STEVIA AN UNTOUCHED NATURE'S GIFT CAN BE A BOON TO DIABETIC

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REVIEW ARTICLE

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ABSTRACT

Plants and fungi are a vital part of healthcare. Over 80% of the global population rely on traditional medicine, much of which is based on plant remedies. Traditional Chinese medicine alone uses over 5,000 plant species.

There is a healing quality in nature, which has been known for centuries, be it taking time to smell the roses, meditating on a mountain, lying in a wildflower field, strolling by a meandering stream, or hiking in ancient redwood groves. Hippocrates, the father of modern medicine, recognized this powerful attribute in his humbling statement: *Nature cures—not the physician.* Hippocrates

Keywords: *Stevia rebaudiana* , Steviol, Natural Herb, FSSAI.

INTRODUCTION

One of the nature's creation Stevia a herb which has a long history from past to present. It is one such untouched nature's gift which has the potential to change many sugar related theories.

Figure 1: Image of *Stevia rebaudiana*

Steviol the basic building block of stevia's sweet glycosides.

About Stevia: Stevia is a genus of about 240 species of herbs and shrubs in the sunflower family (Asteraceae), (1) native to subtropical and tropical South America and Central America. The species Stevia rebaudiana, commonly known as sweet leaf, sugarleaf, or simply Stevia, is widely grown for its sweet leaves. Several stevia species called "candyleaf" are native to New Mexico, Arizona and Texas. As a sweetener and sugar substitute, stevia's taste has a slower onset and longer duration than that of sugar. (2)

Literature

Stevia rebaudiana (Bertoni), grows in Paraguay and Brazil, where people have used leaves from the stevia bush to sweeten food for hundreds of years. In traditional medicine in these regions, stevia also served as a treatment for burns, colic, stomach problems and sometimes as a contraceptive.

The whole leaf from stevia is about 30 times sweeter than sugar. Several sweet compounds of stevia have been isolated and named including stevioside, steviobioside, dulcoside A and rebaudiosides A, B, C, D and E. These isolated substances vary in sweetness ranging from 50 to 450 times sweeter than sugar. Pure stevia powder is so sweet that you must first dissolve it in water and then dispense the solution by drops. The sweetness of 1 teaspoon of the liquid is equivalent to a cup of sugar.

The effect of steviol glycosides, isolated from Stevia rebaudiana, in Type 1 and Type 2 diabetics was evaluated in a study published in 2008 in the "Regulatory Toxicology and Pharmacology" journal. The results showed that post-treatment blood glucose levels were not significantly different from baseline measurements in the groups that were given

stevia. Additionally, stevia was well tolerated by the subjects and had no side effects.

As per literature Stevia has a lot of medicinal properties.

Stevia a Low Calories Sweetner:

Stevia has no calories. (3) In contrast, a gram of sugar contains about 4 calories, and there are about 4 grams of sugar in a teaspoon. If you put 3 teaspoons of sugar in your coffee, that's 48 calories for just 1 cup of coffee. Using stevia in place of sugar can help you maintain and achieve a healthy weight. That's important because more than 80 percent of people with Type 2 diabetes are overweight. Stevia has been evaluated for sweetness in animal response testing. (4)

Stevia as an Anti-inflammatory:

Many Studies confirm the anti-inflammatory and immunomodulatory activities of stevioside and steviol. Its metabolite, stevioside weakens the synthesis of inflammatory mediators in LPS-stimulated THP-1 cells by interfering with the IKK beta and NF-kappa B signaling pathway, and stevioside-induced TNF-α secretion is partially mediated through TLR4. (5)

Stevioside also acts as an immunomodulating agent, which acts by stimulating both humoral as well as cellular immunity and phagocytic effect. (6)

Antihypertensive effect of stevioside:

Stevioside was found to possess antihypertensive effect due to its vasodilatory actions as reported in a literature.(7) Stevia has been shown to reduce blood pressure in studies in animals. Stevia produces decrease in blood pressure and increase in diuretic effects in rats. (8, 9)

