WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 5.045
Volume 4, Issue 3, 232-239. Research Article ISSN 2277– 7105

SUGAR AND SULPHITE LEVELS OF ALCOHOLIC AND NONALCOHOLIC BEVERAGES IN NIGERIA

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Article Received on
02 Jan 2015,

Revised on 21 Jan 2015,
Accepted on 12 Feb 2015

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ABSTRACT

Sugar and sulphite levels were assessed in 10 each of commonly consumed alcoholic and non-alcoholic beverages in Nigeria. The alcoholic beverages and their mean sugar contents were Star (88.80 ± 2.20mg/lOOml), Gulder (84.50 ±. 20mg/100ml), "33" (89.50 ± 0.90mjz/100ml). Harp (87.70 ± I.OOmg/1OOml), Smirnoff (98.50 ± O.50mg/100ml), Heinekcn (89.10 ± 6.90mg/100ml), Gulder max (59.20 ± 5.30mg/100ml), Gordon Spark (84.70 + 0.50mg/100ml). Legend Stout (41,20 ± 8.60mg/100ml) and Guiness stout (40.60 ± 9.50mg/100ml) respectively. The respective mean sulphite levels of these alcoholic leverages were Star (320.17 ± l.01mg/100ml), Gulder (736.59 ± 0.04mg/100ml), "33" .75.20 ± 4.05mg/100ml), Harp (320.17 ± 2.05mg/100ml), Smirnoff (256.11 ± O.50mg/I00ml), Meineken (384.24 ± l1.0mg/100ml), Gulder max (592.45 ± : 20mg/100ml). Gordon spark (544.40 ± 0.05mg/100ml), Legend stout (480.47 ± 0mg/100ml) and Guiness Stout (1312.-12± 0.31ml/100ml). The non-alcoholic beverages respectively had these mean sugar levels: Coke (85.10 ± 0.05mg/100ml), spirite-(93.40 ± 0.03mg/100ml), Fanta (76.30 ± 0.04mg/100ml), Club Soda (13.50 ± 50mg/100m!), Mountain Dew (97.40 ± 0.10mg/lOO.ml),Fayrouz (98.90

± 0. 50mg/100ml, Mirinda (82,70 ± 4.80mg/100ml), Pepsi (79.20 ± 4.10mg/100ml), 7Up 05.40 ± 1.30mg/100ml) and Crest Bitter Lemon.(101.90 ± 0.50mg/100ml). Their mean sulphite levels were found to be thus: Coke (448.30 ± O.10mg/100ml), Fanta (400.26 ± 1.80mg/100ml), Club Soda (288.10 ± 2.0lmg/100ml), Mountain Dew (256.11 ±0.05mg/100ml), Fayrouz (432.14 ± 0.02mg/100ml), Mirinda (320.18 ± 0.3 1mg/100ml), pepsi (240.16 ± 1.80mg/100ml), 7Up (288.10 ± 0.01mg/100ml) and Crest Bitter Lemon (432.14 ± 0.08mg/100m). These beverages were found to contain more sugar and sulphite levels than were expected by the public and recommended by FAO/WHO.

KEYWORDS: Sugar and sulphite levels, recommended by FAO/WHO.

INTRODUCTION

The term "beverage" is derived from French word "Beivre" which means a drink. According to the Fruit Products Order (FPO) 1955 Act, Fruit Beverage or Fruits Drink means a beverage or drink which is prepared from fruit juice and water or carbonated water and containing sugar, dextrose, invert sugar or liquid glucose. The minimum percentage of fruit juice in the final product shall not be less than 5%. Fruit syrup connotes sweetened fruit juice of not less than 25% of fruit juice.

In the 19 ' century, carbonated water was developed in imitation of effervescent spa water or mineral water. This was the antecedent of carbonated water made by absorption of carbon (iv) oxide under pressure, a gas that gives a pleasant, slightly acidic taste and also acts as a preservative (Bryndolfaswon, 1982). Beverages are popular among people as drinks that can quench thirst. Having worked oneself to tiredness, one needs to regain the water lost and cool the hot body.

