



Do Artificial Sweeteners Cause Side Effects?

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Introduction

Human beings are born liking the sensation of sweetness. In nature, a number of food ingredients have sweetening features, and this sweetening property mainly varies with the change in the food system, temperature, physical state and presence of other flavors. These food ingredients stimulate the sweet sensation by interacting with the sweet taste receptors (buds) in mouth and throat. The materials which can show sweetness is mainly divided into two types (i) Nutritive sweeteners and (ii) Non-nutritive sweeteners (Artificial sweeteners). Nutritive sweeteners provide a sweet taste with addition of energy and non-nutritive sweeteners provide a sweet taste without any addition of energy. The main nutritive sweeteners include glucose, crystalline fructose, dextrose, corn sweeteners, honey, lactose, maltose, invert sugars, concentrated fruit juice, refined sugars, high fructose corn syrup and various syrups etc. On the other hand main non-nutritive or artificial sweeteners are again divided into three types based on the generation as first generation artificial sweeteners which includes saccharin, cyclamate and glycyrrhizin introduced in 1950's and second generation artificial sweeteners are aspartame, acesulfame-K, thaumatin and neohesperidine dihydrochalcone. Neotame, sucralose, alitame and steviol glycosides fall under third generation artificial sweeteners [1]. Artificial sweeteners are again classified into three types: (i) synthetic (saccharin, cyclamate, aspartame, acesulfame-K, neotame, sucralose, alitame) (ii) semi-synthetic (Neohesperidine dihydrochalcone) and (iii) natural sweeteners (steviol glycosides, mogrosides and brazzein protein) [2]. Polyols are another group of reduced-calorie sweeteners, which provide bulk of sweetness but fewer calories than sugars. Polyols are used in a wide variety of food products, including chewing gums, confections, ice creams, toothpastes, mouthwashes, pharmaceuticals, and baked goods. The commonly used polyols are: erythritol, mannitol, isomalt, lactitol, maltitol, xylitol, sorbitol and hydrogenated starch hydrolysates [3].

Among all the known artificial sweeteners, very few are allowed to use in food industries. The use of artificial sweeteners varies from country to country, for example eight authorized artificial sweeteners are allowed to use in European Union (EU) (acesulfame-K, aspartame, cyclamate, neotame, neohesperidine dihydrochalcone, saccharin, steviol glycosides and sucralose). Whereas in United States Food and Drug Administration and in Japan cyclamate, neohesperidine dihydrochalcone, steviol glycosides were not included in the list [4]. In Food Standards Australia and New Zealand (FSANZ), China and Taiwan except neohesperidine dihydrochalcone remaining all artificial sweeteners are allowed to use in their food industries [5]. Sweeteners can be used individually or in combination with other artificial sweeteners. The common trend in food industry is usage of mixed forms of artificial sweeteners which is known as "Sweetener blends". The main advantage of sweetener blends is to reduce the side effects (side & bitter taste) of one sweetener in the mixture and to enhance the overall sweetness of the system. A well-known sweetener blend is saccharin-cyclamate (1:10), the bitterness of the saccharin can be masked with cyclamate and the unpleasant taste of the cyclamate can be masked by saccharin, as a result the sweetening capability of the mixture finally increases [6]. Similarly the bitterness taste of steviol glycoside is masked with the mixture of Rebaudioside A and other artificial sweeteners [7].

The safety of artificial sweeteners is controversial due to undesirable health effects which includes dermatological problems, headaches, mood variations, behavior changes, respiratory difficulties, seizures, allergies and cancer [8]. Recently, the



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sweeteners are considered as “global emerging pollutants” because the prominent concentration levels in ground water, soil, dust were noticed [9]. Hence, considering the safety of consumer it is necessary to control the content of artificial sweeteners in foods and beverages.

Side Effects of Artificial Sweeteners

Recent studies from the Naturalnews (<http://www.naturalnews.com>) finding that nearly 200,000 people per year are killed by sugar-sweetened beverages. This information was presented at the 63rd Annual Scientific Session of the American College of Cardiology in 2014, where they discussed how diet soft drinks can cause many of the same health problems as sugar-sweetened drinks. Studies spanning the past 40 years have suggested alternately that sugar-substitutes may be “potentially helpful”, “potentially harmful”, or have “unclear effects” with regard to your health. New evidence, in fact, states that people who frequently consume sugar substitutes may be at an increased risk of excessive weight gain, metabolic syndrome, type 2 diabetes, and cardiovascular disease. San Antonio Heart Study made a survey on the people who took the diet beverages over a period of seven to eight year. The interesting findings came to light that the change in the body weight in men and women were significantly greater than those who did not drink diet beverages. On the other hand, investigation was carried out on the adolescents who takes artificial sweeteners associated beverages. The results says that in males and females who consumed diet beverages for two years observed increase in body mass index and body fat percentages. In literature different reports have been reported that consumption of diet soft drinks may increase the risk of metabolic syndrome such as high blood sugar level, excess body fat around the waist, and abnormal cholesterol levels and heart disease, and other diseases

Current investigations say that those who consume diet

beverages may have 2-fold enhancement in the risk of metabolic syndrome, compared with non-consumers. In a European study, the risk for developing type 2 diabetes more than doubled for participants in the highest quartile of diet beverage consumption, compared with non-consumers. Of course, sugar-sweetened beverage consumption was also associated with an increased risk of type 2 diabetes. Data from the Nurses’ Health Study also indicated that risk for type 2 diabetes was amplified in those consuming at least one diet drink or sugar-sweetened drink per day; the same evidence was found by a European investigation into cancer and nutrition.

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