

AN INVESTIGATION OF THE HEALTH HAZARDS OF SOME OF THE CHEMICAL CONTENT OF POWDERED JUICE SOLD IN THE GAMBIA

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ABSTRACT

This short piece takes a limited look at the health hazards of the chemical contents of seven fruit juices sold in The Gambia. All of them have very negative effects on health. The following additives were considered: sweeteners, coloring agents, flavoring agents and acidifiers vis-à-vis established studies. [*African Journal of Chemical Education—AJCE 5(1), January 2015*]

INTRODUCTION

Powdered fruit juices are sold and consumed all over The Gambia. They are very economical in the sense that from a small sachet of 100 grams, one can dilute the contents with a lot of water and obtain over a liter or more of juice. This makes them to be famous and popular among the population. However, all these contain food additives that are not known by the population. The Gambia has a low literacy rate (51.1%, age 15years plus) [1] and this may be blamed, in part, for the ignorance of the population *vis-à-vis* the content of these fruit juices and their effects on health. Further to this, many of these powdered juices are widely advertised using various media within the country.

This study aims to ascertain the bad effects that all the powdered fruit juices sold in The Gambia have on health. The study explored all the synthetic powdered juices sold in The Gambia.

The country is divided into six regions: Region One is the urban area (locally referred to as *The Kombos*), while the remaining Areas are regarded as the rural areas. All goods sold are imported through the urban area and then distributed to the rest of the country by merchants. With this in mind, the researchers purchased all the powdered fruit juices sold in Region One. The following were purchased: trix, foster clarks, mr cool, luminy, tiara, pop drink and aruzat. These brand substances have the following components:

Tiara

Ingredients: Sugar, Acid (E 330), Sweeteners (E 951, E 952, E 950), Natural identical strawberry flavor, Anti-caking agents (E 341, E551), Vitamin C, Acidity regulator(E331), Stabilizers (E 415), Colours (E 171, E 102, E 110).

Trix

Ingredients: Sugars, Acidity regulator (citric acid, trisodium citrate), Maltodextrin, Sweeteners (aspartame, acesulfame-K), Anti-caking agents (tricalcium phosphate, silicon dioxide), Antioxidants (vitamin C), Stabilizers(guar gum), Orange flavor, colorants (sunset yellow, titanium dioxide, turmeric).

Mr. Cool

Ingredients: Sugar, Acidifiers (citric acid E 330, trisodium citrate E 331), Ascorbic acid (vitamin C E300), Sweeteners (aspartame E 951, acesulfame- K E950), Natural identical flavor (coconut), Anti-caking agents (tricalcium phosphate E 341), Maltodextrin, Thickening agents (xanthan gum E 415), Colouring agents (tartrazin E 102, sunset yellow E 110).

Aruzat

Ingredients: Sugar, Acidity regulators (citric acid, trisodium citrate), Maltodextrin, Natural identical fruit flavor, Anti-caking agents (tricalcium phosphate, silicon dioxide), Colorants (titanium dioxide, sunset yellow, tartrazin, carmosine), Natural cloudy carboxymethylcellulose, Thickening agent (guar gum), Vitamin C, Sweeteners (aspartame, acesulfame-K).

Foster Clark's

Ingredients: Sugar, Citric acid E 330, Natural identical and artificial berry flavor, sodium citrate E 331, Sweeteners (aspartame, asulfame-K), Colours (E 129, E 133), Calcium phosphate E 341, Vitamin C, Anti-caking agent E 551.

Pop Drink

Ingredients: Sodium cyclamate, Citric acid, Strawberry flavor, Carmoisine.

Luminy

Ingredients: Sugar, Acidity regulator, Citric acid(E 330), Maltodextrin, Sweeteners (aspartame E 951, acesulfame-K E 950), Thickeners (guar gum E 412), Vitamin C (E 300), Natural banana aroma, Colouring agents (tartrazine E 102, sunset yellow E 110), Clot prevention (tricalcium phosphate E 341).

The Gambia is almost completely encircled by Senegal except at the sea where it opens up to the Atlantic Ocean. There are many porous borders and these are used for smuggling virtually anything into and out of the country. Hence, the researchers would not rule out the existence of a powdered juice or more found somewhere in the rural areas and not covered by this study, probably because it is smuggled into the country through unofficial borders. No laboratory work has been conducted in this study; it is purely literature-based.

RESEARCH QUESTION, HYPOTHESES AND METHODOLOGY

This study aims to answer only one question: Are the powdered fruit juices sold in The Gambia injurious to health?