The encyclopedia of science and technology reviewed that carbonated beverages are beverages which contain dissolved carbon dioxide. The process of dissolving carbon dioxide in water is called carbonation. Carbon dioxide may be naturally occurring in the beverage from fermentation or a mineral source. Sweetening agents according to the same encyclopedia of science are substances used to sweeten foods and drinks. The commonest are the sugar, especially glucose and sucrose. They are usually added to foods and drinks that normally do not have it (or have it only in small quantities) just because we crave the taste of its own sake. Glucose and sucrose are major sources of energy for all living things. Other artificial sweeteners are also present, though with no food value but many times sweeter than sugars are used sometimes (Geoffrey , 1987).

In the brewing of beer, it is normal to treat the beer with carbon dioxide inter alia on storage, carbonation and washing of the beer (dusting) to provide a beer which is acceptable to the consumer and is for example a sparkling beer with a good head and pleasant taste. The carbon dioxide used in the processing of the beer is normally obtained from the industrial source. Sulphiting agents have been used as food additive since antiquity help prevent enzymatic and non-enzymatic browning, control growth of micro organism, nets as bleaching agents, anlioxidanls, or reducing, agents, and carry out various other function (Sapers, 1993; Taylor, el al. 1986).

AIM OF RESEARCH

To assess the levels of sugar and sulphite in alcoholic and non-alcoholic beverages as a basis for advising the public on the desirability or otherwise of consuming these products.

MATERIALS AND METHOD

MATERIALS

SAMPLE COLLECTION

Ten different brands of alcoholic beverages and another ten different brands of non-alcoholic beverages were purchased from various shops and markets in Abakaliki metropolis bringing the samples to a total number of twenty (20). Tables 1 & 2 below showed the different brands of beverages that was analysed.

Table 1: Brands of Alcoholic Beverages and their respective NAFDAC NO.

S/n	Brand	NAFDAC NO.
01	Star	01-9541
02	Gulder	01-0606
03	"33" •	01-0308
04	Harp	01-0694
05	Smirnoff	01-8959
06	Heineken	01-1467
07	Gulder Max	01-0321
08	Gordon Spark	01-4421
09	Legend Stout	01-3310
10	Guiness Stout	01-0691

Table 2: Brands of non-alcoholic carbonated beverages and their NAFDAC NO.

S/N	BRAND	NAFDAC NO.
1	Coke	01-0259
2	Sprite	01-0261
3	Fanta	01-0260
4	Club Soda	01-0237
5	Mountain Dew	01-7741
6	Fayrouz	01-9506
7	Mirinda	01-0159
8	Pepsi	01-0163
9	7Up	01-0164
10	Crest Bitter Lemon	01-0262

DETERMINATION OF SUGAR IN BEVERAGES PROCEDURE

1ml of sample each and 2ml of dilute reagent was measured into a beaker mixed together. The beaker and its content were suspended in a boiling water bath for exactly 5 minutes. The beaker was removed and immediately transferred into a cold-water bath to cool for another 5 minutes. 5ml of distilled water was then added and mixed by inversion. The absorbance was then read at 420nm against the blank containing 1ml of water and 2ml of dilute reagent.

DETERMINATION OF SULPHITE IN BEVERAGES PROCEDURE

10ml of each sample was pipetted in 20 test tubes containing the different brands and 5ml of IN NaOH was added. It was *mixed and allowed to* stand for 15 *minutes.* Then 2ml of dilute sulphuric acid and 0.25ml of starch solution were added. It was then titrated with 0.5N iodine solution until *blue-black colour changes occurred, 1ml* equivalent to 0.00 16g or 1.60mg of sulphite.

RESULTS

The mean sugar and sulphite levels of the alcoholic and non-alcoholic beverages were determined ± standard deviations as reported in tables 3, 4, 5, and 6 below.

Table 3: Mean sugar levels of alcoholic beverages.

