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HEALTH EFFECT OF ASPARTAME: A LOW CALORIES SWEETENER

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ABSTRACT

Use of low calorie sweeteners (LCS) in place of high calorie sugars (sucrose or carbohydrates) may be helpful to control various chronic diseases particularly diabetes and obesity. Diabetes occurs when high blood sugar levels develop and obesity occurs when accumulation of large amount of fat in the various body parts in the form of adipose tissue. A top priority is to keep blood sugar levels as normal as possible and low calorie diet to control both diabetes and obesity. Diabetes and obesity is the main cause of various chronic diseases mainly cardiovascular. As part of eating plan, limit the amount of carbohydrates in each day diet and LCSs (like aspartame) are one easy tool to help for follow eating plan.

Keywords: Aspartame; diabetes; obesity, sugar; low-calorie sweeteners.

INTRODUCTION

The energy and/or carbohydrate content of nutritive sweeteners needs to be included in the meal plan, whereas non-nutritive sweeteners do not affect blood glucose levels and provide little or no energy that are useful in control of various chronic diseases such as diabetes and obesity. Diabetes and obesity diseases may promote other diseases like cardiovascular, kidney and neurological disorders etc. For example, aspartame is a nutritive sweetener. It provides 16 kJ / g but has

a minimal energy contribution to the diet because it is extremely sweet, more than sucrose, so only a very small amount is required to sweeten a food product^[1-3].

The Food and Drug Administration (FDA) has approved five low-calorie sweeteners (LCS) for use in foods and beverages: Aspartame, acesulfame potassium (acesulfame K), neotame, saccharin and sucralose. LCSs undergo extensive and rigorous safety testing. The scientific data showed that LCSs are safe for

human and are not linked to adverse health reactions. LCSs add sweetness without calories to foods and beverages that's similar to sugar (sucrose). LCSs eliminate or significantly reduce the calories in foods and beverages and diet. The FDA also has approved other LCSs, polyols (sugar alcohols) and tagatose, which reduce calories in food, fewer than sugar. Moderate use of nutritive (sucrose, fructose, the sugar alcohols (xylitol, mannitol, sorbitol, isomalt, lactitol and maltitol) and aspartame) and non-nutritive sweeteners (acesulfame potassium, sucralose, cyclamate and saccharin) can be part of a well-balanced diet for people with diabetes and obesity^[4,5].

ASPARTAME

Aspartame is an artificial sweetener, which contains two amino acids—aspartic acid and phenylalanine. It is 180-200 times sweeter than sucrose; it provides essentially no calories to food. Aspartame, launched in 1981 by Monsanto, the manufacturer of NutraSweet, will find a vast catalogue of frightening personal accounts attributing multiple health disasters to exposure to aspartame^[6]. The European population of 375 million consumes about 2000 tonnes annually, almost half a million extra tonnes of sugar would therefore be needed to generate the same sweetness. In contrast, aspartame use implies that it embodies a healthy way of life and avoids obesity.

Evidence does not support links between aspartame and cancer, hair loss, depression,

dementia, behavioural disturbances, or any of the other conditions. Agencies such as the Food Standards Agency (FSA), European Food Standards Authority, and the FDA have a duty to monitor relations between foodstuffs and health to study reasonable doubt emerges. Aspartame's safety was convincing to the European Scientific Committee (ESC) on Food in 1988^[7], but proving negatives is difficult. The FSA takes public concerns very seriously and thus pressed the ESC on Food to conduct a further review, encompassing over 500 reports, in 2002. It concluded from biochemical, clinical, and behavioral research that the acceptable daily intake of 40 mg/kg/day of aspartame remained entirely safe—except for people with phenylketonuria^[8].

Dietary recommendations for the management of diabetes conclude that up to 10% (about 200 kcal (837 kJ), or 50 g daily) of total energy can safely come from sugars but that artificial sweeteners may help avoid weight gain^[9,10]. When sugar is consumed as a sweetener it is chemically identical with the sugar found in fruits, which we are promoting keenly, and its metabolic effects are no different if consumed in reasonable amounts even by people with diabetes^[10]. Most evidence points to fat as the main dietary culprit in obesity, and one counterargument to the use of artificial sweetener instead of sugar includes evidence that high sugar diets tend to be lower in fat^[11]. Displacing saturated fat would offer particular advantages by reducing risk of heart disease^[12].

Carried to extremes, large amounts of sucrose will increase triglycerides, a key component of the metabolic syndrome, and turn the tables back towards promoting heart disease. Its fructose component is responsible for this hazard^[13].

