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Quality evaluation of herbal squash developed from rosemary herb and amla

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Abstract

Amla juice, Rosemary extract, Sugar syrup and Sodium benzoate were blended to form a herbal squash, which was stored at 5 °C for 10 days. Physico-chemical and sensory analysis was done on day 0, 5, and 10. Pure Amla squash was taken as Standard and two variations, V1 and V2, were formulated with different quantities of Rosemary extract incorporated in it. Only slight changes in the Physico-chemical properties were observed. There was no change in the Total Soluble Solids content of both, the Standard and Variations, during the period of storage. The titratable acidity subsequently increased and pH gradually decreased during the storage period. Addition of rosemary extract to Amla squash has increased the Vitamin C content. Total Sugars content and reducing sugar content was found to be the same during storage period. A panel of 20 semi trained members found higher acceptability for Variation 2(V2), with a score of 7.45 out of 9 when compared to the Standard.

Keywords: Herbal squash, Rosemary herb beverage, Vitamin C enriched beverage, Squash, Physicochemical analysis of herbal squash.

1. Introduction

Squash is a ready to drink beverage, which must be reconstituted with water before consumption. The main constituent of squash is sugar syrup mixed with fruit extract. Nowadays, herbal extracts are added so as to enhance the sensory and therapeutic value of the product. *Phyllanthus emblica*, commonly known as Indian Gooseberry (Amla) is a fruit with many therapeutic uses. It is one of the precious gifts of nature to mankind. Amla, has been used in Ayurveda, the ancient Indian system of medicine since ancient times. It has been used for treatment of several disorders such as common cold, scurvy, cancer and heart diseases. It is believed that the major constituent responsible for these activities is vitamin C (ascorbic acid). Not only it is a rich source of Vitamin C, 1 g of vitamin C per 100 ml fresh juice ^[1], but also the Vitamin is quite stable during processing when compared to the Vitamin C present in other citrus fruits ^[2].

Rosmarinus officinalis L., commonly known as Rosemary is a powerful herb belonging to the family Lamiaceae that originates from the Mediterranean region ^[3]. It has many culinary uses and medicinal benefits. It is useful in curing conditions related to the brain and nervous system, cardiovascular, liver, respiratory, gastrointestinal, circulatory, reproductive and other conditions like headache and reducing menstrual cramps. Rosemary is rich in Vitamin C and has a high Total phenolic content which contributes to its antioxidant properties. Rosemary infusions are frequently used as home medicines, have antioxidative and pharmacological properties related to the presence of phenolic compounds, especially phenolic acids and flavonoids. Studies have shown that on consumption of rosemary leaf powder there is an increase in Vitamin C levels in the body ^[4].

Thus the central idea behind incorporating rosemary extract is to compensate for the loss of Vitamin C that occurs during processing. This is a new product developed in the form of a natural health drink with enhanced Vitamin levels. Both Amla and rosemary has a complementing flavour and so the extracts of both were blended together to formulate a therapeutic squash.

2. Materials and Methods

Fully matured and fresh amla were procured from a domestic market in Chennai. Rosemary herb was procured from a supermarket in Chennai. Pure Amla Squash was taken as standard and Variations were formulated with different amounts of rosemary extract incorporated in it.

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The following table showcases the amount of ingredients for standard and variation.

2.1 Preparation of Rosemary extract

For preparation of rosemary, 2 variations were formulated.

Table 1: Preparation of Rosemary extract

Ingredients	I	II
Rosemary Herb	10g (5%)	20g (10%)
Water	200ml	200ml

Rosemary extract was prepared adopting decoction method of extraction. The yield of rosemary extract was as follows. 10g in 200ml water heated to 65 °C yielded 172ml of rosemary extract. 20g in 200ml water heated to 65 °C yielded 175ml of rosemary extract (Table 1). Among these, the second variation was found to have good sensory appeal. The vitamin C content of the extracts was also analysed.

2.2. Preparation of Standard Amla Squash:

Amla was cut into pieces and the seeds were removed. These pieces were then ground in a mixer to a paste and using a muslin cloth the juice was extracted (300g of Amla yielded 250ml of juice). Simultaneously, the sugar syrup was prepared. The process of heating of sugar and water mixture was completed immediately after the sugar dissolved. The syrup was cooled down to 35 °C and amla extract was added, mixed well and again heated in a low flame for 5 minutes. The squash was cooled down to room temperature and then Sodium benzoate was added as preservative. It was then filled with clean PET bottles and sealed. The sealed bottles were stored at 5 °C.