S/N	Brand	Mean sugar level (mg/100ml)
1	Star	88.80 + 2.20
2	Gulder	84.50 + 3.20
3	"33"	89.50 + 0.90
4	Harp	87.70+1.00
5	Smirnoff	98.50 ±0.50
6	Heinekcn	89,10 ±6.90
7	Gulder max	59.20 ±5.30
8	Gordon spark	84.70 + 0.50

9	Legend stout	41.20 ±8.60
10	Guiness stout	40.60 + 9.50

The highest mean sugar level was found in Smirnoff (98.50 + O.SOmg/lOOml) and the least in Guiness stout (40.60 ± 9.50mg/100ml).

Table 4: Mean sugar levels of non-alcoholic beverages

S/N	Brand	Mean sugar level (mg/100ml)
1	Coke	85.10 + 0.50
2	Sprite	93.40 ±0.30
3	Fanta	76.30 ±0.40
4	Club soda	13.50+ 1.50
5	Mountain Dew	97.40 ±0.10
6	Fayrouz	98.90 + 0.50
7	Mirinda	82.70 + 4.80
8	Pepsi	79.20 ±4. 10
9	7up	105.40 ±1.30
10	Bitter lemon	101.90 + 0.50

Contrary to organoleptic reports, Mountain Dew had the highest sugar level, well above Fanta, which is generally adjudged the sweetest soft drink, while the least (Club soda) conformed to expectation.

Table 5: Mean sulphite levels in alcoholic beverages.

S/N 1	Brand Star	Mean sulphite level (mg/100ml) (1ml = 1.60mg of SO_3^{2-} 320.17+ 1.10
2	Gulder	738.59 + 0.04
3	"33"	675.20 + 4.05
4	Harp	320.1712.05
5	Smirnoff	256.11 ±0.50
6	Heineken	384.24 ± 1.10
7	Gulder max	592.45+2.20
8	Gordon spark	544.40 ±0.05
9	Legend stout	480.47 + 0.10
10	Guiness stout	1312. 12 + 0.31

The least SO_3^{2-} level was found in Harp and Star, while the highest value occurred in Guiness Stout, explaining why the latter brand deteriorates much less rapidly than others when decampped.

Table 6: Mean sulphite levels of non-alcoholic beverages

S/N	BRAND	Mean sulphite level (mg/100ml) (1ml = 1.60mgof SO_3^{2-}
1	Coke	448.30 + 0.10
2	Sprite	432.14+ 1.40
3	Fanta	400.26+1.80
4	Club soda	288.10 + 2.01
5	Mountain Dew	256.11 ±0.05
6	Fayrouz	432. 14 ±0.02
7	Mirinda	320.18±0.3I
8	Pepsi	240.16 ±1.60
9	7up	288.10 + 0.01
10	Bitter lemon	432.14 + 0.08

Pepsi contained the least SO_3^{2-} level, coke the highest, while other have intermediate values.

DISCUSSION

This work set out to find the sugar and sulphite levels of the major alcoholic and non-alcoholic beverages commonly drunk in Nigeria. Strikingly, all the brands assessed contained both analytes, although to varying extents.

Among the alcoholic beverages, (Table 3), the least mean sugar level of 40.60±9.50mg/ 100ml was found in Guiness stout, the highest occurred in Smirnoff (98.50±0.50mg/100ml), while others had levels that ranged between 41.20±8.60mg/100ml (in Legend stout) to 89.50±0.90mg/100ml in "33" beer. If these values were scaled up according to their volumes per bottle, the 35cl (350ml) bottles would contain three-and-a-half times the levels indicated per 100ml while the 60cl (600ml) bottles would contain six times those values. By implication, these brands- of beer in addition to their alcoholic contents are very high energy stores since the sugars and alcohol directly and indirectly are channelled through the glycolytic pathway for ATP production. Since most people ingest these beers in addition to their normal meals, they must be considered sources of excessive caloric intakes. Furthermore, an uncontrolled intake since these alcoholic, beverages should be discouraged since they have high contents of processed sugars, which are implicated in the pathogenesis of cancers and exacerbation of *diabetes mellitus.* There is no doubt that the brewers incorporate the sugars to enhance taste but this also makes the drinkers to consume more alcohol than is desirable thus exposing them to the risks of excessive indulgence in alcohol.