Alternatively, the following hypotheses were formulated:

1. The powdered fruit juices sold in The Gambia are bad for health.
2. The powdered fruit juices sold in The Gambia are responsible to a large extent for a lot of ill-health and death among the populace.

Researchers undertook a tour of all the local shops and supermarkets within the *Kombos*. Names of all the powdered fruit juices sold in these shops and supermarkets were listed and then they were purchased. Their ingredients were listed and online resources were used to ascertain the effects that they have on health. The information obtained from the internet was based on toxicological studies already carried out by other researchers on the listed chemical ingredients.

RESULTS AND DISCUSSIONS

The food additives found in the synthetic powdered juice were grouped into: acidifier, sweetener, natural identical flavor, anticaking agent, thickening agent, coloring agent and antioxidant. A 'safe' food additive is one that has been certified by Food and Drug Administration (FDA) or some other regulatory body for low toxicity, degenerative illness, health benefit *etc* [2]. Some of the food additives banned by FDA and in some European Union (EU) countries like Norway, Sweden and Switzerland were found in the powdered juice investigated in this study.

The following chemical substances were found in the powdered juices that were purchased; they have been grouped according to their functions:

Acidifiers: trisodium citrate E-331, citric acid E-330, maltodextrin

Anticaking agents: tricalcium phosphate E-341

Antioxidants: ascorbic acid (vitamin C) E-300

Coloring agents: tartrazin E-102, sunset yellow E-110, carmosin E-122

Natural identical flavors: strawberry flavor, grape flavor, orange flavor, pineapple flavor

Sweeteners: aspartame E-951, acesulfame-K E950, saccharin E-954(i)

Thickening agents: xanthan gum E-415, guar gum E-412

Not all the above-listed additives were looked at by this study.

Health Hazards

Sweeteners: With regard to this study, the researchers consulted existing literature and looked at the effects of aspartame, acesulfame and saccharin.

Aspartame raises the amount of phenylalanine in blood and brain [3]. Phenylalanine is an aminoacid used as a building block for proteins. When it is consumed in aspartame it can alter brain function significantly [4].

Acesulfame-K is not metabolized by the body [4]. Large amounts of this substance is clastogenic and genotoxic, this is according to a study carried out by Malaisse W.J. 1998 on mice. It was established that with a certain dose acesulfame interacts with DNA to produce genetic damage [6].

Saccharin is neither absorbed nor metablized by the body [4]; it is excreted unchanged *via* the kidneys. As a result of not being metabolized, the FDA considers it to be a safe food additive [4]. There are studies that show positive and negative results, including potential to induce cancer in rats, dogs and humans [7]. These studies involve exposure to the substance at different stages of development of the organism. In the case of rats, exposure to diets containing 5% to 7.5% from time of conception to death showed an increased frequency of urinary bladder, especially in males. In countries like Canada and United States food products containing

saccharin are required to carry a warning label that says: saccharin is a potential cancer causing agent [8]. In The Gambia no such labels were seen by the researchers in this study.

Color Additives

Tartrazine is an azobenzene (an artificial yellow). When ingested it is reduced to an aromatic amine which is highly sensitive. Its main metabolite identified till date is sulfanylic acid [9]. This substance produces these reactions in the body: urticarial (skin rash), rhinitis (runny nose), asthma, purpura (purple skin bruising) and systematic anaphylaxis (shock). According to Science [29] these reactions are more common in people with asthma or sensitivity to aspirin.

According to a study carried out on rats by Hassan [10], depending on dosage, age, gender, nutritional status, genetic factor and long term exposure to low doses, the following were observed: chromosomal aberrations.

Sunset yellow: this has other names: orange yellow S and yellow 6. It is synthetic coal tar and azo dye. It is used in fermented foods that must be heat treated. Consumption of this substance in food causes hives, runny nose, nasal congestion, allergies, hyperactivity, abdominal pain, nausea and distaste in food. When ingested in amounts that are higher than would be consumed by humans, it was found that it caused an increase in the incidence of tumors and chromosomal damage [11]. For individuals with sensitivity to aspirin, Zach Harmon [12] showed that sunset yellow causes allergic reactions.

Starting from July 2010 these color additives were banned by the European Union Food Standards Agency from food products: tartrazine, sunset yellow, allura red, brilliant blue, indigo

tine and erythrosine [13]. It is interesting to see that they are still being imported into The Gambia.

