



## Evaluation of Sugar Content of Some Soft Drinks in Nigeria

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### ABSTRACT

**Objective:** To evaluate the sugar content of some soft drinks available in Nigeria.

**Methods:** Soft drinks exist in various forms and brands and are marketed by different brewery industries across the country. Ten soft drinks per bottles of different brands and flavours were purchased from stores around the university environment, Ambrose Alli university, Ekpoma, Edo state. The sugar contents in the drinks were determined using standard methods.

**Results:** From the result, significant differences ( $p < 0.05$ ) was recorded in sugar levels of each soft drinks. The sugar contents recorded were 3.17, 2.74, 2.39, 0.36, 3.62, 3.14, 3.88, 0.37, 3.55 and 2.96 g/100 ml for Coke, Dubic malt, Fanta, Limca, Mirinda, Pepsi, Teem Bitter Lemon, Teem Soda, 7up and Sprite respectively. The concentrations of glucose in the various brands of soft drinks showed the following trend: Teem Bitter Lemon > Mirinda > 7up > Coke > Pepsi > Sprite > Dubic Malt > Fanta > Teem soda > Limca.

**Conclusion:** Based on this result, sugar contents were all below recommended limits and the lowest sugar content was in Limca. Therefore it can be consumed by those who need low sugar in the body.

**Keywords:** Soft drinks; Low sugar; Edo state; Brewery industries

## INTRODUCTION

### Soft drinks

A soft drinks is a drink that doesn't contain liquor. The expression "soft drinks" initially alluded only to carbonated drinks and is still regularly utilized in this way. The name "Soft drinks" indicates absence of liquor *via* differentiation to the term "hard" (for example drinks with alcoholic substance). Many carbonated soda pops are alternatively accessible in variants improved with sugar or with low caloric sweeteners. In Nigeria Standards Organization of Nigeria (SON) sets the principles for managing the amount of sugar and different fixings in soft drinks [1].

Across the nation, distinct brewing sectors promote soft drinks in a variety of shapes and labels. Nigeria is an impoverished nation where health issues are prevalent. As a result, individuals there tend to overindulge in them because they think it will provide them more energy [2]. Thus, the purpose of this study was to evaluate the amount of sugar in various soft drinks that

are available in Nigeria. Ten soft drinks, each legal and registered by its own company in Nigeria, were bought from a grocery in the Ihumudumu neighbourhood of Ekpoma. Standard techniques were employed to evaluate the sugar content [3]. Significant differences ( $p < 0.05$ ) were found in the results of Limca's 0.36 g/100 ml and Teem bitter lemon's 3.88 g/100 ml. In conclusion, all of the sugar content was below the suggested level, thus people who require low sugar in the body [4].

Chemically, sugar is one of carbohydrates and is a source of energy in human diet. Sucrose or table sugar has the chemical formula  $C_{12}H_{22}O_{11}$  and is a disaccharide of fructose and glucose. It has a white crystalline appearing; it is the most popular of the various sugar for flavouring, exhibiting properties such as sweetening, preservation and texture in food and beverages. Sugars, especially sucrose are obtainable from sources such as sugar cane, beet sugar, honey etc. It is hard to trace the origin of sugar [5]. But, today table sugar is obtained commercially from only two plant; sugar cane and beet sugar, which provide 56% and 44% respectively of the world total sugar.

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Soft drinks are complex mixtures containing different variety of substances such as colouring compounds, flavoring agents, acidifiers, sweeteners, preservatives and caffeine. Soft drinks are generally synthesized with water plus 1%-3% liquid carbon dioxide, 3%-5% liquid sugar, acidified to a pH of about 2.4-4.0, emulsifiers, colors, flavors and/or spices, herbs and extracts of roots, leaves, seed and flower or bark. Soft drink is any of a class of non-alcoholic beverages, usually but not necessarily carbonated, normally containing a natural or artificial sweetening agent, edible acids, natural or artificial flavours and sometimes juice [6]. Soft drinks have many potential health problems. The inherent acids and sugars have both acidogenic and cariogenic potential resulting in dental caries and potential enamel erosion.

