



X-Rays of the Potential Elements in Soft Drinks and Their Effects on Some Blood Parameters, Glucose Concentration, Growth and Development of Children and Youths

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ABSTRACT

Children and youths require adequate food and drinks for development and growth. Soft drinks are one of those things that can play a good role in the development of growth of children and youths. Fifty (50) bottles of soft drinks of different brands namely Fanta, Coke, Teem Lemon, Sprite, and Teem Soda were analyzed to know their material make-up. Also twenty (20) subjects consisting of both children and youths were used to study the effect of incessant drinking of soft drinks for 7days. It was observed in the study that the material make-up of most soft drinks are carbonated water, (the major content), sugar and sweetener, followed by flavor and caffeine (in Coca-Cola). The blood glucose concentration in the test subjects (Group B) were higher (FBS 92 + 0.7, RBS 105 + 0.5mg/dl) compared to their corresponding controls (FBS 74.6 + 0.8, RBS 76.2 + 0.3mg/dl), also there was gain in the weight of the test subjects compared to their corresponding control (control weight 35.2 + 0.6kg, Test subjects 52.0 + 1.4kg). No significant variance ($P>0.05$) in the haemoglobin concentration and packed cell volume of the test subjects and control subjects. It could be deduced from this study that the presence of sugar and caffeine could be affecting the growth and development of children and youths.

Keywords: Soft drinks, Haemoglobin, Weight, Carbonated water, Glucose, Youths and Children

INTRODUCTION

Every living thing including man requires food and drink for its growth and survival (Oguwike et al, 2013). A soft drink is a drink that typically contains carbonated water, (although some lemonades are not carbonated), a sweetener and a natural or artificial flavoring (Electronic code of Federal regulations, USA 2011). The origins of soft drinks lie in the development of fruit-flavored drinks. In the Medieval Middle East a variety of fruits-flavored soft drinks were widely drunk, such as sharbelt, and were often sweetened with ingredients such as sugar, syrup and honey. Other common ingredients included lemons, apples, pomegranate, tamarinol, jujube, sumac, musk, mint and ice. Another early type of soft drink was lemonade, made of water and lemon juice sweetened with honey, but without carbonated water.

Modern soft drinks constitute a diverse groups of products (Kregiel D, 2015). They can be classified in several ways for instance, on the basis of sugar and fruit juice content, flavoring, carbonation level, main non water ingredient and functionality (Kregiel D, 2015).

Chemical components of soft drinks:

The main chemical components of soft drinks are water (90%), sweetener (8-12%), carbon dioxide (0.3-0.6% w/v), acidulants (0.05-0.3% w/v), flavorings (0.1-0.5% w/v), colorings (0-70ppm), chemical preservatives (lawful limits), antioxidants (<100ppm), and/or foaming agents like saponins up to 200mg/ml.

Most soft drinks are characterized by carbonated water, sugar and caffeine. In the Eastern part of Nigeria, we have different brands of soft drinks namely, Fanta (orange colored), sprite, coke or coca cola, soda water and lemon. They are being produced in soft drink industries such as Seven Up (7 up) bottling companies and Nigerian Brewery Industries.

The aim of this research is to know the activities of the elements contained in these soft drinks in the development and growth of children and teenagers. Our curiosity in embarking on this study is the common use of this soft drinks especially in children and youths who can easily afford it.

Growth and development of a child is the period when adequate growth hormone called somatotrophic hormone or somatotropin (Oyebola, 2002), influences the rate of protein synthesis in all cells, affects all tissues capable of exhibiting growth, causes increase in cell size

(cellular hypertrophy) and also stimulates mitosis leading to increase in total number of cells (hyperplasia). The hormone exhibits several metabolic effects. The phenomenon of growth is complex and it is affected not only by growth hormone alone but also affected by thyroxine, adrenal cortical hormones, androgens, insulin and extrinsic influences such as diet as well as genetic factors.

MATERIALS AND METHODS

Experimental Design:

Twenty children and youths who likes to drink soft drinks especially Fanta brands were selected for this study. They were given six bottles of mineral drinks, every day for one week, later blood sugar concentrations such as Fasting blood sugar and Random blood sugar were analyzed. Their haemoglobin concentration and packed cell volume were also checked. They are group B subject. The control subjects are the group A subjects who were given only drinking water.

Again fifty (50) bottles of soft drinks of different brands namely Fanta, Coke, Sprite, Teem soda and Bitter lemon were purchased from shopkeepers located near the university campus of Chukwuemeka Odumegwu Ojukwu University. They were brands of soft drinks produced by Seven Up (7up) Bottling Company of Nigeria.

DETECTION OF THE COMPONENTS IN SOFT DRINKS:

Samples were collected from each of the brand of soft drinks; Fanta, Coke, Sprite, Teem soda and Bitter lemon. They were taken to the research laboratory for analysis of the components and their percentage occurrence.

