CHARACTERIZATION OF THE EXTRACT OF CALYCES OF ROSELLE AS A SOURCE OF "SOBO" DRINK IN NIGERIA.

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A plant of the family Malvaceae used all over the world as a pleasant, caffein-free drink to replace tea and coffee, ROSELLE is the Eritrean denomination of *Hibiscus sabdariffa* L.
Nowadays, this shrub of Jamaican origin (*sabdariffa* is the local West Indies name) is grown in all tropical countries, including Nigeria, where the following study has been carried out by prof. I.A. Amoo, from Nigeria.
The annual plant can be even two metres high and the drug, composed of the flower calyx, is collected at the beginning of $4^{th}/5^{th}$ month, i.e. after the flowering period and the fruit setting, with average yields of 80 quintals/hectar. Once the yellow petals fall off, the red fleshy calyx surrounding the fruit with five pointed slits and fixed to the dentate crown-shaped calycle, is picked with its fruits from which it is then separated. The drug is composed of big fragments (even blackened) of the sepals, with straw-coloured residues of the fragmented capsules. The flavour is sweet and pleasant and the taste is rather bitter. In native countries, it is sold as such, while in Europe it arrives in powder form and packed in sachets ready for infusion.
Its organoleptic characteristics, which make it tasty, are due to the following components: - organic acids (citric, oxycitric, malic, oxalic) and mucilages. Organic acids may exceed the drug by 20% in weight and they are responsible for the pleasant acid taste of the preparations, such as teas and gelatines. When Roselle is poured into water, the solution becomes red (anthocyanins in acid solution) as its pH value is around 3, like with lemon juice.
It is listed in DAB 9 (*Hibisci flos*), where the dosing methods of its acid content and colouring power are described. It also appears in the German Monographs of the European Commission.
The phytotherapeutic indications of Roselle are similar to those suggested for mucilaginous Malvaceae in the case of catarrah in the upper airways and of gastric disorders as well as mild constipation.
A mild laxative action is linked to the ingestion of large amounts of Hibiscus preparations and is caused by the organic acids and their salts which are not absorbed in the intestinal tract (saline laxatives which increase the volume of stool).

Abstract:
Proximate, chemical and mineral analyses locally prepared "sobo" drink and the calyces extract were carried out using standard methods. The proximate, acidity and total solid of the locally prepared "sobo" drink were moisture (87.73%), crude protein (2.45%), carbohydrate (12.27%), fat and crude fibre are not detected, acidity (0.07%) and total solid (9.68%) while that of the extract were moisture (93.40%), crude protein (1.83%), fat and crude fibre were not detected, ash (0.06%) and total solid (6.60%). In the "sobo" drink, the mineral levels (mg/100g) were sodium (1.32), potassium (3 16), calcium (2.88), magnesium (2.50), iron (0.18), zinc (0.82), copper (0.06) and phosphorous (0.08) while levels for the extract were sodium (1.79) potassium (3.33), calcium(2.48), magnesium (2.85), iron (0.26), zinc (0.84), copper (0.09) and phosphorous (0.10). Manganese and lead were not detected in both samples.
The "sobo" drink has total sugar (12.10%), sucrose (10.60%), inverted sugar (12.10%), sucrose (10.60%), dextrose (1.11%), fructose (1.18%), hydrated maltose (1.78%), an hydrated lactose(1.43%) and hydrated lactose (1.51%) while the extract contains total sugar (0.73%), sucrose (0.27%), inverted sugar (0.45%), dextrose (0.44%), fructose (0.47%), hydrated maltose (0.69%), anhydrous lactose (0.56%), and hydrated lactose (0.59%). The vitamins A and C. of the "sobo" drink were 22.19 mg/100g R.E and 9.33 mg/ 100g respectively while that of the extract were 21.20 mg/100g R.E and 6.25 mg/100g respectively. Nitrite (0.40 ppm)was detected only in the "sobo"drink while the nitrate contents were (4.2 ppm) for the "sobo" drink and (4.00 ppm) for the extract.