Many people in Nigeria think that some of the soft drink varieties available from different manufacturers have high sugar content and can raise blood sugar levels. Determining the amount of sugar in soft drinks present in the surrounding environment is crucial. It is crucial to understand that sugar content does not go above the amount advised in a diet [7]. If people's claims that some of these drinks have less sugar than others are accurate, then it is important to prove that some of these drinks have more sugar than the recommended daily allowance. If the sugar content of these particular soft drinks is higher than the recommended daily allowance, people might want to think twice before consuming as many commercial soft drinks.

## MATERIALS AND METHODS

### Apparatus/Equipment

Measuring cylinder, beakers, weighing balance, micro pipette, centrifuge, spectrophotometer, funnel and filter paper.

**Table 1:** The phenol-sulphuric acid method.

| Reagents                             | Test tubes |     |     |     |     |     |     |     |     |      |
|--------------------------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|------|
|                                      | 1          | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10   |
| Glucose solution (mL)                | 100        | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Distilled H <sub>2</sub> O (mL)      | 900        | 800 | 700 | 600 | 500 | 400 | 300 | 200 | 100 | -    |
| 5% Phenol (μL)                       | 50         | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50   |
| Conc. H <sub>2</sub> SO <sub>4</sub> | 5          | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5    |

### Statistical analysis

All analyses were performed using graph pad prism 6.4. Total sugar contents of the soft drinks were expressed as mean ± standard error of mean of triplicate determination [9].

### Chemicals

Glucose, distilled water, activated charcoal, phenol, concentrated H<sub>2</sub>SO<sub>4</sub> and vanillin.

### Collection of samples

Soft drink bottles of different brands and flavours were purchased from stores around the university environment and was taken to biochemistry laboratory of Ambrose Alli university, Ekpoma, where further analysis were carried out [8].

### Determination of glucose standard curve

The glucose standard curve was determined by the phenol-sulphuric acid method. The standard procedure of this method is as follows (Table 1).

- After the preparations of glucose solution, 100 mL-1000 mL was pipetted into each test tubes labelled as 'test-tube 1-10'.
- Also, measured amount of distilled water was also pipetted into the labelled test tubes.
- About 50 μL of 5% aqueous solution of phenol in each test tube was mixed with 5 mL of concentrated sulfuric acid.
- The solutions were allowed to cool to room temperature and the various absorbance were measured at 480 nm.
- The glucose concentration (mg/ml) of the various glucose solutions versus their absorbance values at 480 nm were used to plot a glucose standard curve.
- A standard curve was plotted and this was used to calculate the concentration of sugar content in each of the samples.

## RESULTS AND DISCUSSION

The evaluation of the ten soda tests utilizing densitometer and refractometer showed that the sugar levels are basically inside the reach for sodas as determined by standard (7%-14% brix esteem) aside from S3 and S5.

Over shot the norm by 0.08% and 0.10%, separately; yet these are simply minimal and subsequently irrelevant. In any case, care ought to be taken by the makers to guarantee full consistence to standard consistently.

Despite the fact that sugar is a wellspring of energy in human eating routine and it is likewise harmful to health. It is a drawn out compound toxin.

At the point when we discuss sugar, we incorporate awful sustenance all in all, since anybody who enjoys sugar has awful dietary propensities essentially. The sugar content (g/100 ml) ranges from 0.36 g/100 ml in Limca to 3.88 g/100 ml in teem bitter lemon [10]. Among the ten samples considered, teem bitter lemon has the highest sugar content while Limca has the least total soluble sugar content (Table 2).