Antioxidant activity

Stevia contains many active constituents like stevioside, steviolbioside, isosteviol and steviol which causes inhibition of oxidative phosphorylation to show antioxidant properties. They also act as uncouplers of oxidative phosphorylation as being reported. (10)

Effect on blood glucose

Stevioside has also shown a very positive effect by acting as an anti-hyperglycaemic and a blood pressure lowering substance. (11) Stevia contains rebaudioside A which has been reported to possess insulinotropic property and may serve a potential role in treatment of type 2 diabetes mellitus. (12)

Stevioside helps to lower postprandial blood glucose levels in type 2 diabetic patients, indicating beneficial effects on the glucose metabolism. (13) The stevioside in combination with other dietary supplements like fenugreek seed, soy protein, Neem leaves etc. possesses beneficial qualities in the treatment of type 2 diabetes.

It has been reported to possess blood glucose and reduced free fatty acids lowering properties so can be used in treatment of hyperglycaemia, hyper-tension and dyslipidemia. (14)

Approvals by governing organizations:

After a long tenure of four years the scientific panel recommended its usage as a natural sweetner got a green signal from various approving authorities. A notification on 13th November the Food Safety & Standards Authority of India has permitted its use in a range of products. (15) This includes carbonated water, dairy-based desserts and flavoured drinks, yoghurts, ready-to-eat cereals, fruit nectars and jams, among others.

This approvals will be leading to a great success for key users of sugar, i.e. who are dealing with bakery, beverage and confectionary makers, to consider stevia as a sugar alternative in their products. The natural sweetener is found in a plant called *Stevia Rebaudiana*. The chemical compound responsible for the sweetness is called steviol glycoside. (16)

FSSAI has recommended quantities for the use of this potent sweetener as mentioned in gazette notification. As per food safety experts, Stevia extracts, are up to 300 times sweeter than sugar with less calorie values.

Table 1: Maximum level (mg/kg) (steviol equivalent)

S No.	Type of Food Stuff	Quantity Specified
1.	Carbonated water, soft drink concentrates, yoghurts, fruit nectars, dairy-based flavoured drinks and non-carbonated water-based beverages	200 mg a kg of steviol glycoside
2.	Ice lollies or edible ice	270 mg a kg of steviol glycoside
3.	Dairy-based desserts and ready-to-eat cereals	330 and 350 mg a kg
4.	Jams, jellies and marmalades	360 mg a kg
5.	Chewing gum	3,500 mg a kg of steviol glycoside
6.	Table-top sweeteners	7 mg per 100 mg of the ingredient

Stevia and Diabetes:-The data as per WHO specifies 300 million sufferers from this disease, and every 10 seconds a person is effected from it can lead to a great damage in long run.

This is a disease which acts as a termite causing damage to various parts like gangrene, blindness, Deafness and complication like ESRD in advance stages.

There is no such thing as a one-size-fits-all "diabetic diet." In fact, it is essentially the same balanced and healthy eating plan that everyone, whether or not they have diabetes, should follow. But if you do have diabetes, then managing the amount, quality and timing of the foods you eat and beverages you drink – particularly those containing carbohydrates – becomes even more important.

Fortunately though, having diabetes does not mean having to give up all of your favorite foods.

Here is the segment where stevia fits in. It is a zero calorie, plant-based sweetener of natural origin that has been used for hundreds of years dating back to indigenous people in South America. Stevia itself contains no carbohydrates, so it does not affect blood sugar or insulin levels. And in many foods and beverages you buy, it helps cut calories while still allowing you to enjoy the sweet tastes you love. Since stevia is sometimes used in combination with other types of sweeteners. (17)

So the effect of diabetes can be controlled by the incredible Stevia plant. Research conducted by Dutch and Japanese scientists in 2003 have revealed that continuous intake of Stevia, induces the beta cells of pancreas to produce more insulin. This in turn reduces the dependence on oral as well as Injectable insulin and controls diabetes.

CONCLUSION

As FSSAI has recently given permission for the use of steviol glycoside in various products like with their quantities as mentioned in table (Table-1) can help to control the risk of diabetes.

Steviol glycoside is non toxic, zero calories sweeteners, so it is use in dairy desserts a diabetic patients and an obese person can also eat.

