

***Stevia rebaudiana*: An Excellent Natural Alternative for Sugar Replacer**

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Abstract - Nowadays, health is becoming a main concern for people around the world. However, many people are turning towards nature and seeking foods or food ingredients that not only healthy, but also have a good taste. According to the World Health Statistics report in 2012, which contained a WHO's annual compilation of data from 194 countries, it was claimed that 12% of the world's population was considered obese and 30% of people in the WHO European Region had raised blood pressure, which is a high risk condition for stroke and heart disease. Indeed, one out of 10 adults worldwide has diabetes and if it is left untreated, diabetes can lead to

cardiovascular disease, blindness and kidney failure. There is a natural plant-derived sweetener that can be used to answer all of this health problem, namely *Stevia rebaudiana*. It is now widely available and rapidly replacing artificial sweeteners in food products. Besides, its level of sweetness is 250 times sweeter than sucrose and it does not cause tooth cavities. Stevia has many natural anti-oxidants that can help to lower blood pressure and cholesterol, and to control diabetes, hence it can prevent many chronic diseases like what have been mentioned before. Also, Stevia has no side effects or health risks so it is very safe and beneficial for everyone. It has become an alternative

to calorie conscious consumers who want to enjoy a sweet taste without added calories or glycemic response. Moreover, Stevia is considered to be generally recognized as safe (GRAS) by FDA.

Keywords: *stevia; health; natural sweetener; safe; beneficial*

INTRODUCTION

Stevia Rebaudiana is an herb in the Chrysanthemum family which grows wild as a small shrub in parts of Paraguay and Brazil. This wondrous herb is also known as “Honey-Leaf”, “Sweet-Leaf” and “Sweet-Herb”. Stevia is 200-250 times sweeter than regular sugar and it contains no calories, so it is suitable for diabetics and those with high blood pressure. Children can also enjoy it without health concerns and it does not cause tooth cavities. This herbal sweetener is heat stable and thus could be used for cooking and baking. Stevia extract is a great alternative for synthetic sweeteners. It can be easily blended with other sweeteners, such as honey. Stevia is already widely and safely consumed in many countries around the world for decades [1]

Leaves of stevia sweeteners, in addition to containing glycoside (stevioside, rebauside, and dulcosida), is also contain protein, fiber, carbohydrates, phosphorus, potassium, calcium, magnesium, sodium, iron, vitamin A, vitamin C, and also oil [2]

Sweet taste of stevia is caused by two components, namely stevioside (3-10% dry weight of leaves) and rebaudioside (1-3%). It can be increased 250 times the sweetness of sucrose. Stevioside has advantages over other artificial sweeteners, which is stable at high temperatures (100 °

C), the pH range of 3-9, and does not cause the dark color after the cooking. Stevioside has the molecular formula C₃₈H₆₀O₁₈ and a molecular weight of 804.90. When parsed perfect, stevioside contains 56.90% C, 7.51% H, and 35.78% O [2]

Rebaudioside is the best sweetener found in plants that give stevia taste 250 times sweeter than sugar. High purity Rebaudioside obtained by crystallization of the stevia extract using high-level purification technology. Rebaudioside have a better sense of stevioside. Some people experience a bitter aftertaste when consuming products with Stevia sweetener in them. This bitter taste is due to the presence of essential oils, tannins and flavonoids which are similar to the compounds that make tea and coffee bitter, but give them their therapeutic potentials.

The crude stevia leaves and herbal green powder is 10-15 times sweeter than sucrose while refined stevia extracts are 200 to 300 times [3]. Unlike some other high-intensity sweeteners, stevia is light, heat and acid stable, which makes it ideal for acidic juice drinks and pasteurised dairy products [4]. *Stevia rebaudiana* leaves are commercially available and used in many countries including Japan and several South American countries as sweetener for a variety of foods and beverages [5]

REGULATORY STATUS

In December 2008, the US Food and Drug Administration (FDA) stated it has no questions regarding the conclusion of expert panels that rebaudioside A, which is a stevia sweetener isolated and purified from the leaves of the stevia plant, is a GRAS (Generally Recognized as Safe) for use as a general purpose sweetener in foods and beverages, excluding meat and poultry. In June 2009, FDA stated that it has no questions regarding the conclusion of an expert panel on the GRAS status of

another steviol glycoside extract with high rebaudioside A content for use as a tabletop sweetener [6]

In 2010, the European Food Safety Authority (EFSA) assessed the safety of steviol glycosides from stevia and established an Acceptable Daily Intake (ADI) for their safe use. In November, 2011, the European Commission authorized the use of steviol glycosides as a sweetener in foods and beverages. It is also approved as a dietary supplement in the EU. In Canada, stevia is sold as a natural health product. Stevia and steviol glycosides have a long history of use in several countries, including Japan and Paraguay. Stevia sweeteners are approved for use in many other countries, including Korea, Mexico, Taiwan, China, Russia, Australia, Argentina, New Zealand, Colombia, Peru, Uruguay, Brazil and Malaysia [7]

The Joint FAO/WHO Expert Committee on Food Additives (JECFA) defines Acceptable Daily Intake (ADI) as "An estimate of the amount of a substance in food or drinking water, expressed on a body-weight basis, that can be ingested daily over a lifetime without appreciable risk (standard human = 60 kg). The ADI is listed in units of mg [milligram] per kg [kilogram] of body weight." Consuming more than the ADI does not mean an effect will occur because the ADI includes a wide margin of safety above what is deemed the "No Observed Effect Level." JECFA has assigned an ADI of four mg/kg bw for steviol glycosides, expressed as steviol.

