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Quality assurance of different fruit juice with special reference to essential mineral concentration

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ABSTRACT

Regular consumption of fruit or in form of juice is associated with reduced risks of cancer, cardiovascular disease, stroke, Alzheimer disease, cataracts, and some of the functional declines associated with ageing because of the various Phytochemicals. Interest in the nutritional value of fruits and vegetables has been increasing, in part because of recent findings on the high level of obesity and other diet-related health problems. Fruits are generally high in fiber, water and vitamin C, specifically in the beverages, such as fruit juices (orange juice, apple juice, grape juice, etc). Juicing fruits (especially citrus fruits such as orange and grapefruit) has been a mainstream phenomenon for many years. The fruit juice more popular than vegetable juice, because of the taste, it's absolutely deliciousness to get once system up and running. Fruits on the whole tend to contain more sugar than vegetables and so fruit juices tend to be sweeter. Vegetable juice can in comparison tasteless. However, some prefer to juice vegetables rather than fruit for a twist on the same reason, as eating whole raw fruit is a lot easier and tastier than eating whole raw vegetables. In India, as well as in most countries in the Middle East, the hot climate means that the intake of liquids must be high to compensate for the inevitable losses from perspiration and respiration. Keeping in view and in accordance with the objective study reveals, a good diet should include a variety of Fruits and vegetables, whether they are fresh or the juices and here in we suggest, while the practice of consuming fresh fruit juices with meals should be encouraged on nutritional grounds, steps must be taken to improve the microbial quality of the products.

Key words: Fruit juice, Cancer, Cardiovascular disease, ageing, phytochemicals.

INTRODUCTION

Fruits and vegetables are composed of 70–90% water, and are a major source of macronutrients such as fibre and micronutrients such as minerals specifically copper and Zinc, and vitamins C. Studies reveal that fruit juice is the best source of energy and an outstanding source of vitamin C and carotene.[1-3] Scientists are still investigating the relationship between what may be detected in the laboratory and the "bioavailability" or amount of material that is absorbed into our bodies. Research indicates that as long as fresh products undergo minimal storage and are handled at proper temperatures, they are superior to processed products in terms of vitamin C content. Mineral and fiber content was found to be similar in fresh fruit and vegetable products[1-3, 5]. Review of literature on elements like Copper and Zinc also reveals as an essential mineral component in the produce compares fresh fruit and their product i.e. Juices indicate areas for further research[4-6].Copper is an essential element. Enzymes containing copper are important for the body to transport and use iron (WHO 1996). Anemia is therefore one of the first symptoms of copper deficiency. Copper deficiency, however, is not common (WHO 1998), as copper is widely distributed in food and all estimated mean dietary exposures to copper should be within acceptable health standards. Zinc is also an

essential nutrient that is extremely important to long term health. Zinc is necessary for the function of various enzymes and plays an essential role in DNA, RNA and protein synthesis[7-9]. The major symptoms of zinc deficiency are delayed growth and slow maturation (WHO 1996).

At one time, cool drinks purchased alone or with meals tended to be in factory-filled cans or bottles but, recently, two additional sources of 'water' have become important. Locally-bottled or imported spring water has become widely popular but, for more social occasions, fresh fruit juices are often the beverages of first choice. Most restaurants, cafes and, even, road-side stalls have on-site facilities for extracting the juice from fresh fruits like oranges, mangoes and any other fruits that may be available, and then serving the juice, liberally dosed with ice, to their thirsty customers. Such drinks have much to recommend them. They are extremely pleasant on the palate and they contain most of the minerals and vitamins found in the original fruit but, bearing in mind that their mineral potential and the concentration of essential elements copper and zinc an inevitable question arises over health aspects because fruit juice as good fiber intake which is essential for maintaining a healthy digestive system. The fiber content of fruit is the fact that the fiber content can help control the rate at which sugars are absorbed into the bloodstream. Looking to the importance of essential minerals or elements, present study has been under taken to evaluate their concentration in different type of juice available in local market.

MATERIAL AND METHODS

Fresh fruit juices viz., Mossambica, Pomegranate, Pine apple, Apple, Cheeku, Nashpati, and Bottle guard which was collected from different fruit juice parlor in Bhopal. Analysis was done as inclusion of 100 g of whole fruit pulp / juice made up to 250 ml of juice as consumed. Six local juice parlors were selected on the basis of size and general appearance with respect to cleanliness, and each juice parlor was visited in turn. At each parlor, all types of juice covering the entire range usually available, namely apple, banana, carrot, lemon, mango, mixed fruit, orange and pineapple were collected without ice and, on receipt, the juice was decanted into a sterile Duran bottle (500 ml). At the same time, around ten ice cubes were transferred with sterile tongs from the ice-bucket to a wide-mouth sterile screw-cap jar. Sample contained bottle of juice and the jar of ice were then transported immediately to the Quality Assurance Laboratory of Madhya Pradesh Council of Science and Technology, Bhopal in a cool box. At the Laboratory, the bottles of juices and were stored in a refrigerator (4 - 5°C). This same approach was adopted on each visit. The sample container was kept for around two hours for the ice to melt, at which time the juice samples were prepared for the analysis. Typical analytical procedures for the test of adulterant, pH value, acidity total suspended solids, and determination of Copper and Zinc in fruit juice and the investigations were done as per the standard analytical procedure prescribed by the Prevention of Adulteration Act, 1954, and were followed accordingly (AOAC, 2000)[12] and other essential elements done as per the manual of ECIL, Hyderabad and Perkin-Elmer, USA.

