

Development and Evolution of Antioxidant Rich Fruit Beverage

Research Article

Dharti P¹ and Dhvanika P^{2*}¹ Smt. K.P.Patel college of Home Science, Anand People's Medicare Society, Anand 388001, Gujarat, India.² Professor Smt. K.P.Patel college of Home Science, Anand People's Medicare Society, Anand 388001, Gujarat, India.

Abstract

The purpose of this study was to develop and analyze antioxidant rich fruit beverages to determine antioxidant concentrations. It may provide protection differently against oxidative stress because they are different in antioxidant capacity. Fruits are used commonly in form of fleshy or pulpy, juice. Fruit juices and beverages are most effective against disease related to such as reduced levels of oxidative stress, obesity, diabetes, atherosclerosis, high blood pressure, diabetes, osteoporosis, arthritis, some forms of cancer and even biological aging, chronic inflammation, Cardiovascular diseases. Antioxidant analysis such as Total Phenol, Flavanoids, Total antioxidant capacity, Vit C, Anthocyanins content in Pomegranate, strawberry, Red grapes, orange, Dried Green Tea. Fruit beverages were prepared at different ratio. Its content of antioxidants shows highly significant difference with each other.

Keywords: Antioxidant, Fruit beverages, Fruit juice, Total phenol, Flavanoid

*Corresponding Author:

Dhvanika Patel,
Smt. K.P.Patel college of Home Science, Anand People's Medicare Society, Anand 388001, Gujarat, India.
Tel: +91-9979095023
E-mail: dhvanikunj@yahoo.com

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Introduction

Fruits and vegetables are important sources of various vitamins, minerals, fibers, antioxidants, including ascorbic acid, carotenoids, and polyphenolic [1]. In common usage of fruits in the form of fleshy or pulpy, juicy, and it's usually sweet, with fragrant aromatic flavors. [2] Citrus fruits are rich in bitter limonoids and vitamins such as ascorbic acid, carotenoid, folates, polyphenols, and flavonoids. Fruit juice is very similar to that of the original fruit and 100% natural product. Fruit juices are free from chemical preservatives and other additives. Fruit juices contain nutrients, such as minerals, trace elements, vitamins and phytochemicals, micronutrients, potassium, calcium and magnesium, low in sodium and fat. [4] A large variety of vitamin enhanced waters (VEWs) on the market and some products advertise high concentrations of antioxidants and therefore high antioxidant capacity. There are also the four berry juices that are thought to be rich in polyphenols: These are noni, goji, mangosteen and acai. Other widely available polyphenol rich beverages are fruit and berry juices, *i.e.*, blueberry, mango, pineapple, etc. Some of these juices have been analyzed for their antioxidant content [5].

Phenolic compounds as secondary metabolites are widely present in fruits and vegetables. A positive relationship between consumption of food with abundant phenolics and low incidence of degenerative diseases, including cancer, heart disease, inflammation, arthritis, brain dysfunction and cataracts. [6] Flavonoids are diphenylpropanes that commonly occur in plants > 4000 flavonoids have been identified. Which are flavones, flavanones, anthocyanins, flavans, and proanthocyanidins. Anthocyanins are a group of flavonoids in fruits such as blackberry, blueberry, cranberry, raspberry, strawberry, and boysenberry (*Rubus* sp.), range from 200 to 4950 mg. kg⁻¹ of fresh fruit. Consumption of 100 to 150 g (-1cup) of these fruits could easily result in an intake of 100 to 200 mg of anthocyanins [7].

Materials and Methods

In the present study was analyzed antioxidant contain from DGT, Orange, Pomegranate, Red grapes, Strawberry and Developed Fruitbeverage. Four samples was prepared in the form of different ratio mixing with water and evolution by sensory score and selected sample analysis of their anti-oxidant concentration.

Total Phenol by FolinCioculten method

Sample Preparation is 10 gm of sample was mixed with 25ml 80% methanol, shaker for 2 hr, centrifuged at 8000rpm for 10min, collected supernatant. Standard of Gallic acid working solution (20-100µg) and made up volume 8ml with distilled water, 0.5ml of folincioculten (1:1) After 1 min add 1.5ml of sodium carbonate solutions, incubated for 2 hours at dark place and the reading 765nm on UV Spectrophotometer. For Sample, 0.1 ml of extracted sample and blank 8ml of D/W was taken and treated same as standard.

Flavonoid by using Kosalecet et al method

Extracted Total phenol sample 20ml evaporated in a water bath, add 2ml of 80% of methanol. Standard working solution of

catchin (20-100µg), 4ml D/W, 0.3ml Sodium nitrite, Incubated for 5 minutes, 0.3ml of aluminum trichloride, 2ml Sodium hydroxide, volume made by the Distil water and read at 510 nm on UV Spectrophotometer. For sample take 1ml and blank 1.5ml of D/W and treat same as standard.

