Review Article

Artificial Sweeteners and Cardiovascular Health: Need for Advocacy In Nigeria

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ABSTRACT

Background: Artificial sweeteners are synthetic, non-caloric sweeteners characterised by a strong sweetening flavour without calories. They are mainly found in soft drinks, snack foods, sugar-free candies, and dairy products. Despite the adverse effects of artificial sweeteners on human health, (including cardiovascular health and general ill feeling after eating and cancer), especially when consumed at a relatively high level, there is still wide use of such artificial sweeteners in many processed foods and beverages products in Nigeria. This paper, therefore, proposed strategic intervention at controlling the use and consumption of such sweeteners in Nigeria.

Methods: This is an opinion article derived from the general review of technical reports, policy documents and publications related to effects of artificial sweeteners, especially aspartame, to cardiovascular health and human health in general.

Results: The type and content of any sweetener as may be contained in any food or beverage offered for sale are not always declared, hence there is need to profile the various natural and artificial sweeteners in use by the Nigerian food and beverage industry. The Regulatory Agency, NAFDAC, should ensure regular monitoring of food and beverages for the type and contents of any artificial sweetener in foods and beverages. Advocacy should therefore commence on the adverse effects of high-level consumption of aspartame and any other artificial sweetener as well as natural sweeteners.

Conclusion: Governmental and non-governmental agencies should, as a matter of urgency, take positive actions on the proposed strategic interventions as this will help to minimise the consumption of artificial sweeteners to the barest minimum, thereby promoting improved cardiovascular health in Nigeria.

Keywords: Artificial Sweeteners, Non-Caloric Sweeteners, Cardiovascular Health, Aspartame

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INTRODUCTION

Sweeteners are classified as additives, which are substances added to food to maintain or improve its safety, freshness, taste, texture or appearance; these may be derived from plants or animals, or they can be synthetic (1). According to WHO, additives can be grouped into three categories, namely flavouring agents, enzyme preparations and other additives (1). Other food additives are used for preservation, colouring and sweetening purposes. The latter, sweetening agents, are mainly non-sugar sweeteners which are used as alternatives (artificial sweeteners) to sugar, and they contribute fewer or no calories when added to food (2). Common natural sources of sweeteners include carbohydrates, sugar alcohols, thaumatin and stevia, honey, dates, sugar, maple syrup, molasses, and agave nectar (3). Some of these are used to

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impart texture, colour, preservation and nutritional value (caloric and non-caloric).

Artificial sweeteners are mainly found in soft drinks, snack foods, sugar-free candies, and dairy products. They are referred to as "synthetic non-caloric sweeteners" and are generally characterized by a strong sweetening flavor but without calories. They are usually found in various products such snack foods, soft drinks, dairy products and candies (sugar free) (4).

One of the commonly used artificial sweeteners in Nigeria the Aspartame and it is being used as a sugar substitute in variety of foods. Studies in Nigeria have reported the effects of the artificial sweeteners, although in Wistar rats. For example, Eiya and Osunbor (5) reported that chronic consumption of aspartame and diet soda increased body weight in Wistar rats. Also, adverse effects on pancreas morphology suggested impending health implications, including excessive weight gain characterized by abnormal fat accumulations, which subsequently leads to obesity. In addition, Adaramoye and Akanni (6) suggested that metabolism of aspartame may induce oxidant/antioxidant imbalance due to free radicals generated by aspartame. Despite the adverse effects of artificial sweeteners on human health, especially when consumed at a relatively high level (including cardiovascular health and general ill feeling after eating and cancer cases), there is still wide use of such artificial sweeteners in many food products and beverages in Nigeria. This paper, therefore, proposed strategic intervention to control the use of such sweeteners in Nigeria.

METHODOLOGY

This article is an opinion article derived from the general review of technical reports, policy documents and publications related to effects of artificial sweeteners, especially aspartame, to cardiovascular health and human health in general.

Sweeteners and Cardiovascular Health

a. **Natural Sweeteners and Cardiovascular Health:** Grembecka (7), in his review on natural sweeteners and human health, presented an excellent picture of the adverse effects of high consumption of natural sweeteners on human health leading to increasing incidences of non-communicable diseases such as diabetes and coronary heart disease. This would partly explain the introduction of ten percent (10%) sugar tax on beverages and carbonated drinks by the Nigerian government which has been acknowledged as a means of reducing the rising incidences of non-communicable diseases in Nigeria (8, 9).

b. **Artificial Sweeteners and Cardiovascular Health:** Artificial sweeteners are synthetic sweeteners characterised by a strong sweetening flavour without calories (4). They are mainly found in soft drinks, snack foods, sugar-free candies and dairy products. Examples of artificial sweeteners include, but not limited to the following: sucralose (600 times sweeter than table sugar); saccharin (300 to 500 sweeter than table sugar); aspartame/NutraSweet or equal which is one of the most popular; contains 4 calorie per gm and is 200 times sweeter than table sugar); Xylitol which is in between the best and the worst artificial sweetener and Erythriol which is low in calories, does taste like sugar and is regarded as being safe to consume (3).