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CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest.

REFERENCES

1. History of Stevia Low Sugar and Zero Calorie - So Sweet [Internet]. So Sweet [cited 2016 Feb 15]. Available from: http://www.sosweet.in/History-14-3.html
2. Stevia plant (herb) nutrition facts and health benefits. [Internet]. nutrition-and-you; 2015 [cited 2016 Feb 2]. Available from: http://www.nutrition-and-you.com/stevia-plant.html
3. Cardello HM, Da Silva MA and Damasio MH. Measurement of the relative sweetness of stevia extract, aspartame and cyclamate/saccharin blend as compared to sucrose at different concentrations, Plant Foods Hum Nutr. 1994; 54: 119-30.

4. Srimaroeng C, Chatsudthipong V, Aslamkhan AG and Pritchard JB. Transport of the natural sweetener stevioside and its aglycone steviol by human organic anion transporter (hoat1; SLC22A6) and hoat3 (SLC22A8). J Pharmacol Exp Ther. 2005; 313: 621-8.
5. Boonkaewwan C, Toskulkao C and Vongsakul MJ. Anti- Inflammatory and Immunomodulatory Activities of Stevioside and Its Metabolite Steviol on THP-1 Cells. J Agric Food Chem. 2006; 54: 785-9.
6. Sehar I, Kaul A, Bani S, Pal HC and Saxena AK. Immune up regulatory response of a non-caloric natural sweetener. Stevioside. Chemico-Biological Interactions. 2008; 173: 115-21.
7. Chan P, Xu DY, Liu JC, Chen YJ, Tomlinson B, Huang WP and Cheng JT. The effect of stevioside on blood pressure and plasma catecholamines in spontaneously hypertensive rats. Life Sci. 1998; 63: 1679-84.
8. Melis MS. Chronic administration of aqueous extract of *Stevia rebaudiana* in rats: renal effects. J Ethnopharmacol. 1995; 47: 129-34.
9. Melis MS. A crude extract of *Stevia rebaudiana* increases the renal plasma flow of normal and hypertensive rats. Braz J Med Biol Res. 1996; 29:669-75.
10. Bracht AK, Alvarez M and Bracht A. Effects of *Stevia rebaudiana* natural products on rat liver mitochondria. Biochem Pharmacol. 1985; 34:873-82.
11. Abudula R, Jeppesen PB, Rolfsen SED, Xiao J and Hermansen K. Rebaudioside A potently stimulates insulin secretion from isolated mouse islets: Studies on the dose, glucose and calcium – dependency. Metabolism. 2004; 53:1378-81.
12. Lailerd N, Saengsirisuwan V, Sloniger JA, kulkao C and Henriksen EJ. Effects of stevioside on glucose transport activity in insulin-sensitive and insulin-resistant rat skeletal muscle. Metabolism. 2004; 53:101-7.
13. Gregersen S, Jeppesen PB, Holst JJ and Hermansen K. Antihyperglycemic effects of stevioside in type 2 diabetic subjects. Metabolism. 2004; 53:73-6.
14. Dyrskog SEU, Jeppesen PB, Colombo M, Abudula R and Hermansen K. Preventive effects of a soy-based diet supplemented with stevioside on the development of the metabolic syndrome and type 2 diabetes in Zucker diabetic fatty rats. Metabolism. 2005; 54:1181-8.
15. Food Safety and Standards (Food Products Standards and Food Additives) Amendment Regulation, 2015 relating to standards of Steviol Glycoside in various food products. [Internet]. India: FSSAI; 2015 Nov 20 [cited 2016 Feb 3]. Available from: http://www.fssai.gov.in/gazettednotifications.aspx
16. Wikipedia. Stevia. [Internet]. Wikipedia; 2016 [cited 2016 Feb 20]. Available from: https://en.wikipedia.org/wiki/Stevia
17. Kumar D. Pharmatutor. Are you diabetic don't fear "come to desserts" [Internet]. India: Pharmatutor; 2016 [cited 2016 Feb 20]. Available from: http://www.pharmatutor.org/articles/are-you-diabetic-do-not-fear-come-for-desserts