Anthocyanin Pigment Content by AOAC Official Method

The maximum Extracted sample Solution portion added should be 10ml (1 part test portion, 4 parts buffer) so as not to exceed the buffer capacity. Sample Solution diluted (Mixed) with pH 1.0 buffer and same sample diluted with pH 4.5 buffer read at both 520 and 700 nm. The diluted sample portions are read versus a blank with distilled water.

Note: - Measure absorbance within 20–50 min of preparation. If the diluted test portion is excessively turbid, clarify by centrifuging or filtering before measurement.

Total Antioxidant Capacity by Macue

Extracted Sample 0.5ml add 0.5ml Methanol, 3ml DPPH reagent, incubated at 37°C for 20 minutes, measured at 517nm. The control sample was DPPH alone. Methanol was used as blank. For standardization Gallic acid use. Not DPPH Dye should be use after reach $OD \leq 1$

Vitamin-C by using Roe and Kurther

Sample preparation takes 2 gm sample, add 10 ml of 4% oxalic acid, centrifuge for 10-15 minutes. Collect the supernatant make up the volume 25 ml 4% oxalic acid and treat with a pinch of charcoal, Standard (Ascorbic acid) working 10 ml, blank 10 ml of 4% oxalic acid and sample 10ml titrate it against dye 2-6 dichloroindophenolblue, end point pink color.

Development Of Fruit Beverage

Fruit beverage was developed from pure fruit juice and DGT (dried green tea) Extraction (2 GM of DGT in 100ml of water boiled for 15-20mins), after that Fruit beverages was evaluation of antioxidant content. For the preparation of fruit beverage all required ingredients were purchased from the local market of

Anand.

Standardization of Fruit Beverage

The Fruit Beverages developed from DGT, Orange, Pomegranate, Red grapes, Strawberry, water were mixed in 5 different ratios as mentioned below. Sensory evaluation was done by 10 trained staff a member of the APMS campus Anand and one ratio (S4) was selected for further evolution. Sensory was done by composite scorecard for selection of fruit beverage. In sensory score card include colour, flavour, consistency, taste, after taste, astringency, over all acceptability, absent of defect.

Dehydrated Green Tea= DGT, Orange=O, Pomegranate juice = P, Red grapes = RG, Strawberry juice = S, Water=W.

S 1 : 10 ml GT+15 ml O+15ml P+15ml RG+15 ml S+30 ml W
S 2: 10 ml GT+10 ml O+20ml P+10ml RG+20 ml S+30 ml W
S 3: 10ml GT + 20ml O+10ml P + 20 ml RG+10ml S+ 30ml W
S 4: 20ml GT + 15ml O + 20ml P+15ml RG + 20ml S+ 10ml W
S 5: 20ml GT+20ml O+15ml P+20ml RG+15ml S + 10ml W

Result and Discussions

Total phenol, Flavanoid, Vitamin C, Anthocyanin, Total Antioxidant Capacity content of Strawberry, Pomegranate, Red grapes, Orange, DGT which were found highly significant difference (**P < 0.001) between comparisons to each other. (Table no 1.) where as Graphical show the DGT contain higher amount of Total phenol, Flavanoid, Vitamin C, and Pomegranate were contained higher amount of The Anthocyanin and The Total Antioxidant Capacity. (Fig 1) Fruit beverage was contained all antioxidants with good amount. (Table no 2). The sensory score for color, flavor, consistency, taste, aftertaste, Astringency, absence of defect, overall acceptability, was the highest score observed in Sample 4. (Table no. 3) and (Fig 2)

Conclusion

Antioxidants have become a recent interest to health conscious individuals. As a result, beverages containing high concentrations of Antioxidants are becoming increasingly popular. This is due to the health benefits that accompany polyphenol consumption, derived from their antioxidant properties. Antioxidant has been

Table 1. Total phenol, Flavanoid , Vitamin C, Anthocyanin, Total Antioxidant Capacity content of Strawberry, Promogrent, Red grapes, Orange, DGT