**Table 2:** Factory label of some soft drinks in Nigeria market.

| Brand             | Manufacturer                   | Constituents claimed by respective manufacturer   |
|-------------------|--------------------------------|---|
| Coca-Cola         | Nigerian Bottling Company, PLC | Carbonated water, sugar, caramel, colour, phosphoric acid, flavouring and caffeine  |
| Dubic malt        | Guinness Nigeria PLC           | Carbonated water, sucrose, caramel, sorgum, hops and stabilizer (E405)  |
| Fanta             | Nigerian Bottling Company, PLC | Carbonated water, sugar, acidulants (e330, e296), stabilizer (modified food starch, e445; e444), flavouring, sodium. Benzoate, colourants, sunset yellow, non-nutritive sweeteners (acesulfame-k, sucralose)  |
| Limca             | Nigerian Bottling Company, PLC | Carbonated water, sugar, acidulants (e330, e296, e331), stabilizer (modified food starch, e415; e444; e445), non-nutritive sweeteners (acesulfame-k, sucralose), antioxidant (ascorbic acid), flavor (lemon and lime flavor) and preservative (potassium sorbate) |
| Mirinda           | 7-up Bottling Company          | Carbonated water, sugar, citric acid, gum arabic, sodium benzoate, ester gum, natural flavours, yellow no. 6 (sunset yellow), ascorbic acid, yellow no. 5 (tartrazine), propylene glycol  |
| Pepsi             | 7-up Bottling Company          | Carbonated water, sugar, caramel, colour, phosphoric acid, caffeine, gum arabic and natural flavour   |
| Teem bitter lemon | 7-up Bottling Company          | Carbonated water, sugar, lemon flavor, quinine, caramel, sodium benzoate, citric acid, gum arabic and ester gum   |
| Teem soda         | 7-up Bottling Company          | Carbonated water, sugar, clear and colourless colour, sodium bicarbonate, sodium chloride and potassium sulphate  |
| 7up               | 7-up Bottling Company          | Carbonated water, sugar, citric acid, malic acid, sodium citrate, natural lemon and lime flavours, sodium benzoate preservative   |
| Sprite            | 7-up Bottling Company          | Carbonated water, sugar, acidulants (sodium citrate, citric acid), lime and lemon flavourant, sodium benzoate   |

As shown in the result, there was significant differences ( $p < 0.05$ ) in sugar levels of each soft drinks [11]. The sugar contents recorded were 3.17, 2.74, 2.39, 0.36, 3.62, 3.14, 3.88, 0.37, 3.55 and 2.96 g/100 ml for Coke, Dubic malt, Fanta, Limca, Mirinda, Pepsi, Teem bitter lemon, Teem soda, 7up and Sprite respectively. The concentrations of glucose in the various brands

of soft drinks showed the following trend: Teem bitter lemon > Mirinda > 7up > Coke > Pepsi > Sprite > Dubic malt > Fanta > Teem soda > Limca. The result of this researches was slightly lower than that reported by Sodamade, which was stated that the sugar contents of the soft drinks ranges between  $9.91 \pm 0.0141$  g/100 ml to  $13.55 \pm 0.0071$  g/100 ml. The difference in the value may be

because of the different soft drinks used and the method used to determine the sugar level in those soft drinks (Table 3).

**Table 3:** Evaluating the sugar content of some soft drinks in Nigeria.

| S/N | Soft drink        | Sugar content (g/100 ml) | Unit volume (cl) | Sugar content per bottle (g/100 ml) |
|-----|-------------------|--------------------------|------------------|-------------------------------------|
| 1   | Coke              | 3.17                     | 60               | 19.02 ± 0.21                        |
| 2   | Dubic malt        | 2.74                     | 33               | 9.04 ± 0.10                         |
| 3   | Fanta             | 2.39                     | 60               | 14.34 ± 0.17                        |
| 4   | Limca             | 0.36                     | 60               | 2.16 ± 0.02                         |
| 5   | Mirinda           | 3.62                     | 50               | 18.10 ± 0.33                        |
| 6   | Pepsi             | 3.14                     | 60               | 18.84 ± 0.08                        |
| 7   | Teem bitter lemon | 3.88                     | 50               | 19.40 ± 0.08                        |
| 8   | Teem soda         | 0.37                     | 50               | 1.85 ± 0.01                         |
| 9   | 7up               | 3.55                     | 50               | 17.75 ± 0.23                        |
| 10  | Sprite            | 2.96                     | 60               | 17.76 ± 0.08                        |

The standard organization of Nigeria recommended limit range of 7 g/100 ml-14 g/100 ml for soft drinks. All the soft drinks were below the stated recommended limits [12].

