Comparative Analysis of Natural and Commercially Processed Orange Juices for Ascorbic Acid Content.

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Abstract.
Ascorbic acid content of orange fruit juices extracted from ripe and unripe oranges obtained directly from the orange tree and two brands of commercially processed orange juices bought from a Supermarket in Minna were comparatively studied using standard analytical methods. The results revealed that the juices extracted from the unripe oranges had higher ascorbic acid content (77mg/100ml) than the commercially processed orange fruit juices (48mg/100ml). Other parameters, P^H, refractive index, total titratable acids and volatile acids analyzed on the juices fell within the minimum acceptable limits. The results suggest that natural orange fruit juices contain more essential nutrients than the processed juices.

Introduction:

Vitamins are organic substances required in small amount for various metabolic processes. They are essential for normal growth and development of the body and for proper functioning of the digestive system (Basu and Scorah, 1981; Rivers, 1987; Macrae et al, 1997). They are classified either as soluble (C and D) or insoluble (A, D, E, K) vitamins (Marks, 1975). Although, plants naturally synthesize these vitamins and store them up in their different organs, some like A, D and C can now be synthesized through laboratory processes (Bender and Barker, 1982; Sumato and Rajapopal, 1983;).

Vitamin C (ascorbic acid) the major vitamin found in fruit juices is very essential in the maintenance of healthy body in human and also helps to prevent scurvy, mental depression, sore mouth, bleeding of gum, fast healing of wounds and elimination of intestinal disorder (Nagy and Smoot, 1977). Some fruits have low content of vitamin C, while other citrus fruits such as orange fruits have as high as 40 – 70mg/100g vitamin C. This value increases just before ripening and then decreases after ripening (Nagy, 1980; Bender, 1992). Further more it is easily destroyed on exposure to high temperature (Renken, 1988).

In view of the important role vitamin C plays in human metabolism, organizations such as Food and Agricultural Organization (FAO) and World Health Organization (WHO) have recommended a minimum daily dietary allowance of 30mg/100g vitamin C (Bieri, 1980). Deficiency of this vitamin is characterized by weakness, swollen, bleeding gum; delay wound healing and easy fracturing of bones. It has been reported that vitamin C possesses some antioxidant property, which have helped to reduce the risk of cardiovascular diseases and some form of cancer (Bender, 1992).

Some school of thoughts have opined that processed fruit juice remains the best source of vitamin C, while others contended that fresh fruits have higher content of vitamin C. Amongst the latter school of thoughts, there are those who opined that unripe fruits will provide the highest concentration of vitamin C. There is therefore the need to carry out a study to obtain information that will clarify these views.

Materials and Methods

Four pieces (four ripe and four unripe) of orange fruits plucked directly from the orange tree and two commercially processed orange fruit juices namely Delight and Chivita bought from a super market in Minna were used for this study.

Methods

The natural oranges were peeled, sliced and the juice content extracted using a juice extractor into a 250ml beaker. This was then filtered through a Whatman filter paper. Highly coloured filtrates were refiltered to obtain a colourless filtrate and stored in a refrigerator prior to analysis. Same filtration procedure was used for the commercially processed fruit juices. The titratable acids and volatile acids content in the fruit juices were determined according to AOAC (1980) methods. Using the NIS (1987) methods, 50ml of the colourless filterate was pipetted into a 100ml volumetric flask followed by the addition of 25ml of 20% metaphoshoric acid solution and was made up to the mark with distilled water. 10ml of the solution was then pipetted into a 50ml flask followed by the addition of 2.5ml acetone solution (only to the commercially processed juices) and titrated with a standard indophenol solution until a pink colouration was obtained and the vitamin C content was calculated using the titre values. The refractive index was also determined according to NIS (1987) methods using a refractometer and the percentage sucrose content was read off from the refractive index Table. The p^H was determined using a laboratory p^H meter (EiL 7045/46 Kent P^H meter England)

Results and Discussion

The results obtained from the analysis are presented in table 1 below.

Table 1: Some Physicochemical properties of orange juices analysed

Juice	p^H	Vitamin C (mg/100ml)	Titratable acid (mg/100ml)	Volatile acid (mg/100ml)	Refractive index	Sucrose (% w/w)
Unripe	3. 36	77	0. 54	0. 146	1. 482	76
Ripe	3. 21	54	0. 50	0. 150	1. 483	77
Delight	2. 46	50	0. 48	0. 154	1. 485	78
Chivita	3. 59	48	0. 43	0. 142	1. 480	76

From the results obtained from the study, the p^H values indicated that the juices examined are acidic and fell within the range recommended by Nigerian Industrial Standard, NIS (1987) for consumable fruit juices. According to NIS (1987), the refractive index of any fruit juice is a measure of the level of its sucrose content. In otherwords, the higher the refractive index, the higher the sucrose contents. The highest of these parameters was obtained against one of the commercially processed fruit juices namely Delight, while the lowest were those of the unripe and Chivita whose values are 76 in each case.

The titratable acids, which measure the level of the fruit spoilage, were more or less the same as there is no significant variation in the value of the parameters for all the samples analysed. This suggests that this low value might be the characteristic of fruit juices. In a similar study carried out by Ajagbonna (1997), on ascorbic content of artificially ripened mango fruits, a titratable acid value of 0.58g/100ml was obtained.

As seen from the results, the maximum value of vitamin C was recorded with the unripe fruit followed by the ripe fruit juices. This trend seems to justify the suggestion of Nagy and Smoot (1980). This variation is in line with the report of Nagy (1980), Renken (1988) and Bender (1992), that the vitamin C content of citrus fruit juices decreases with ripening. It increases just before ripening and decreases after ripening. In terms of energy advantage of the samples analysed, it is clear from the results that Delight is most

recommended in terms of its sucrose content (78%), being higher than other fruit juices. The next in value is the ripe fruit (77) but as observed, the difference in margin between the fresh ripe fruit and Delight is insignificant.

The low vitamin C content in processed fruit juices may have been due to the exposition to high temperature during processing, storage conditions and also due to the addition of extra sweeteners to improve their taste (Renken, 1988).

Conclusion

Vitamin C, sucrose and other physical parameters of fresh fruits (ripe and unripe) and commercially processed were analysed. The highest content of vitamin C was obtained with the unripe fresh fruit, followed by that of the ripe sample. The fresh ripe fruit may therefore be recommended to optimize the use of vitamin C in juices. It is also recommended that positive attitude be develop towards the consumption of natural oranges fruit juices, which are cheaper and richer in vitamin C rather than resorting to processed fruit juices, which are expensive, and of low vitamin C content.

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