Analysis was done using Harbourne's method 1973 while fasting blood sugar and Random blood sugar of the youths were done using BG meter.

Haemoglobin concentration and packed cell volume were determined by methods described by Baker et al, 1998.

RESULTS:

Table 1: Phytochemical analysis of soft drink (Bitter Lemon, Coca cola and Fanta)

Constituents in extracts of soft drink							
	Calcium	Carbohydrate	Alkaloids	Sapo-nins	Flave-noids	Phenols	Steroids, Glucosides, and Tannins
Degree of concentration	++	+++	++	+	-	+	-

- Negative (absent), + Present in small concentration
 ++ Present in moderate high concentration
 +++ Present in very high concentration

Table 2: Effects of soft drinks (Fanta, Coke Sprite) in weight, Glucose concentration and haemoglobin concentration

Subjects	Weight (kg)	Glucose conc. mg/dl ± S.D FBS	Glucose conc. Mg/dl ± S.D RBS	HB g/dl ± S.D	PCV l/l ± S.D
Groups A Control n=20	35.2 ± 0.6	74.6 ± 0.8	76.2 ± 0.3	13.5 ± 0.4	39 ± 1.2
Test Subjects Group B on 6 bottles of Fanta n=20	52 ± 1.4	92 ± 0.7	105 ± 0.5	13.8 ± 0.2	40 ± 0.4
P. Value	P < 0.05	P < 0.05	P < 0.05	P > 0.05	P > 0.05

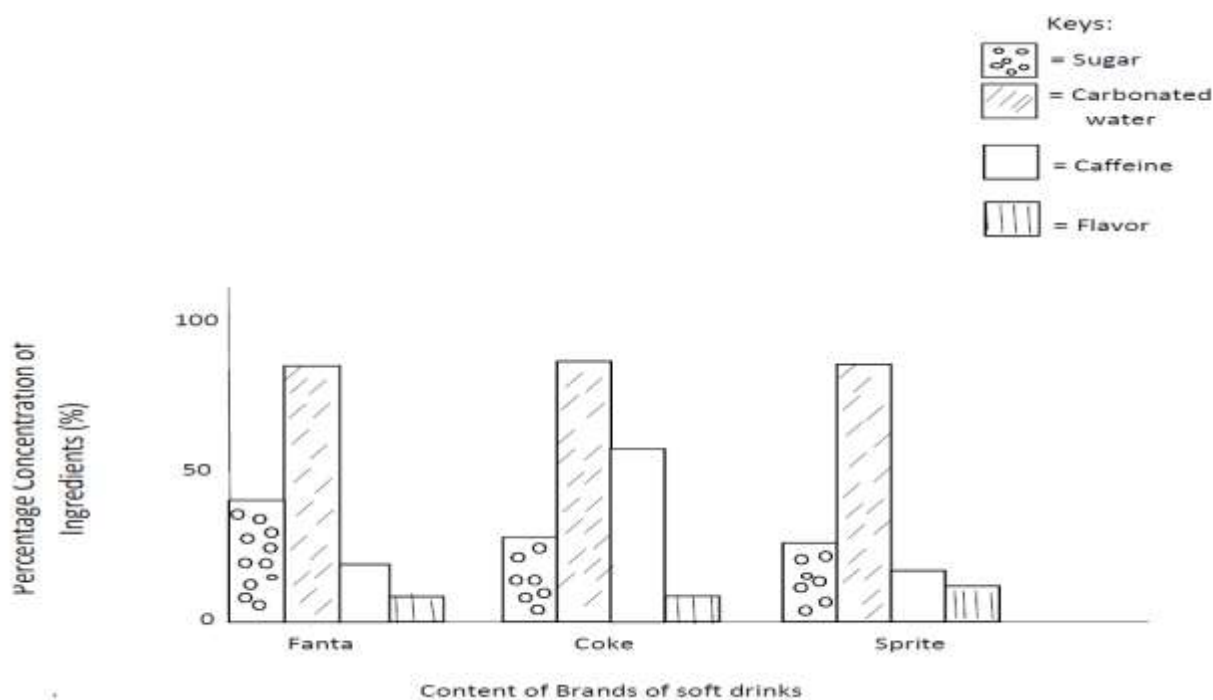


Figure 1: Percentage concentration of elements (ingredients) present in soft drink (Fanta, Coke and Sprite)