Damages caused by sugar include the following:

- Sugar is by a wide margin the main source of dental weakening holes in the teeth, draining gums, disappointment of bone construction and loss of teeth.
- Sugar is the primary driver of diabetes, hyperglycemia and hypoglycemia.
- It is either a critical or contributory reason for coronary illness, arteriosclerosis, psychological sickness, despondency, feebleness, hypertension and disease.
- It has a very unsafe impact in unbalancing the endocrine framework and harming its part organs like the adrenal organs, pancreas and liver, causing glucose level to generally change.
- It has various other incredibly harming consequences for the human body. The above specified outcomes of sugar underlie the need to consume sugar with control and alert. The vast majority of the body harms featured begin to appear following quite a while of collections.

## CONCLUSION

The presence of sugar, carbon dioxide, phosphate and acidity in soft drinks in Nigeria gives it the characteristic taste which justifies its frequent consumption. Based on the result from this study, the sugar levels were all below recommended limits and the lowest sugar content was in Limca. Therefore it can be consumed by those who need low sugar in the body.

## REFERENCES

1. Grimm GC, Harnack L, Story M. Factors associated with soft drink consumption in school-aged children. *J Am Diet Assoc.* 2004;104(8): 1244-1249.
2. Fernandes MM. The effect of soft drink availability in elementary schools on consumption. *J Am Diet Assoc.* 2008;108(9):1445-1452.
3. Adegbola RA, Adekanmbi AI, Abiona DL, Atere AA. Evaluation of some heavy metal contaminants in biscuits, fruit drinks, concentrates, candy, milk products and carbonated drinks sold in Ibadan, Nigeria. *Int J Biol Chem Sci.* 2015;9(3):1691-1696.
4. Godwill EA, Jane IC, Scholastica IU, Marcellus U, Eugene AL, Gloria OA. Determination of some soft drink constituents and contamination by some heavy metals in Nigeria. *Toxicol Rep.* 2015;2:384-390.
5. Qadri S, Adesola MO, Oladepo SM, Bolarinwa IF. Comparative study of the safety and chemical composition of commercially available fruit juices and soft drinks in southwest Nigeria. *European J Nutr Food Saf.* 2021;13(7):17-30.
6. Ansa VO, Anah MU, Ndifon WO. Soft drink consumption and overweight/obesity among Nigerian adolescents. *CVD Prev Control.* 2008;3(4):191-196.
7. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: A systematic review. *Am J Clin Nutr.* 2006;84(2):274-288.
8. Malik VS, Pan A, Willett WC, Hu FB. Sugar-sweetened beverages and weight gain in children and adults: A systematic review and meta-analysis. *Am J Clin Nutr.* 2013;98(4):1084-1102.
9. Adams SO, Akano RO, Rauf RI. An evaluation of the chemical composition of soft drinks in Nigeria: A principal component analysis approach. *Adv Modell Anal.* 2020;57(4):14-21.
10. Ojezele OJ, Ojezele MO, Onyeaghala A. Nutrition evaluation and heavy metal analysis of commonly consumed fruit and milk drinks in south-west Nigeria. *Biochemistry.* 2017;29(4).



11. Hassan A, Emifoniye E. Evaluation of mineral element and sugar contents of soft drinks in Nigeria. *J Appl Sci Environ Manag.* 2018;22(11):1769-1775.
12. Amusa NA, Ashaye OA, Aiyegbayo AA, Oladapo MO, Oni MO, Afolabi OO. Microbiological and nutritional quality of hawked sorrel drinks (Soborodo)(the Nigerian locally brewed soft drinks) widely consumed and notable drinks in Nigeria. *J Food Agric Environ.* 2005;3(3):47-50.