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# UTILIZATION OF *STEVIA REBAUDIANA* & ITS HEALTH BENEFITS

**Vincent Kevin Tejo, Biondy Adiyoga, and Victoria Kristina Ananingsih**

Department of Food Technology, Soegijapranata Catholic University, Semarang, Indonesia
centz_tejo@live.com

## ABSTRACT

Nowadays, health become a main concern for people around the world. Many people have turned their backs around into healthy and natural food when many health issues increased every year. As a result, many people not only looking for food with good taste but also looking for food which have many functional component. There is one natural plant-derived sweetener which have many functional component known as stevia. Stevia is natural sweetener from Paraguay and Brazil and rapidly replace artificial sweeteners among food products around the world recently. Stevia have many benefits, its level of sweetness is 250 times sweeter than sucrose, zero calories, and very beneficial for many health problems like diabetics, obesity, hyperactivity, hypertension, carbohydrate cravings, hypoglycaemia, hypertension, indigestion, tooth decay, and will not affect blood glucose or insulin respons. It becomes an alternative to calorie conscious consumers who want to enjoy a sweet taste without added calories or glycemic response, adding extra pounds, and excellent treat for children to avoid tooth decay and possible hyperactivity. Then, stevia not only used as food ingredient but also used as non-food ingredient such as toothpaste and mouthwash. Related to stevia functional component, stevia leaves contain many functional component such as protein, fiber, carbohydrates, oil, phosphorus, vitamin A, vitamin C, zinc, magnesium, sodium and iron. About its safety, stevia has become GRAS or generally recognized as safe by JECFA since 2009. So, stevia has all the benefits as natural sweeteners and none of the drawbacks.

**Keywords:** *health, natural, stevia, GRAS, benefit*

## 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 was widely and safely consumed by many countries around the world for decades [1].

Leaves of stevia contain glycoside and other compounds such as protein, fiber, carbohydrates, phosphorus, potassium, calcium, magnesium, sodium, iron, vitamin A, vitamin C, and also oil [2].

Stevia have many advantages than 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 [2].

However, some people experience a bitter aftertaste when consuming products with addition of stevia sweetener. 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 phytochemicals.

The crude of stevia leaves and herbal green powder is 10-15 times sweeter than sucrose while refined stevia extracts are 200 to 300 times of sweetness level [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 in many countries including Japan and several South American countries as sweetener for a variety of foods and beverages [5]

## SAFETY STANDARD FOR STEVIA

Steviol glycosides were extracted from *Stevia rebaudiana* leaves to act as natural sweetener for food, beverages, and confectionery in many countries. According to European Food Safety Authority (EFSA), many countries such as Europe, Australia, and New Zealand have evaluated and approved steviol glycosides as GRAS or Generally Recognized as Safe with Codex Alimentarius number E-960 as food additive.

The establishment of ADI (Acceptable Daily Intake) in Europe, Australia, and New Zealand for steviol glycosides is 4 mg / kg body weight / day (expressed as steviol equivalent). EFSA with JECFA (Joint FAO / WHO Expert Committee on Food Additives) also approved the establishment of NOAEL or No Observed Adverse Effect Level for 2,5% stevioside in food application equal to 967 mg stevioside / kg body weight / day (approximately 388 mg steviol equivalents / kg body weight / day). This level was determined based on two years carcinogenicity study in rat and 100-fold uncertainty factor. Then, EFSA panel concluded that human consumption or daily doses of the steviol glycosides can exceed from 1000 mg/person/day equivalent to 16.6 mg/kg bw/day for a 60 kg person with normal glucose metabolism or type-2 diabetes mellitus.

In order to evaluate steviol glycosides as food additive, chemical specification of steviol glycosides is necessary. The establishment of chemical specification in steviol glycosides as food additive in Europe should comply with JECFA. Chemical specification of steviol glycosides consist of pH, purity, loss on drying, total ash, solubility, residual solvents, arsenic, and lead [11]. Chemical specification of steviol glycosides presents at Table 1.