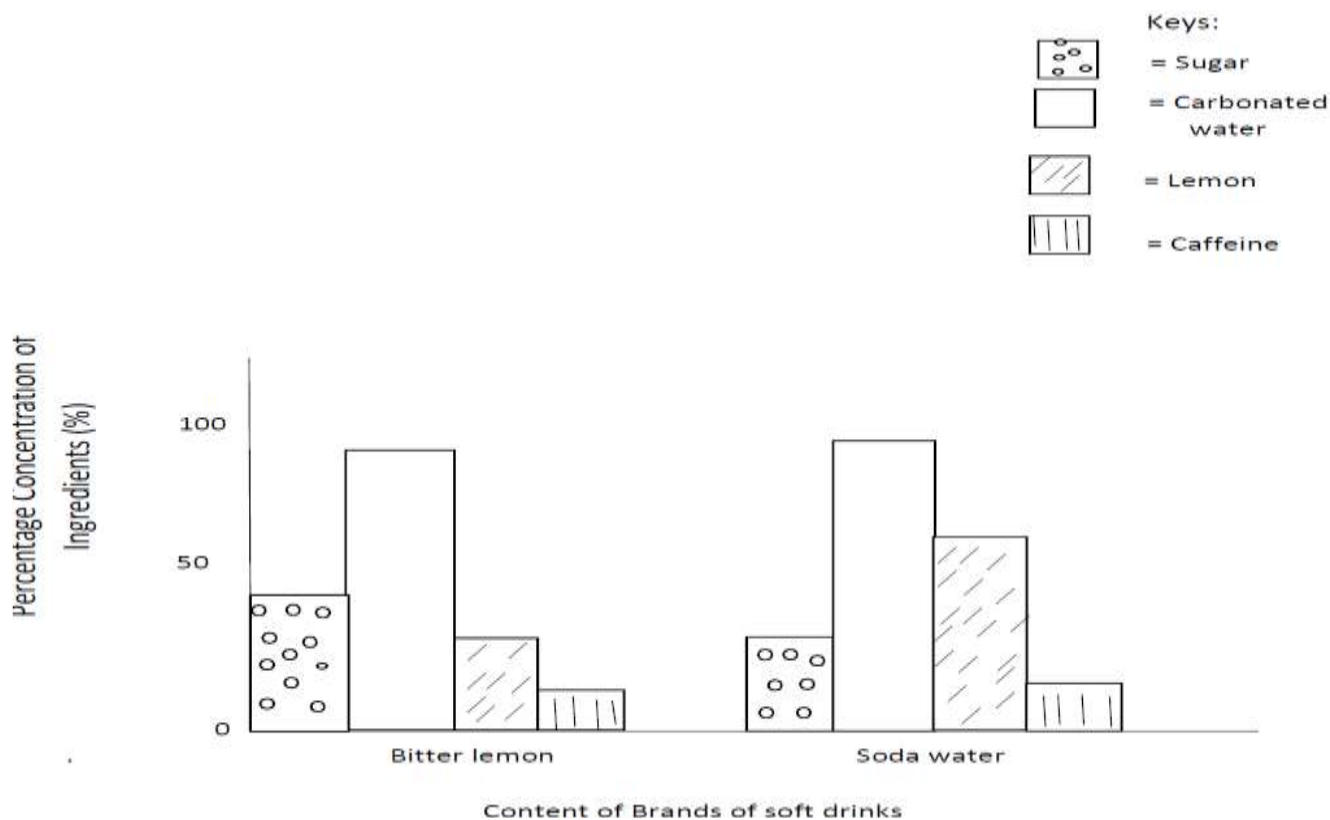


Fig 2: Percentage concentration of elements (ingredients) present in Bitter lemon and Soda water soft drinks

DISCUSSION

The potential elements present in soft drinks commonly consumed by children and youths in our locality have been x-rayed. Children and youths need basic nutritional elements such as vitamins, proteins, carbohydrates and micro elements to grow and develop very well. The soft drinks consumed from the result of the research studies could be seen from tables 1 and 2 that soft drinks consumed by children and youths are advantageous to their growth and developments. The results of the phytochemical analysis (Table 1) indicated the presence of carbohydrate in moderate quantity. The product of carbohydrate consumption are absorbed from the intestine into the blood of the portal, venous system in the form of monosaccharides, chiefly the hexoses, (glucose, fructose, mannose and galactose) (Mayer, 1977) although the pentose sugar if present in the food injected will also be present.

Carbohydrate (sugar) present in soft drinks (Table 1) is responsible for weight gain in subjects in Group 2 compared to their corresponding controls. The consumption of sugar, sweetened beverages is associated with weight and obesity, and changes in consumption can help predict changes in weight. Glucose plays a major role for energy and for effective working of the brain in children (Osman, 1978).

The blood sugar concentrations in the test subjects were elevated compared to their corresponding control because of the high content of sugar in the soft

drinks (Table 2). This shows that consumption of soft drinks in large quantities is associated with diabetes, hypertension, dental carries and low nutrient levels. Most soft drinks are characterized by carbonated table water, sugar and caffeine. The molecular formula of caffeine is 1, 3, 7-trimethyl xanthine (David, 1978). Caffeine is linked to anxiety and sleep disruption when consumed in excess. Caffeine contained in Colas used in producing Coca cola soft drinks stimulates digestive juices and carbonated water speeds the digestion, and the combination of effects along with the stimulant action of the two alkaloids, can make a difference to someone not feeling well.

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