IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 15, Issue 10 Ser. II (October 2021), PP 52-54
www.iosrjournals.org

Analysis of Soft Drinks for Nutrient Contents in Abakaliki Metropolis, South East Nigeria

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Abstract
The study analyzed selected soft drinks for their nutrient contents using experimental method. Six brands of soft drinks (Coca Cola, Fanta, Sprite, Pepsi, Mirinda, and 7up) were purchased from a retail shop in Abakaliki and analyzed for glucose, Ascorbic Acid and Citric Acid contents. The results indicated that Coca Cola has the highest glucose content while Pepsi contains the least glucose content. Generally, the glucose content in the analyzed soft drinks was higher than the codex standard. The ascorbic acid content of the analyzed soft drinks ranged from 30.7 mg/100g to 20.85 mg/100g in the following decreasing order: Fanta< Coca Cola<Sprite<Mirinda< 7up< Pepsi. Apart from fanta that has ascorbic acid slightly above the accepted codex standard (30 mg/100g), the rest however contains quantities that are below codex value. The citric acid contents of the analyzed soft drinks ranged from 4.6% to 4.2% in the following order: 7up < Mirinda< Pepsi< Sprite< Fanta< Coca Cola. Generally, the citric acid contents in the analyzed soft drinks were slightly below the accepted regulatory standard. Codex standard for nutritional facts of soft drinks should be strictly adhered to. Also, indiscriminate disposal of empty soft drinks plastic containers must be avoided to ensure a cleaner environment.

Keywords: *Abakaliki, Contents, Drinks, Nutrient, Selected.*

I. Introduction

Soft drinks are among beverages which are highly consumed in Nigeria and contain preservatives. These soft drinks exist in various brands. Produced and marketed by different brewery industries across the country [1], [2] some example of soft drinks prevalent in Nigeria markets are Coca Cola products, 7up, Pepsi, mirinda among others. The drinks are readily consumed on daily bases especially when undergoing tedious activities like hard work and sports [6]. According to [7], the rate of consumption of non-alcoholic beverages in Nigeria is 159.85 g/ person/ day. Moreso, with the relatively affordable prices, they are highly consumed during leisure relaxation, outings and are served the general public in celebrations such as traditional marriages, weddings, funerals, etc [5]. The high consumption rate of soft drinks is attributed to the characteristic taste, flavour, simulating effect or their medicinal value as well as their thirst quenching potential [11], [13]. These characteristics are defined by the constituents present such as sugar which is responsible for its sweetness, carbonated water which is water compressed with carbon dioxide to make it an ultimate thirst quencher and flavouring agents to add flavor to the drinks [12]. The constituents of soft drinks are mainly water, sugar, preservatives, colour, and fruit pulp [14]. Preservatives are the substances that increase the shelf life of foods and beverages [10]. Preservatives inhibit growth of spoilage microorganisms and chemical degradation of food component. Numerous chemical compounds such as benzoic acid, sulphite as sulphur dioxide, citric acid and sorbate are able to inhibit the growth of microorganisms.

The Study Area

The study area, Abakaliki is located on Latitude 06°19[1]N and Longitude 08° 06[1]E, covering an area of about 83square kilometers. It is the Capital City of Ebonyi State, South Eastern Nigeria. Abakaliki belongs to the tropical rain forest zone of Nigeria which is characterized by a rainy season spell, running from April to October and a dry season period, from November to March. Average annual rainfall is between 1500-1650mm. Dry Season temperature ranges from 20°c to 38°c while rainy season temperature range is from 16°c to 28°c [8].

II. Materials And Methods

Materials

Soft drinks, conical flasks, burette, pipette, reagents, pen and paper.

Sample Collection

Soft Drinks of different brands (Coca Cola, Fanta, Sprite, Pepsi, Mirinda, and 7up) were purchased from retail shops and used for the analysis. For Coca cola bottling company, Coke, Fanta and Sprite were used. For 7-Up

bottling company, 7- Up, Pepsi and Mirinda were used respectively. Analysis was carried out immediately after the samples were received at the Federal University Ndufu-Alike Ikwo (FUNAI), Chemistry Laboratory.

Laboratory Procedure
All laboratory procedure was carried out using the method described by Association of Official Analytical Chemists (2012).