Artificial Flavors

According to the National Centre for Health Statistics, Hyattsville, USA, artificial flavors contribute to good health. They reduce the risk of heart attacks by preventing blood clots [14]. Artificial flavors contain salicylates; these are chemical cousins of aspirin. Aspirin is known to reduce the risk of heart attacks by preventing blood clots [14]. On the other hand, Keener [15] found that these chemicals are carcinogenic, neurotoxic, are responsible for hyperactivity disorders (attention deficit disorders and attention deficit hyperactivity disorder) and food allergies.

Artificial flavorings are difficult to study because they are a cocktail of very many chemicals and their recipes are kept as corporate secrets among many food industries; this is according to Harmon [12] and is the reason advanced for the FDA not been able to study them. An instance of this is synthetic strawberry flavor which consists of fifty-nine different ingredients; some flavorings consist of hundreds [12]. Along with this is the fact that there is a lot of uncertainty and risk in creating these artificial flavors and consuming them. If someone is allergic to certain manufactured food, it may be that he is allergic to certain chemical(s) in the flavoring agent added. With this comes the possibility of exposure to new chemicals everyday; and the body may not be used to handling these substances. So it is possible to have two situations: one in which an individual does not react to a natural flavoring and a second one in which the same individual has a reaction to an artificial flavoring.

Acidifiers

Citric acid stands out among all the acidifiers. It is a weak acid found as a natural preservative in acid or sour foods (soft drinks) [16]. The European Union allows citric acid to be added as an acidifier (acid regulator) in fruit juice; 3g per kilogram for fruit juice [17]. Excess consumption of the acid leads to dental corrosion, muscle twitching or cramps, swelling, weight gain, fatigue, mood changes, rapid and shallow breathing [17].

Dickens [25] found that cancerous tissues contain a lot more citric acid in associated body fluids than normal. This acid has also been blamed for modulating pulmonary hypertension, this, according to a study on pulmonary hypertensive chickens orally exposed to the substance for 45days [18]. Studies on rats [19] showed an increase in enzyme activity, organ weights, especially kidneys and an overall decrease in body weight compared to a control group used in the study.

Modern day use of citric acid is based on 1973 guidelines which considers it be a safe food additive and harmless; this is according to the FDA 2010. In line with this is the unrestricted use of the substance [21]. On the other hand, some countries describe it as ‘the most dangerous cancerous’ additive. They have given it the nickname *E poisons in food*.

CONCLUSIONS AND RECOMMENDATIONS

All the chemicals listed from the labels are consumed in The Gambia and considering the health hazards discovered by review of scientific literature, one cannot deny the fact that these substances are harming the population in one way or the other. How many avoidable deaths can be ascribed to the consumption of these chemicals? Some, no doubt!

There are no laboratories within the country to analyze for these chemical substances; this may be one reason why they continue to be imported. Even if their presence were detected, is the appropriate government agency aware of the health effects of these substances? Is the awareness of enough concern to ban their importation?

There is thus a need to setup laboratories to analyze these dangerous food additives in imported foods. This should go hand-in-hand with the enforcement of regulation to stop their importation. All the additives that have been banned in the EU and are still being imported should also be banned. If they have already been banned in those countries, there must be a reason for it especially considering the fact these countries have well-equipped laboratories.

The Gambia may not be in a position to understand and validate the reason. Further to this, safer and natural alternatives could be explored. For example, in the use of sweeteners, stevia has been found to be a safer option. According to New York University Medical Center, stevia helps with hypertension and diabetes. This is a better substitute considering the carcinogenic effects of the sweeteners studied in this study.

There is need to enforce the labeling of food products that contain hazardous chemicals, with a warning. For example, as seen earlier: “In countries like Canada and United States food products containing saccharin are required to carry a warning label that says: *saccharin is a potential cancer causing agent*”. With this kind of labeling in The Gambia the researchers in this study are of the opinion that consumers would be able to make an informed decision.

A safer and less injurious option would be for the government to adopt the use of the contemporary synthetic products in use in the EU. The banned additives must have been replaced by ‘safer’ options; these safer options should be used in The Gambia.

It is the considered opinion of the researchers that if the same synthetic products can be found in other African countries, then one can easily conclude that some medical harm is also being done to the populace, and as such something needs to be done as a matter of urgency.

More importantly, we believe that the young generation should be taught in schools and colleges about the dangers of the use of these chemicals as part of their regular chemical education programs.

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