BENEFITS OF STEVIA

For people who are suffering from diabetes, obesity, high blood pressure, heart disorders and high cholesterol, stevia is a great option. Whether it is used as a dietary supplement or a sugar substitute, this wonder herb can

be very beneficial to our body. It's also rich in nutrients such as phosphorus, calcium, proteins, vitamins, magnesium, zinc, sodium and other minerals that are needed by the human body. By replacing sugar with stevia, it can also control the sugar intake. Consuming beverages and foods with stevia sweeteners is now a part of a healthful diet and lifestyle

Scientific research indicates that stevia effectively regulates blood sugar in people with diabetes and hypoglycemia, bringing it toward more normal levels. Studies have indicated that stevia tends to lower elevated blood pressure while not affecting people with normal blood pressure, do not affect blood glucose levels or interfere with insulin.

Steviosides, the principle sugar molecule component of stevia, pass through the human alimentary canal without being altered by digestive processes, demonstrating remarkable stability. They simply cannot be broken down into their metabolites under normal gastric conditions. As a result, the sugar molecules pass unchanged through the human gastrointestinal tract and are not absorbed into the blood, producing no calories [8]. With zero calories, stevia sweeteners offer people with diabetes greater variety and flexibility in budgeting total calorie intake and assisting with weight management.

APPLICATION OF STEVIA

Stevia can also widely used in bakery process. Bakery products which sweetened with stevia do not brown as much. Stevia can also be added to other sweeteners like honey to lower their caloric content. People who cook with stevia often add it to honey or molasses to potentiate sweetening power in smaller quantities. Stevia also works particularly well on dairy products, fruit dishes, beverages and fresh desserts.

Unlike most artificial sweeteners, Stevia does not break down and can withstand at high temperatures while cooking and cold temperatures when frozen. It is also compatible with salt and organic acids and natural sweeteners such as barley malt, honey, fructose and sorbitol. Stevia can be used safely and effectively as a substitute for sugar in all recipes where sugar and low calorie sweeteners would be normally used. Stevia sweeteners can be used in beverages and foods such as desserts, sauces, yogurt, pickled foods, breads and confections. Stevia can also inhibits the growth and reproduction of oral bacteria and other infectious organisms. So, besides its application for food products, it also has been used as a mouthwash or for brushing teeth (added to toothpaste) have reported an improvement to bleeding gum problems. This inhibition of oral bacteria may explain why users of stevia-enhanced products report a lower incidence of colds and flu. Subsequently, an increasing number of toothpaste manufacturers are now using stevia in their products [9]. Apart from this, a facial mask made of stevia leaves helps in smoothing and rejuvenating the skin. It has also been used for treating other skin disorders, such as eczema and dermatitis.

FEASIBLE STUDY ON STEVIA APPLICATION IN INDUSTRY

Artificial sweeteners, such as saccharin, aspartame, cyclamate and neotame has been widely used in food industry for processed food products such as baked goods, beverages, canned foods, fruit products dairy products and powder drinks. They are so ubiquitous in our food products and the safety of this artificial sweeteners has been controversial since their invention. Animal studies have linked artificial sweeteners to not only weight gain but also a wide variety of serious health hazards, and some studies have noted similar health hazards in humans. Another important consideration is the fact

that today's products often contain a combination of many of these artificial sweeteners, the potential interactions, and health risks of which are largely unknown and difficult to assess [9]

Stevia can be implemented in food products and replace those artificial sweeteners with better health factors. Since its sweet intensity is 250 times sweeter than sucrose, it is definitely decreasing the production cost comparing to sugar as the sweeteners. However, if it is compared to those artificial sweeteners whose sweet intensity is almost similar to stevia, the production cost will be almost the same or even higher. In the other hands, with the shift of food consuming lifestyle from taste to health, using stevia in food products will give many benefits for both industry and consumers. It can boost consumer health perspective towards the food brand. Moreover, it can also change the image of the food brand itself which is up-to-date dan health concerning product.

CONCLUSION

Stevia is an excellent natural alternative for sugar replacer since it has many benefits regarding its composition. Also, it has health benefits compared to those many artificial sweeteners that now has been widely used. Furthermore, it has been stated as GRAS (Generally Recognized as Safe) for use as a general purpose sweetener by FDA and can be applied in various foods and beverages products. With the shift of food consuming lifestyle from taste to health, using stevia in food products will give many benefits for both industry and consumers to develop the food brand.

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