2.3 Preparation of experimental squash

Amla juice was extracted in the same manner as mentioned above. Weighed amount of rosemary and water was taken in a pan separately and heated to 65 °C, cooled down, the herbs were filtered and the extract was separated. Since the herb contains all essential vitamins, the water was not allowed to boil at 100 °C, so as not to lose out on the therapeutic profile of the product. The prepared extract was then measured and poured into the sugar syrup along with amla extract. Sodium benzoate was added as preservative. The squash was then filled with clean PET bottles and sealed. The sealed bottles were stored at 5 °C.

Standard

Table 2 (a): Formulation of Standard Beverage

Ingredients	Quantity
Sugar	250g
Water	250ml
Amla Extract	250ml
Sodium Benzoate	0.015 g

Variations

Table 2 (b): Formulation of Experimental (V1&V2) Beverage

Ingredients	Quantity	
	Variation 1	Variation 2
Sugar	250g	250g
Water	250ml	250ml
Amla Extract	150ml	125ml
Rosemary Extract	100ml	125ml
Sodium Benzoate	0.015g	0.015g

3. Physicochemical and sensory analysis

3.1 Total Soluble Solids

Total Soluble solids was analysed by using a digital refractometer (Rudolph USA). A drop of sample was put on the refractometer prism and TSS was recorded as °Brix ^[5].

3.2 Titratable acidity and pH

10g well mixed juice was diluted to 100ml with distilled water. Titration was done with 0.1N NaOH and phenolphthalein as indicator. End point was pale permanent pink colour. pH was analysed using a pH meter ^[5].

3.3 Total and Reducing Sugars

Total and reducing sugars was analysed by Lane and Eynon's method.

3.4 Vitamin C

Sample solution equivalent to 0.2mg ascorbic acid was prepared in water containing 3% metaphosphoric acid. It was titrated against 2, 6 dichlorophenol indophenol solution of 0.5mg /ml concentration until the pink colour developed completely ^[5].

3.5 Sensory analysis

Sensory analysis was conducted using 9-point hedonic scale where 9 is "like extremely" and 1 is "dislike extremely". 20 semi-trained panelists carried out the sensory acceptance for the product ^[6].

4. Results and Discussion

4.1 Physicochemical analysis

4.1.1 Total Soluble Solids (TSS)

Total soluble solids was stable for all the samples during the time of storage. From Figure 1 it can be observed that the TSS for the standard was 49±0.00 (°Brix) and for both variations it was 46±0.00 (°Brix)

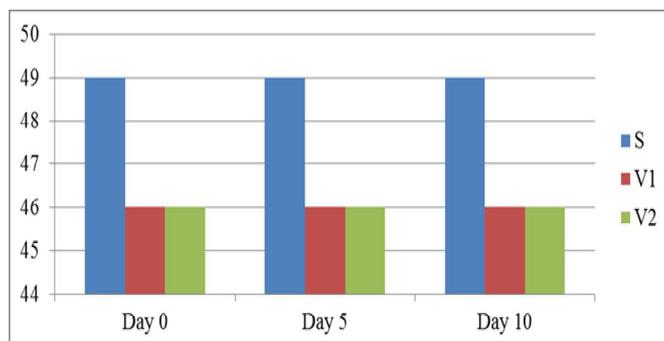


Fig 1: Total soluble solids content of herbal squashes

Table 3: Showing Total Soluble Solids for Standard and Variations on day 0, 5 and 10

TSS	Std	V1	V2
Day 0	49±0.00	46±0.00	46±0.00
Day 5	49±0.00	46±0.00	46±0.00
Day 10	49 ±0.00	46±0.00	46±0.00

4.1.2 Titratable Acidity

Titrate acidity increased on storage for all the three samples. It was found to be the highest in Variation 2. (Figure 2). The increase in acidity is due to the presence of ascorbic acid from Amla in the blends and also due to the presence of rosmarinic acid in rosemary herb.

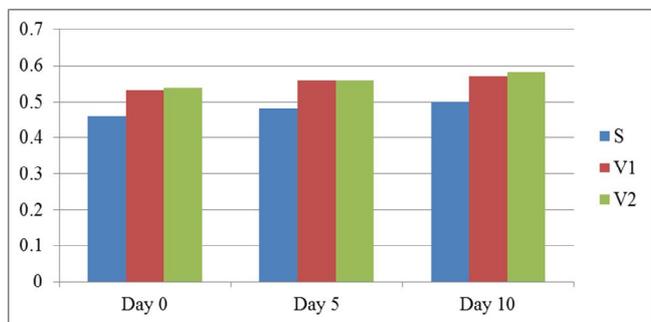


Fig 2: Titratable Acidity (expressed as mg of ascorbic acid) of Herbal Squashes.