***Table 1. Chemical specification of steviol glycosides***

| No. | Parameter | Limit |
|---|---|---|
| 1. | pH | 4,5 – 7,0 |
| 2. | Purity | Not less than 95% of the total of seven named steviol glycosides in dry basis |
| 3. | Loss on drying | Not more than 6 % (105°C in 2 hours) |
| 4. | Total ash | Not more than 1% |
| 5. | Solubility | Soluble in water |
| 6. | Residual solvents | Not more than 200 mg / kg methanol and 5000 mg / kg ethanol |
| 7. | Arsenic and lead | Not more than 1 mg / kg |

Steviol glycosides have used in many food application after EFSA with JECFA evaluated and approved ADI and NOAEL for steviol glycosides. Maximum levels of steviol glycosides in food has been made on ADI 4 mg / kg body weight / day (expressed as steviol equivalent) [13]. Some food products with steviol glycosides as natural sweetener present at Table 2.

***Table 2. Food uses and levels of steviol glycosides***

| № | Food | Steviol glycosides | Steviol equivalents |
|---|---|---|---|
| 1. | Water-based flavoured drinks without added sugar | 600 mg/L | 198 mg/L |
| 2. | Breakfast cereals with fibre content more than 15 % and without added sugar | 1000 mg/kg | 330 mg/kg |
| 3. | Soybean sauce, fermented or non-fermented | 500 mg/kg | 175 mg/kg |

Determination of steviol equivalent based on Food Standards Australia New Zealand (FSANZ) for steviol glycosides established in 2009. Steviol equivalent was obtained by multiplying the conversion factor of each steviol glycosides with the concentration of total steviol glycosides in food [12]. Then, EFSA state that steviol equivalent was obtained by dividing the value of maximum use levels of steviol glycosides with the conversion factor 0,33 of rebaudioside A as dominant component of steviol glycosides besides stevioside [11].

Adsorption, metabolism, and fate of steviol glycosides in human body was analyzed and reviewed by many researchers to study about its biological and toxicological characters. Fate of

steviol glycosides in human metabolism has been analyzed by using a single dose of 375 mg of stevioside in human male during 60 until 180 minutes [10]. After this incubation time, stevioside concentration in human blood was 0,11 g / ml, there were no free steviol, epoxide or 15-oxosteviol in blood plasma and most of free steviol primarily found in faeces. Another research about fate of steviol glycosides in human body was reviewed by EFSA. EFSA state that only few steviol glycosides found in feces and most of aglycone steviol in steviol glycosides were metabolized by human intestinal flora. Then, sixty percent of metabolized steviol glycosides were excreted out as steviol glucuronide in amounts of up to 318 mg or 205 mg steviol equivalents every 24 hour of human urine [11].

## HEALTH BENEFITS OF STEVIA

For people who are suffering from diabetes, obesity, high blood pressure, heart disorders and high cholesterol, stevia can be a good alternative as sweetener. 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 necessary for human body. By replacing sugar with stevia, it can also control the sugar intake. Consuming beverages and foods with stevia sweetener can become a part of a healthful diet and lifestyle.

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

Sugar molecules namely steviol glycosides, pass through the human alimentary canal without being altered by digestive processes. Then, they were demonstrating a remarkable stability. They 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]. Due to the zero calories of stevia sweetener, it can be useful for people with diabetes to get a greater variety and flexibility in budgeting total calorie intake and assisting with weight management.

## APPLICATION OF STEVIA

Stevia widely used in bakery process. Bakery products with stevia sweetener do not brown too much. Stevia also can be added to other sweeteners like honey to lower their caloric content. People incorporate it into honey or molasses to increase the sweetening power in smaller quantities. Stevia also works well particularly on dairy products, fruit dishes, beverages and fresh desserts.

Unlike most artificial sweeteners, stevia does not break down under food processing. Stevia has properties to withstand against high temperatures while it cooks and at low temperatures when it is 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 sweetener 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. Besides its aplication for food products, it also has been used as a 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 [14].

## 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, it can 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 many countries like Europe (EFSA), JECFA, and FSANZ (Australia and New Zealand) 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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