Sample	Total phenol mg %	Flavanoid mg %	Vitamin C mg %	Anthocyanin mg %	Total antioxidant Capacity mg %
Strawberry	151.8 ^b ±8.743	79.2667 ^b ± 0.24037	66.6667 ^c ± 1.66667	16.2 ^c ± 0.11547	83.1733 ^c ± 0.87027
Promogrent	158.927 ± 3.32306	74.7333 ^b ± 2.23035	16.6667 ^a ± 1.66667	32.4 ^d ± 0.1	89.8 ^c ± 1.01489
Red grapes	113.1333 ^{ab} ± 4.54252	9.6 ^a ± 1.37477	11.6667 ^a ± 1.66667	0.3367 ^b ± 0.05207	37.9333 ^b ± 1.73622
Orange	76.3667 ^a ± 0.81104	7.1067 ^a ± 0.10975	43.3333 ^b ± 1.66667	0.2367 ^{ab} ± 0.00667	17.1167 ^a ±3.64398
Green tea	2446.9 ^c ±47.69036	226.0333 ^c ±19.8696	136.6667 ^d ±3.33333	0.05 ^a ±0.001	39.6 ^b ±9.16642
F value	2264.413 ^{**} ±0.000	98.390 ^{**} ±0.000	578.750 ^{**} ±0.000	39660.218 ^{**} ±0.000	48.449 ^{**} ±0.000 ^a

Figure 1. Comparison of Total phenol, Flavanoid , Vitamin C, Anthocyanin, TotalAntioxidant Capacity content of straw- berry, promogrent, red grapes, orange, DGT