Table 4: Showing Titratable acidity for Standard and Variations on day0, 5 and 10

Titratable acidity	Std	V1	V2
Day 0	0.46±0.01	0.53±0.00	0.54±0.01
Day 5	0.48±0.01	0.56±0.04	0.56±0.00
Day 10	0.50±0.02	0.57±0.00	0.58±0.00

4.1.3. Vitamin C content

Vitamin C content decreases on storage as it gets oxidised by presence of light and oxygen. Figure 3 shows the Vitamin C content of Rosemary extract. Figure 4 shows the vitamin C content of the formulated squashes. It can be observed that the vitamin C content of all the three samples decreased gradually. The Vitamin C content of Variation 2 was the highest and that of the Standard was the least. (Figure 4)

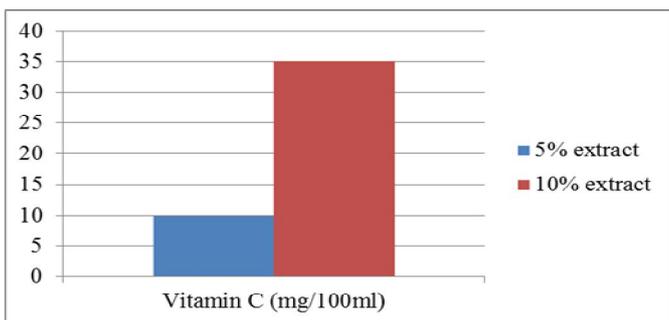


Fig 3: Vitamin C content of Rosemary extract

Table 5: Showing Vitamin C content of Rosemary extract

Vitamin C	5 % extract	10% extract
Fresh decoction	10±0.00 mg/100ml	35±0.00 mg/100ml

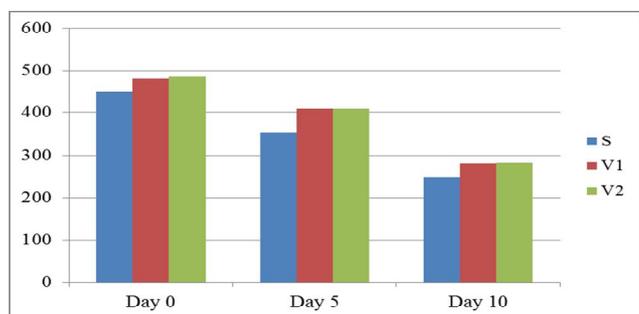


Fig 4: Vitamin C content of Herbal Squashes.

Table 6: Showing Vitamin C for Standard and Variations on day 0, 5 and 10

Vitamin C	Std(mg/100ml)	V1(mg/100ml)	V2(mg/100ml)
Day 0	450 ±0.02	480±0.01	484±0.01
Day 5	355 ±0.01	410±0.02	410 ±0.01
Day 10	250 ±0.01	280 ±0.01	282 ±0.02

4.1.4 Total and Reducing sugars

The reducing sugars and total sugars (Figure 5&6), were observed to be constant throughout the storage time. This data reveals that during storage sucrose was not broken down to glucose and fructose.

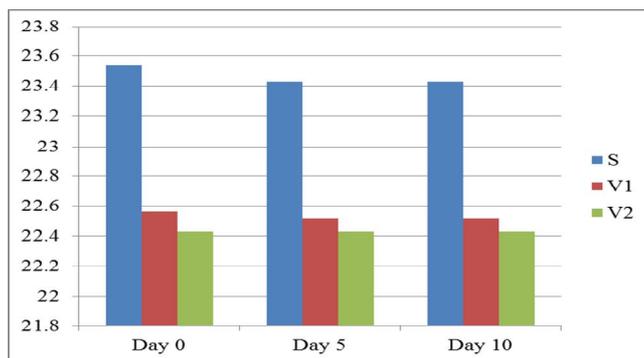


Fig 5: Reducing sugar content of herbal squash

Table 7: Showing Reducing sugar content for Standard and Variations on day 0, 5 and 10

