb, but also as a preventative measure for disease[11].

Conclusion

The health benefits of the perineal stevia rebaudiana bush may significantly help patients with symptoms leading to metabolic syndrome such as blood glucose, obesity, and blood pressure. Although the effects of steviol glycosides need further investigation to prove their efficacy, the risk of adverse effects and toxicity is minimal, making the benefits more immense. As a non-carcinogenic, zero-calorie sweetener, Stevia's health benefits will gain more solid evidence that can be used for various patient populations.

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