Introduction:
"Sobo" drink has been in existence for long, most especially in the northern part of Nigeria. Interestingly, the rate at which it is coming to lime-light cannot be over emphasized. With the look of things, it is widely believed that it might displace every other soft drinks in the 21^{st} century; "sobo" drink is made from a pleasant red colour calyces of roselle plant *Hibiscus sabdariffa var. s.* belongin to Malvaceae family. Roselle is known as "soborods" in Hausa language, "mnyanya oj" in Igbo and "isapa pupa" in Yoruba language. Alternative names are Red sorrel, Jamaican sorrel and Indian sorrel(Rice et al. 1986). Beverages are foods that are distinguished by two principal characteristics from other foods. Firstly, they are hands or are consumed in the liquid form but the relative lack of actual food value differentiated them from others like milk products, secondly, they are either consumed for their thirst quenching properties or for the stimulating effects (Ihekoronye et al. 1985). The demand for "sobo"drinks is largely based on their nutritive value, flavour, aroma and colour (Adenipekun, 1988). Hence the work is focused on the nutritional composition of roselle calyces extracts and locally prepared "sobo" drink.

Materials and Methods:
Plant materials: Dry calyces of roselle plant were bought from Karu market at Abuja, Nigeria and screened to remove unwanted materials. "Kanabenri" a local flavour, pineapple, vanilla flavour, ginger and sugar were bought from central market (Oja Oba), Akure.
Sample preparations: The preparation of two litres of "sobo" drink by widely recommend method was carried out thus: 2 cups of milk tin (about 52g. dry weight) of "sobo" were put into a clean container containing about 1 of clean water and after which ginger and "kanabenri" were added. This was boiled for about 15 minutes for proper extraction of the juice. It was allowed to cool and then sieved with a clean sieve. Two spoonful of vanilla flavour and pineapple juice (about 90 ml squeezed from _ of a whole fruit) were added to the extracts. Water was then added to make up to 2 litres after which a cup of milk tin, 205g. of sugar was added and stirred to ensure that it well dissolved. The drink was then kept in the refrigerator. For dry calyces extract, it was prepared exactly like the "sobo" drink except that it contains only the calyces.

Proximate analysis:
The moisture and ash contents of the samples were determined according to AOAC (1990) method while the fat and crude protein were estimated by Pearsons method (1976). The sugar components were measure with Amoo and Lajide (1999) method. The experimental methods described by Josyln (1970) were used to measure the crude fibre and vitamin A contents of the samples. Phosphorous and other minerals were estimated by the methods of Rogent et al. (1973) and Oshodi (1992) respectively. Nitrates and nitrites were analysed for by Kamm et al. (1980) method.
The total acidity was carried out by titration and the total solid was done by evaporation to a constant weight.
The vitamin C content of the samples was determined thus: 5 ml of the sample was transferred into a centrifuge tube containing 5 ml mercuric chloride (saturated solution) solution and 10 ml acetone.
The content was stirred with glass rod, washed down with distilled water and set aside for 30 minutes. The solution was centrifugal at 2,500 r.p.m. for 10 minutes and the supernatant liquid was removed with a pipette. The residue was treated with 20 ml of 10% acetic acid solution, centrifuged an the supernatant liquid was removed as before. The residue of mercurous chloride was transferred into titration flask with little water an 25 ml of 0,01M iodine solution was added to dissolve the precipitate. 5ml of 10% potassium iodine solution was added and the excess iodine was titrated with 0.01m thiosulphate solution using starch indication near the end point. At the end point, the dark brown solution turned colourless.

Calculation:
1ml 0.01M iodine used up = 0.88 mg ascorbic acid

Table 1: Proximate, total solid, acidity, vitamins A & C, nitrite and nitrate compositions of "sobo" drink and "sobo" extract (Mean S.D.)

Components	Sample A	Sample B
Moisture content (%)	87.73±0.18	93.40±0.10
Crude protein (%)	2.45±0.06	1.83±0.26
Fat (%)	nd	nd
Ash (%)	0.14±0.04	0.19±0.08
Crude fibre (%)	nd	nd
Carbohydrate (%)	12.27±0.18	4.58±0.25
Total solid (%)	9.68±0.29	6.60±0.10
Acidity (%)	0.07±0.06	0.06±0.04
Vitamin A (mg/100g R.E)	22.19±0.16	21.20±0.22
Vitamin C (mg/100g)	9.33±0.21	6.9±0.31
Nitrate (ppm)	4.20±0.03	4.00±0.06
Nitrite (ppm)	nd	0.40±0.05