RESULTS AND DISCUSSION

For the presence of unwanted material or the presence of Non Permitted Coal Tar Dye / Metanil Yellow test of adulterant was done immediately, and a pink red colour appeared, which shows the absence of particular metanil yellow in all the selected fruit juices including Bottle guard which are now commonly used for the heart diseases.

As per the Parameters prescribed by the PFA total suspended solids (TSS) was carried out and it was found that 5.0% to 8.0 % TSS present in all the concerned samples where as the pH of all the samples of fruit juices was done and the range of pH was 4.9 to 6.7 which show the acidic condition of the target juices however the samples show the exact range and the level which was found within the range that follow the value of PFA (Table 1-2). An estimate of the gross chemical composition of the juices performed during the study period appeared to be some marked differences between different juices. Essential elements like copper and zinc concentration in all the collected samples of fruit juices have been done to observe the value of such essential micro elements in the food products.

It was appeared that the Cheeku (0.0894 ppm) has shown the lower value than that of the other fruit juices found with a value of copper in the fruit juice of Apple (0.0966), then Pomegranate (0.1795), followed by Bottle guard (0.1803), Nashpati (0.3189), Mossambica (0.3853) then Pine apple (0.4105). Whereas the zinc concentration in all type of the fruit juices found with a value of Pomegranate (0.2016) then Apple (0.2316) followed by Bottle guard (0.2510), (Cheeku (0.2641), Mossambica (0.3882) and Pine apple (0.4220). All the data regarding the copper and zinc concentration and the standards conditions for the estimation of both of the essential elements by Atomic Absorption Spectrophotometer has been shown in Table-3 and 4.

As far as minerals are concerned, the citrus and fibrous juices are a useful source of dietary calcium and other microelements specifically copper and the zinc which are considered as good as essential elements for the human body to maintain the body function and the energetic source required for the proper functioning of the body. However, it has been suggested that it is relevant that juice of this type is consumed immediately after preparation. The selected parameters values suggest the current trend to buy pure fruit juices to accompany a meal or snack has much to recommend it. Inevitably, each juice provides a different range of those components that are desirable in a diet. Cheeku, Apple and Banana juices can provide a welcome source of readily-available energy as well as boost the intake of potassium, while a glass of pine apple and mango juice meets the requirement for vitamin C many times over, as well as supplying a level of carotene found in few other sources. However, these natural benefits will be lost if the microbial quality of the products is so low that consumers are placed at risk of contracting a food-borne infection. How the Authorities can combat this threat is another matter, for while the Standards published by the GCC

Table 1: Chemical parameter of different fruit juice

S. No.	Fruit juice	Sample code	Total suspended solids(%)	p^H	Acidity Expressed as Citric acid (Max. %)
1.	Mossambica	FP-22	6	6.5	2.6
2.	Pomegranate	FP-23	5	5.8	2.5
3.	Pine apple	FP-24	8	4.9	3.0
4.	Apple	FP-25	6	6.2	3.2
5.	Cheeku	FP-26	8	6.7	2.8
6.	Nashpati	FP-27	7	6.3	2.4
7.	Bottle guard	FP-28	5	6.5	2.5

Table 2: Chemical parameter Standard of different fruit juice (PFA, 1954)

S. No.	Fruit juice	Sample code	Total suspended solids(%)	p^H	Acidity Expressed as Citric acid (Max. %)
1.	Mossambica	FP-22	9	6.2-7.0	3.5
2.	Pomegranate	FP-23	10	6.2-7.0	3.5
3.	Pine apple	FP-24	10	6.2-7.0	3.5
4.	Apple	FP-25	10	6.2-7.0	3.5
5.	Cheeku	FP-26	10	6.2-7.0	3.5
6.	Nashpati	FP-27	10	6.2-7.0	3.5
7.	Bottle guard	FP-28	-	-	3.5

Table 3: Trace metal determination by atomic absorption spectrophotometer

S. No.	Fruit juice	Sample code	Copper(ppm)	Zinc(ppm)
1.	Mossambica	FP-22	0.3853	0.3882
2.	Pomegranate	FP-23	0.1795	0.2016
3.	Pine apple	FP-24	0.4105	0.4220
4.	Apple	FP-25	0.0966	0.2316
5.	Cheeku	FP-26	0.0894	0.2641
6.	Nashpati	FP-27	0.3189	0.3650
7.	Bottle guard	FP-28	0.1803	0.2510

Table 4: Standard condition of atomic absorption spectrophotometer

S. No.	Conditions	Copper (ppm)	Zinc(ppm)
1	Wave length(nm)	324.8	213.9
2	Slit(nm)	0.7	0.7
3	Relative noise	1.0	1.0
4	Sensitivity(mg/l)	0.77	0.018
5	Sensitivity check	4.0	1.0
6	Linear range	5.0	1.0
7	Recommended flame	Air acetylene (lean, blue)	Air acetylene (lean, blue)

cannot be faulted, ensuring compliance may prove more difficult. It is concluded that, while the practice of consuming fresh fruit juices with meals should be encouraged on nutritional grounds, steps must be taken to improve the microbial quality of the products.

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