Reducing sugars	Std	V1	V2
Day 0	23.54±0.01	22.56±0.01	22.43±0.01
Day 5	23.43±0.02	22.52±0.01	22.43±0.01
Day 10	23.43±0.02	22.52±0.01	22.43±0.01

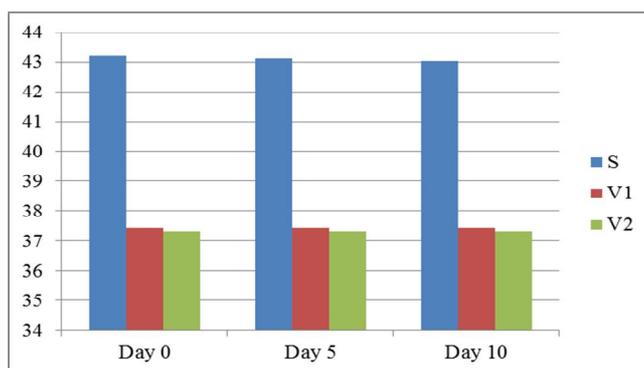


Fig 6: Total sugar content of herbal squash

Table 8: Showing Total sugars for Standard and Variations on day 0, 5 and 10

Total sugars	Std	V1	V2
Day 0	43.20±0.01	37.43±0.01	37.32±0.01
Day 5	43.10±0.02	37.43±0.01	37.32±0.01
Day 10	43.02±0.01	37.43±0.01	37.32±0.01

4.1.5 pH

The pH of all three samples decreased on storage. pH of the variations was same and higher than the standard. Figure 7

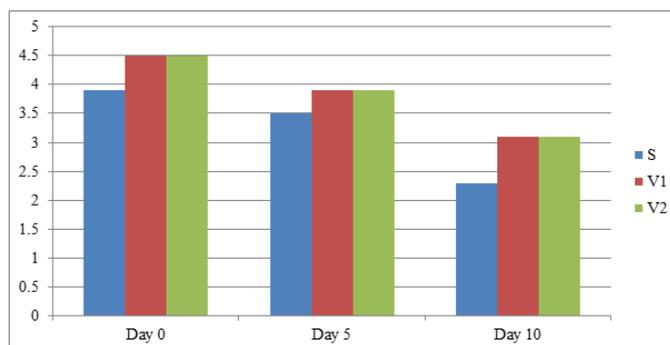


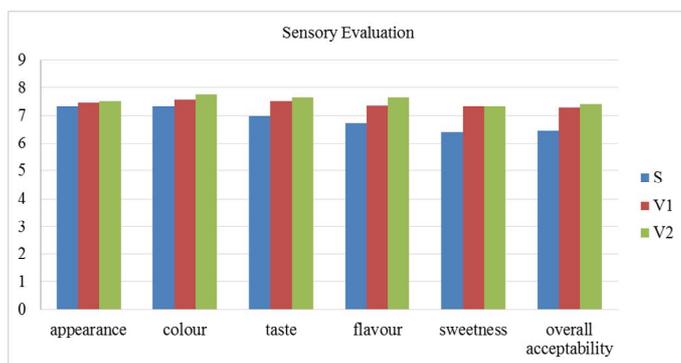
Fig 7: pH of herbal squash

Table 9: Showing pH values for Standard and Variations on day0, 5 and 10

pH	Std	V1	V2
Day 0	3.9±0.00	4.5±0.00	4.5±0.00
Day 5	3.5±0.00	3.9±0.00	3.9±0.00
Day 10	2.3±0.00	3.1±0.00	3.1±0.00

4.1.6 Sensory analysis

Sensory analysis was conducted using 9-point hedonic scale where 9 is “like extremely” and 1 is “dislike extremely”. 20 semi-trained panelists carried out the sensory acceptance of the product, and it was found that the 3rd sample, i.e. Variation 2 had an overall better sensory acceptance.

**Fig 8:** Sensory acceptance of herbal squash

5. Conclusion

It is concluded from the study that the squash prepared by incorporating 50% amla extract and 50% rosemary extract was acceptable in sensory analysis. Physicochemical analysis shows that the vitamin C content of amla squash can be increased by the addition of rosemary herb extract and is also stable during storage period. On the basis of above results revealed in the present study it can be concluded that this formulation can satisfy consumer taste and preferences. Hence Rosemary herb extract can be used for enrichment and fortification of Vitamin C in food products. Utilization of the herbs in the diet or by incorporation and optimizing their use in fruit beverages, an individual will get all the benefits related to health and also reduces the risk of serious diseases like cancer.

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