Sample A: - "sobo" drink from the dry calyces
Sample B: - Extract from the dry calyces

Table 2: Mineral Analysis (mg/100g)

Elements	Sample A	Sample B
Sodium	1.32	1.79
Potassium	3.16	3.33
Calcium	2.88	2.48
Magnesium	2.50	2.85
Iron	0.18	0.26
Zinc	0.82	0.84
Copper	0.06	0.09
Manganese	nd	nd
Lead	nd	nd
Phosphorus	0.08	0.10

Nd= not detected

Sample A: - "sobo" drink from the dry calyces
Sample B: - Extract from the dry calyces

Table 3: Sugar Contents (%) (Mean S.D.)

Sugar	Sample A	Sample B
Total sugar	12.10±0.03	0.73±0.06
Sucrose	10.60±0.01	0.27±0.02
Inverted sugar	1.02±0.01	0.45±0.02
Dextrose	1.11±0.05	0.44±0.08
Fructose	1.18±0.04	0.47±0.02
Hydrated maltose	1.78±0.03	0.69±0.03
Anhydrous lactose	1.43±0.02	0.56±0.06
Hydrated lactose	1.51±0.02	0.59±0.05

Sample A: - "sobo" drink from the dry calyces
Sample B: - Extract from the dry calyces

Results and Discussion:

The proximate, total solid and acidity composition of the locally prepared "sobo" drink (A) an the calyces extract (B) are displayed in Table 1. From the table, the carbohydrate content of samples A and B are 12.27% and 4.58% respectively. The carbohydrate value in the sample B is lower than the value obtained by Holland et al. (1992) for some fruit juices like pineapple juice (10.50%), grape juice (11.70%) and apple juice (9.90%) but that of sample A is higher and this may be due to the addition of sugar during its preparation.

The crude protein in the samples A and B are 2.45% and 1.83% respectively. These values are more than the values reported for pineapple juice (0.30%) and grape juice (1.00%) by Holland et al. (1992). The samples A and B is 0.07% while that of sample B, is 0.06%. These values are low and therefore make the drink safe for consumption.

The total solids recorded for samples A and B are 9.68% and 6.60% respectively.

The vitamins A and C content of locally prepared sobo drink and extract from the dry calyces as presented in Table 1 are 22.19 mg/100g R.E and 9.33 mg/100g respectively for sample A; and 21.20 mg/100g R.E. and 6.95 mg/100g respectively for sample B.

The high content of vitamin A can be a good source of treatment for people suffering from eye problem and the vitamin C obtained compared favourably with that of fruit of *Nauclea latifolia* which has been confirmed as a good source of fruit juice (Amoo and Lajide, 1999). As depicted in Table 1, the nitrate level in sample A is 4.20ppm and in sample B is 4.00ppm.

Sample A contains no nitrite while sample B contains 0.40ppm of nitrite. The nitrate and nitrite levels obtained are all far below the and the recommended limits of nitrate and nitrite daily intake of 300ppm and 18ppm respectively (Amoo, 1998). This makes the samples safe for human consumption most especially the infants. The mineral analysis (mg/100g) of the samples A and B as shown in Table 2 are sodium (1.32), potassium (3.16), calcium (2.88), magnesium (2.5), iron (0.18), zinc (0.82), copper (0.06), phosphorous (0.08), manganese and lead are not detected. For sample A: and for sample they are sodium (1.79), potassium (3.33), calcium (2.48), magnesium (2.85), iron (0.26), zinc (0.84), copper (0.09), phosphorous (0.10), manganese and lead are not detected. The mineral levels are dam too low. Sugar content founds in samples A and B are presented in Table 3.

In sample A, the amounts are total sugar (12.10), sucrose (10.60), inverted sugar (1.02), dextrose (1.11), fructose (1.18), hydrated maltose (1.78), anhydrous lactose (1.43), an hydrated lactose (1.51), while in sample B, the levels are total sugar (0.73), sucrose(0.27), inverted sugar (0.45), dextrose (0.44), fructose (0.47), hydrated maltose (0.69), anhydrous lactose (0.56) and hydrated lactose (0.59).

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