It is generally believed that club soda is sugar-free and therefore almost recommended for diabetics who desire to quench thirst with non-alcoholic beverages. To the contrary, it contains as

much as 13.50mg/100ml or (13.5 x 3.5 or 47.25mg/35cl) of processed sugar, a quantity that could upset the delicate sugar balance of diabetic individual. Another unexpected finding was that Fayrouz, 7Up and Crest Bitter Lemon and Mountain Dew, which are considered to be low-sugar soft drinks on the basis of taste alone, indeed do contain higher sugar levels than the much criticized Coke, Sprite and Fanta. The level found in Pepsi was a bit aberrantly low since by taste, it approximates to coke in sweetness. On the basis of these findings, it is hereby suggested that those on the usual carbohydrate-rich African diets should minimize their intakes of these beverages studied on account of high caloric values and exposure to high levels of processed sugars, which has adverse health implications. Sulphites are incorporated into foods and beverages as preservatives (Sapers et al., 1993). Also, the Joint Food and Agriculture Organization and World Health Organization (Joint FAO/WHO) committee of 1974 established the daily intake level for humans at 0.7mg/kg body weight for a 70kg man therefore, this amounts to Hmgper day.

Among the alcoholic beverages assayed for their sulphite contents, the least was 320mg/100ml for Star and Harp beers. Since they are 60cl (600ml)-bottled beers, the sulphite content of each of them is at least six times this value. This gives at least 137 times the FAO/WHO recommended daily sulphite intake per bottle. Since some people ingest many bottles daily, their daily sulphite intakes are at least outrageous. Sulphite has been implicated in the depletion of vitamin B2 least outrageous. Sulphite has been implicated in the depletion of vitamin B2 (Steel, 1997) and could initiate IgE-mediated immune response (hypersensitivity reactions) among other adverse effects (Lester, 1995). In those .with sulphite oxidase deficiency, their inability to breakdown sulphite can be life threatening, and the symptoms include restricted breathing and depletion of essential mitbchondrial enzymes, i.e., it interferes with the respiratory chain (Knodel, 1997).

CONCLUSION

In conclusion, the sugar and sulphite levels found in the brands of alcoholic and non-alcoholic beverages studied were above expected and recommended levels. Utmost care should be exercised in ingesting large quantities of these beverages in view of the health hazards posed by high intake of processed sugars and sulphite-containing substances.

REFERENCES

1. Bryndolfaswon, (1982). "Soft drink" Encyclopedia of science and technology.
2. Edited by Peterson J. Mc-Graw Hill press, New York. P, 612-652.
3. Geoffrey, C. Sugar: The Amazing Vanishing Conference. The Politics of Food: The Secrete

World of White hall and the food agents, which threaten your health. I[st] Edition century Ilutchinson press, London : 1987, P. 99-152.

4. Knodel, O. Intolerance to sodium metabisulphite in beverages. Allergy. 1997; 51 : (7)8-10.
5. Lester, M.. Food additives as a cause of symptoms of allergy. Ann Allergy. 1995; 26:5-6.
6. Steel, R.J. Thiamine deficiency in a cat associated with the preservation of 'Pet meat with sulphur dioxide. Australian Veterinary Journal. 1997; 75 (10): 719-21.
7. Sapers, O. Adverse reactions to food additives in the United States Food and Drug Administration. Regular toxicology and pharmacology. 1993; 12 (4): 234-6.
8. Taylor, S.L., Higley, N.A., Bush, R.K. Sulphites in foods: uses, analytical methods, residues, fate exposure assessment, metabolism, toxicity, and hypcrsensitivily. Advance Food Residues. 1986; 30: 11-76.