Data Analysis
The data was subjected to analysis of variance (ANOVA) using SPSS. Significant means were tested using Fishers Least Significant Difference (F L S D). Other likely statistical variations were detected with Standard Deviation (SD) and Co-efficient of variation (CV) by Steel and Torrie (1982).

III. Results

Table 1 shows the result of the glucose content in the six (6) analyzed soft drinks. Coca cola coke has the highest glucose content of 32.33 mg/l00g while Pepsi contains the least glucose content (26.30 mg/100g). The mean value for the sampled soft drinks was 30.05 mg/l00g while the standard deviation was 0.55.

Table 1: Glucose Contents in Selected Soft Drinks

Soft drinks	**Sprite**± SD	**Fanta**± SD	**Coke**± SD	**7up**± SD	**Pepsi**± SD	**Mirinda**± SD
Glucose content (Mg/100g)	32.30± 0.55	32.32± 0.55	32.33± 0.55	29.28± 0.55	26.30± 0.55	27.58± 0.55
Mean	30.01					
CV (%)	1.83					
Codex Standard	25.0					

The result as presented in Table 2 shows the ascorbic acid content of the soft drinks. The mean value of ascorbic acid was 25.09 mg/l00g with a standard Deviation of 1.24. The ascorbic acid content of the six (6) analysed soft drinks ranged from 30.07 mg/l00g to 20.85 mg/l00g.

Table 2: Ascorbic Acid Contents in Selected Soft Drinks

Soft drinks	**Sprite**± SD	**Fanta**± SD	**Coke**± SD	**7up**± SD	**Pepsi**± SD	**Mirinda**± SD
Ascorbic Acid Content (Mg/100g)	25.85± 1.2	30.07± 1.2	25.92± 1.2	22.74± 1.2	20.85± 1.2	25.08± 1.2
Mean	25.09					
CV (%)	4.78					
Codex Standard	30.0					

The result in Table 3 shows the mean value of citric acid in the analysed soft drinks was 4.43% and the standard deviation was 0.65. The citric acid contents of the individual soft drinks ranges from 4.6% to 4.2% in the increasing order of 7up < Mirinda < Pepsi < Sprite < Fanta < Coca-Cola.

Table 3: Citric Acid Contents in some Selected Soft Drinks

Soft drinks	Sprite± SD	Fanta± SD	Coke± SD	7up± SD	Pepsi± SD	Mirinda± SD
Citric Acid Content (Mg/100g)	4.5± 0.7	4.6± 0.7	4.6± 0.7	4.2± 0.7	4.4± 0.7	4.3± 0.7
Mean	4.4					
CV (%)	15.91					
Codex Standard	10.0					

IV. Discussion

The result indicated that the analysed soft drinks contain sugar in the form of glucose, with coca cola having the highest value. The glucose contents were obviously higher than the acceptable codex standard of 25 mg/l00g. In general, the soft drinks contained high quantity of glucose which contributes to the sweet taste associated with these soft drinks. Apart from its unavoidable roles and contributions [5], sugars have been linked to tooth decay, over weight and obesity, diabetes, and heart disease [7]. Apart from Fanta that has ascorbic acid slightly above the accepted codex standard (30 mg/l00g), the other soft drinks however contain quantities that are below the Codex standard value. Hence, low nutritional value. Comparing the citric acid contents in the sampled soft drinks, it was observed that the values were below codex acceptable. The values therefore suggest that the analysed soft drinks contain citric acid in a quantity that is slightly below the approved standard and this can affect the shelf life of the products.

V. Conclusion

The sugar contents of all the analysed soft drinks were above Codex acceptable value. Ascorbic acid which is a nutritional factor in the soft drinks was below Codex standard, except Fanta that met the standard. Citric acid values were also below Codex standard. The nutritional values and citric acid content of the soft drinks should be enhanced to meet stipulated standards.

Acknowledgement

We sincerely acknowledge the laboratory staff of Alex Ekwueme Federal University, Ndufu Aliki, Ikwo, Ebonyi State for analyzing the samples. We also wish to thank all staff of Soil Science and Environmental Management of Faculty of Agriculture and Natural Resources Management, Ebonyi State University for their support and encouragement.

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