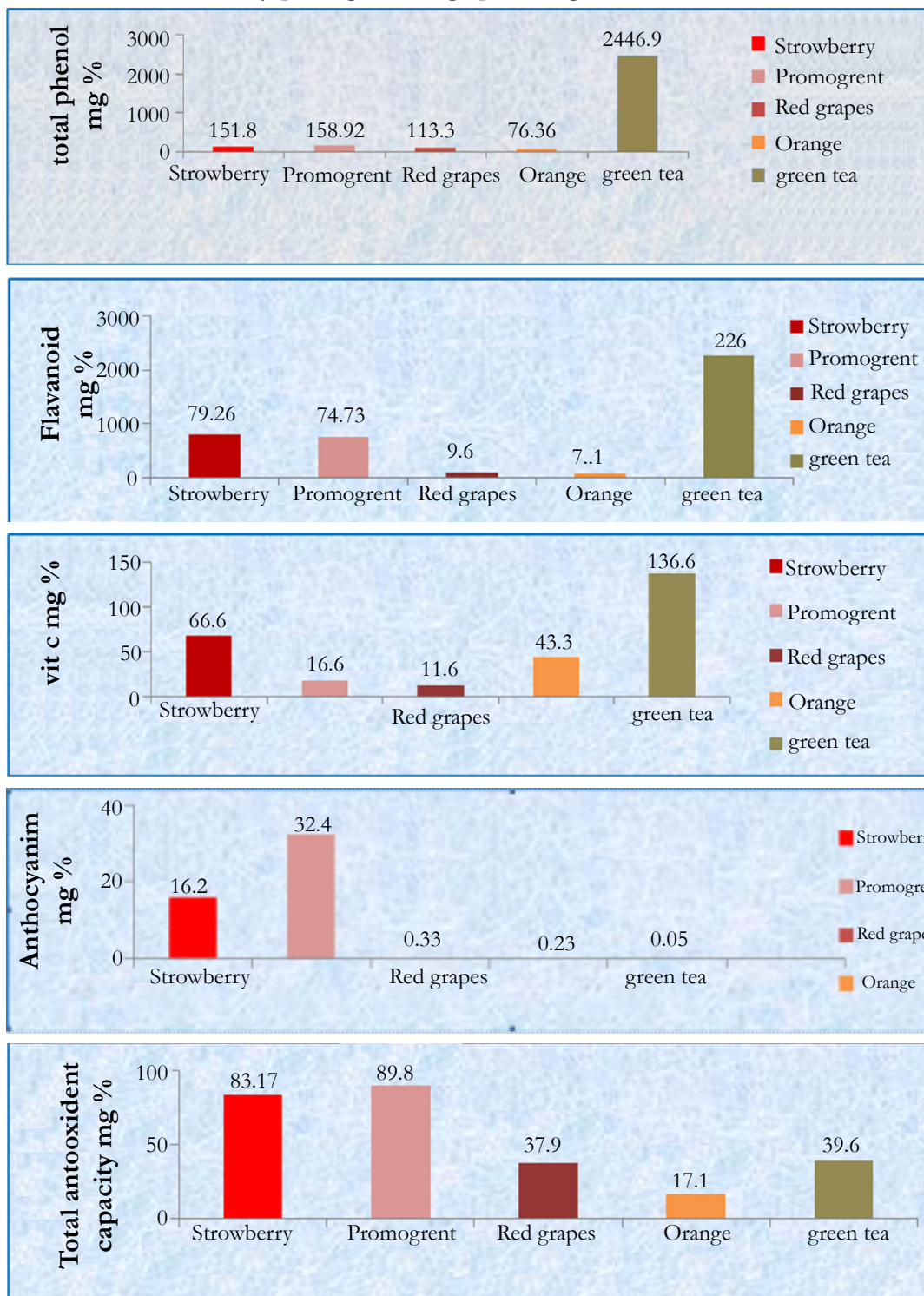


Figure 2. Comperication of sensory score of fruit beverages at different ratio

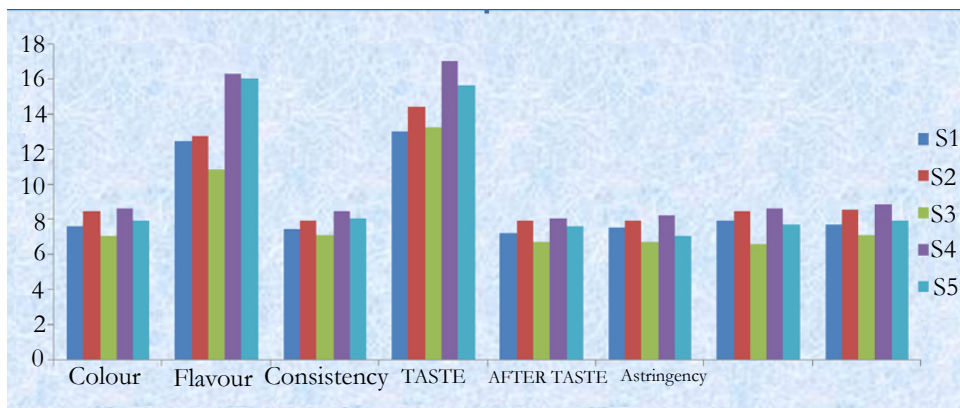


Table 2. Total phenol, Flavanoid , Vitamin C, Anthocyanin, Total Antioxidant Capacity content of Fruit Beverage

Sample	Total phenol mg %	Flavonoid mg %	Vitamin C mg %	Anthocyanin mg %	Total antioxidant Capacity mg %
Fruit beverages	282.667 ±7.62066	44 ±4.26654	116.667 ±1.66667	5.493 ±.10990	82.053 ±2.87370

Table 3. Sensory score of Fruit beverages at different ratio

SENSORY EVALUTION	COLOR	FLAVOR	CONSISTENCY	TASTE	AFTER TASTE	ASTRINGENCY	ACCEPTABILITY	ABSENCE OF DEFECT
Sample 1	7.6 ^{ab} ±0.55	12.4 ^{ab} ±2.42	7.4 ^{ab} ±0.77	13 ^a ±2.19	7.2 ^{ab} ±0.76	7.5 ^{abc} ±0.87	7.9 ^b ±0.69	7.7 ^{ab} ±0.86
Sample 2	8.4 ^{bc} ±16	12.7 ^{ab} ±2.61	7.9 ^{ab} ±0.79	14.4 ^{ab} ±2.26	7.9 ^{ab} ±0.63	7.9 ^{bc} ±0.69	8.4 ^b ±0.55	8.5 ^{bc} ±0.73
Sample 3	7 ^a ±0.07	10.8 ^a ±2.46	7.1 ^a ±0.79	13.2 ^a ±2.23	6.7 ^a ±0.72	6.7 ^a ±0.61	6.6 ^c ±0.48	7.1 ^a ±0.50
Sample 4	8.6 ^c ±0.55	16.3 ^b ±2.17	8.4 ^b ±0.40	17 ^b ±2.15	8 ^b ±0.72	8.2 ^c ±0.59	8.6 ^b ±0.29	8.8 ^c ±0.36
Sample 5	7.9 ^{abc} ±0.57	16 ^b ±1.82	8 ^{ab} ±0.60	15.6 ^{ab} ±2.07	7.6 ^{ab} ±0.82	7 ^{ab} ±0.47	7.7 ^b ±0.54	7.9 ^{abc} ±0.42
F- value	4.00** ±0.007	3.59** ±0.01	1.83 ^{NS} ±0.13	1.95 ^{NS} ±0.11	1.76 ^{NS} ±0.15	2.91* ±0.03	7.22** ±0.00	4.05** ±0.00

found to inhibit reactive oxygen species formation and protect against coronary heart disease, inhibit the development of certain types of cancer, such as breast cancer, and slow tumor growth, help prevent chronic disease. By considering this point an evolution of antioxidant, developed fruit beverage and sensory evolution studies was conducted. The fruit beverage contains large quantities of all the antioxidants which prevent human health problems.

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