The adverse effects of artificial sweeteners on human health which have been reported include headaches, stomach aches, a general ill feeling, alteration of the good bacteria in one's microbiome and reported cases of cancer (10). One of the effects of artificial sweeteners on human health which has received attention in recent times is that of cardiovascular diseases which is on the increase in developing countries, including Nigeria (8,9). In a cohort study conducted in France, Debras et al. (11) showed that artificial sweeteners exert different effects on cardiovascular health as reflected in the following:

I. Total artificial sweetener intake was associated with increased risk of cardiovascular diseases

ii. Artificial sweeteners were more particularly associated with cerebrovascular disease risk

iii. Aspartame intake was associated with increased risk of cerebrovascular events

iv. Acesulfame potassium and sucralose were associated with increased coronary heart disease risk.

It was concluded from the study, as follows: "The findings from this large-scale perspective cohort study suggest a potential direct association between higher artificial sweetener consumption (especially aspartame, acesulfame potassium, and sucralose) and increased cardiovascular disease risk. Artificial sweeteners are present in thousands of food and beverage brands worldwide, however they remain a controversial topic and are being evaluated by the European Food Safety Authority, the World Health Organization, and other health agencies" (10, 11).

1. Aspartame: 'In the eye of the storm'

The artificial sweetener currently 'in the eye of the storm' is aspartame which is one of the most popular artificial sweeteners in recent times. However, there are controversies and concerns over an earlier pronouncement by the World Health Organization on the cancer-causing effect of aspartame (10). However, in a joint expert report published by the WHO, "limited evidence" for carcinogenicity of aspartame in humans has been reported (12). The report surmises as follows: "The findings of limited evidence of carcinogenicity in humans and animals, and of limited

mechanistic evidence on how carcinogenicity may occur, underscore the need for more research to refine our understanding on whether consumption of aspartame poses a carcinogenic hazard" (12). This would appear to be synonymous with the controversies surrounding the use of saccharin over the years, but which has been restored as a safe artificial sweetener in most countries (13, 14). However, various evidence supports the view that when consumed at stipulated low level, aspartame is considered a safe artificial sweetener (9, 10).

2. Nigerian Heart Foundation's (NHF's) Position: The Strategic Interventions

In the light of the above and various global studies (as reported in many learned journals and reports), there are incontrovertible evidence that high level of consumption of natural and artificial sweeteners including Aspartame, in processed foods and beverages, are associated with adverse effects on human health; including cardiovascular health, obesity, diabetes and cancer (10 - 12, 15-19). Although the Regulatory Agency in Nigeria, NAFDAC, which has the mandate for oversight functions of foods, beverages and drugs in Nigeria, has a list of approved "permitted non-nutritive sweeteners for foods" and has the responsibility of ensuring compliance (20), however, developments in artificial sweetener manufacture and technology are not static. New artificial sweeteners are being produced almost regularly and introduced into the market, most especially in developed countries. New artificial sweetener markets are bound to have their ways into the Nigerian market for use by international and local food and beverage industries; therefore, it is imperative to ensure the following on a continuous/at intervals:

i) There is the need to profile the various natural and artificial sweeteners in use by Nigerian food and beverage industry

ii) The type and content of any sweetener as may be contained in any food or beverage offered for sale should be so declared. For instance, the aspartame content of some Nigerian beverages has been reported to range between 306.13mg/L and 525.36mg/L, although less than the maximum approved level of 3000mg/L by NAFDAC, the concentrations were not indicated on the labels (21). This would help Phenylketonurics to avoid such products since they do not posses Hydroxylase Enzyme to convert Aspatamine to Tyrosine Also this would also help other consumers to monitor their daily intake to avoid health disorders associated with high intake of Aspartame.

iii) The Regulatory Agency, NAFDAC, should ensure regular monitoring, through analysis, of food and beverages for the type and contents of any artificial sweetener in foods and beverages offered for sale in Nigeria. This is to ensure that the level so declared matches the actual content to prevent sharp practices by manufacturers of high energy drinks and other beverages.

iv). It is imperative for increased advocacy on the associated adverse effects of high-level consumption of aspartame and any other sweetener as well as natural sweeteners. The advocacy should engage journalists/news media, policy makers, Federal and State Ministries of Health, community health workers, government agencies, researchers, community.

v). Research activities should be enhanced on natural sources of healthy sweeteners/sugars of low calorific values from Nigerian plant sources, such as tamarind (22). Furthermore, enabling environment must be provided for increased research activities by cardiologists, nutritionists, scientists and public health researchers whose findings will serve as basis for dynamic health policy formulation on the use of natural and artificial sweeteners in foods and beverages in Nigeria.

vi). It is imperative to convey a stakeholders' meeting to evaluate and ascertain the current status and usage of artificial sweeteners, including aspartame within the Nigerian context.

vii). There is a need for increased advocacy in Nigeria on the associated adverse effects of artificial sweeteners on human health, especially cardiovascular health.

CONCLUSION

Due to the health effects associated with the consumption of artificial sweeteners, governmental and non-governmental organizations, should, as a matter of urgency take positive actions on proposed strategic interventions as this will help to minimize the consumption of artificial sweeteners to the barest minimum, thereby promoting the population's healthy living; especially, cardiovascular health in Nigeria.

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