If this were entirely replaced by a non-nutritive, non-caloric sweetener such as aspartame then obesity could indeed be vanquished—assuming these calories are not replaced due to stimulation of appetite. We eat about 5 g aspartame annually, equivalent to another kg of sucrose, whose 4000 kcal (16 740 kJ) could generate 0.5 kg gain in weight. But evidence that aspartame prevents weight gain or obesity is generally inconclusive^[5,14], although in children, the consumption of sugar-sweetened soft drinks relates notably to increasing obesity, whereas increasing "diet" drinks or fruit juice is inversely related to weight gain^[15].

The body breaks down aspartame to its components, aspartic acid, phenylalanine and methanol. The body uses these components the same as when they're derived in much larger amounts from common foods such as meat, dairy products, fruits and vegetables. Studies showed that aspartame has no effect on short or long-term serum glucose, cholesterol, or triglyceride concentrations and no effect on serum insulin. Aspartame has been approved as safe for the general population; however, one exception is people who have the rare hereditary disease, phenylketonuria (PKU) that must restrict their intake of phenylalanine from

all sources, including aspartame. Thus, labels of aspartame-containing foods and beverages must include a statement advising phenylketonurics that phenylalanine is present. The American Academy of Pediatrics Committee on Nutrition concluded that aspartame is safe for both the pregnant woman and developing baby. Aspartame is also considered a "Nutritive" sweetener by FDA^[16].

DISCUSSION

Avoidance of sugar has been a major focus of nutritional advice for people with diabetes and obesity. However, research shows that sugars are part of a healthy diet. These sugars obtained from fruits, vegetables and dairy products. Up to 10% of total daily energy requirements may consist of added sugars, such as sugar and sugar-sweetened products, without impairing glycemic control in type-1 or type-2 diabetes^[2,3]. Foods containing sugars vary in nutritional value and physiological effects. For example, sucrose and orange juice have similar effects on blood glucose but contain different amounts of vitamins and minerals^[17,18]. Refined sucrose produces a lower blood glucose response than many refined starches, some sweetened breakfast cereals produce lower plasma glucose and insulin responses than equal carbohydrate portions of unsweetened cereals, since evidence suggests that this may increase serum triglycerides and/or LDL cholesterol in susceptible individuals^[19,20]. Artificial

sweeteners are promoted to prevent dental caries, as sugars form the main substrate for mouth bacteria. However, avoiding sugar does not reduce dental caries dramatically in regions with high levels of caries ^[8]. The dominant factors are fluoride deficiency and prolonged exposure to sugar between meals. If children consume sweetened drinks between meals or suck on sweet foods, resulting in prolonged periods of exposure to sugar, then replacing the sugar with artificial sweeteners in such products has some rationale. Children exposed to heavily sweetened foods develop a "sweet palate," but those who take the plunge and take unsweetened drinks may prefer them, which seems a better solution ^[21,22]. Nutritive and non-nutritive sweeteners are regulated as food additives. Regulate the amount of food additives that are permitted for use in foods. Acceptable daily intake (ADI) for some common sweeteners is expressed in mg/kg of body weight per day, which amount of sweetener that can be safely consumed on a daily basis over a person's lifetime without any adverse effects. The ADI amounts are actually much higher than the amounts an individual would consume in a typical diet. However, individuals with diabetes and obesity should receive individualized counseling on how to include the use of foods containing sweeteners. Individuals should also monitor blood glucose and lipid levels on a regular basis and assess their response to routine sweetener use ^[23,24].

CONCLUSION

Sugar alcohols raise blood glucose only minimally and contribute a small amount of energy to the diet. Sugar alcohols are absorbed and metabolized at different rates in the small intestine and can cause flatulence and diarrhea in some individuals ^[25,26]. During pregnancy and lactation, saccharin and cyclamate are not recommended. In moderation, aspartame, acesulfame K, and sucralose are acceptable. In individuals with phenyl-ketonia, the use of aspartame is contraindicated. However, aspartame comprises just two amino acids (aspartic acid and phenylalanine). Phenylalanine is a natural amino acid, and is toxic only in patients who have phenylketonuria. Food labeling of sweetener is contentious. Six artificial sweeteners are permitted in Europe, each with an acceptable daily intake ^[27,28]. Aspartame alone to reach the acceptable daily intake of 40 mg/kg/day. When using combinations of sweeteners, even high level consumers rarely exceed 10 mg/day. Intakes over 1g/day were needed to alter brain neurotransmitters and provoke seizures in monkeys, and randomized controlled trials of high doses in humans have not shown any behavioral or other effects ^[16].

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