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“Studies on the Development and Shelf Life of Low Calorie Herbal Aonla-Ginger RTS Beverage by Using Artificial Sweeteners”

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Abstract

Indian gooseberry or aonla (Emblica officinalis) juice contains the high vitamin C (478.56 mg/100 ml). Ginger historically was called Jamaica ginger. It was classified as stimulant and carminative, and used frequently for dyspepsia and colic. Hence aonla juice was blended with ginger juice for increasing the nutritional and functional value of RTS beverages. Aonla juice and ginger juice were utilized at various combinations with sugar and artificial sweeteners (aspartame and saccharine) for preparation of nutritious ready-to-serve (RTS) beverages and evaluated for various physico-chemicals and sensory attributes during storage. The study revealed that the RTS beverage prepared by blending aonla and ginger juice with Aspartame scored maximum for almost all sensorial quality attributes such as appearance, color, flavor, taste and overall acceptability and also found ascorbic acid content (180 mg/100 g). A reducing trend was observed in ascorbic acid and increasing trend was observed in acidity content during the storage of beverage at room temperature over a period of 60 days. The beverage changed significantly with respect to TSS content along the storage period.

Keywords: Aonla; Ginger; RTS beverage; Artificial sweetener

Introduction

Beverages based on aonla and ginger continues to receive a considerable amount of attention reflecting a growing awareness of the potential of these products in the market place. These beverages have high nutritional quality and increased energy value. These could be particularly useful in place where is lack of food and improper nutrition leading to deficiencies of certain nutrients [1,2]. The development of any process for its economical utilization would be of great benefit to the beverage industry, the development of nutritionally value added product could therapeutically help on improving the health of consumers. Introduction of new types of value added beverages might improve socio-economic status of the country [3]. Aonla or Indian gooseberry (Emblica officinalis) is the fruit of this deciduous tree found mainly in India. This plant belongs to the family Euphorbiaceae. The fruit of this plant is round shaped with vertical stripes. It is greenish-yellow in color and tastes sour. The fruit is fibrous in nature. Aonla possesses the highest level of heat and storage-stable vitamin C known to man [4]. Pectin and minerals like iron, calcium and phosphorus are also found abundantly in the fruit. It is a very powerful anti-inflammatory herb [5,4]. Dried fruit is useful in diabetes, jaundice, diarrhoea and cough. Aonla is one of the three ingredients of the famous ayurvedic preparation, triphala, which is given to treat chronic dysentery, biliousness and other disorders. Aonla is the richest source of natural vitamin C. It provides up to 900 mg/100 g of juice of the fresh fruit. It has the same amount of ascorbic acid or vitamin C present in two oranges. Due to high Vitamin C content Aonla has anti oxidative properties. Aonla also has carminative properties. It helps in maintaining a healthy digestive system [1]. Ginger scientifically known as Zingiber officinale belongs to the family zingiberaceae. Ginger is contraindicated in people suffering from gallstones as the herb promotes the release of bile from the gallbladder. Ginger may also decrease joint pain from arthritis, though studies on this have been inconsistent, and may have blood thinning and cholesterol lowering properties that may make it useful for treating heart disease [6]. Aonla is presently underutilized fruit, but has enormous potential in the world market. Many attempts have been reported on utilization of aonla in the formulation of various products but still there is a lot of scope to explore the possibility of its utilization in beverage industries. Beverages based functional fruit aonla and ginger are currently receiving considerable attention as their market potential is growing. Blends of these beverages are highly nutritious. They may be particularly useful in places where there is inadequate nutrition, which could lead to nutritional deficiency diseases.

Material and Method

Preparation of Aonla juice

Fresh, fully ripe, sound aonla and ginger were used for extraction of juice. The each fruits were cleaned, thoroughly washed, blanched and blended in a laboratory blender to a pulp and the juice was extracted by filtering through muslin cloth and stored separately.

Preparation of Aonla and ginger based RTS using sugar and artificial sweetener

The aonla and ginger beverages were prepared by blending of aonla and ginger pulp in different proportions in the same ratio (100 ml: 2.5 ml) [7]. But with three sample sugar (control) aspartame (sample A) and saccharine (sample B) respectively. The recipe for preparation of 100 ml aonla juice and 2.5 ml of ginger juice with addition of sugar aspartame and saccharine in varying proportions is presented in table 1 [5,6]. Thus prepared beverages was filtered and filled in previously sterilized glass bottles (200 ml) leaving 2.5 cm head space and sealed.

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aitight by crown corking. Then in bottle sterilization was done at 105°C for 10 min and cooled to room temperature and stored at 7 ± 1°C for storage studies [1]. Samples were drawn at a regular interval of 15 days and evaluated for various quality attributes.

**Standardization of low calorie Anola-ginger RTS beverages**

In the present investigation we were prepared three sample i.e. control sample using sugar, sample A using aspartame and sample B using saccharine and compare their nutritive value respectively [8,9].

| Parameters          | Control Sample | Sample A | Sample B |
|---------------------|----------------|----------|----------|
| Aonla juice         | 100ml          | 100ml    | 100ml    |
| Ginger juice        | 2.5 gm          | 2.5 gm   | 2.5 gm   |
| Sugar               | 5.3 gm          |          |          |
| Aspartame           | 0.2gm           |          |          |
| Saccharine          | 0.02 gm         |          |          |
| Citric acid         | 2 gm            | 2 gm     |          |
| Sodium benzoate     | 0.57 gm         | 0.57 gm  |          |

Table 1: Standardization of low calorie Anola-ginger RTS beverages.

**Proximate analysis**

The proximate analysis of aonla-ginger RTS beverages were done for different parameters. The prepared beverage was analyzed for total soluble solids (TSS) by Refractometer (Abbe Refractometer Model 2WAJ) for two months storage at 15 days intervals. A few drops of well homogenized sample were taken on prism of refractometer and direct reading was taken by reading the scale in meter as described in AOAC [10]. The pH of each sample was determined with digital pH meter (InoLab 720, Germany). A sufficient quantity (50mL) of Beverage was taken in 100mL beaker and pH meter was used to record pH according to method explained in AOAC [10]. The acidity in each sample was determined according to standard procedure given in AOAC [10].

10mL of Beverage along with 100mL water was taken and then titrated with 0.1 N NaOH using phenolphthalein as an indicator (1-2 drops) till light pink color was achieved [11,3].

**Flow sheet 1 of herbal Aonla ginger RTS by using sugar/aspartame/saccharine**

**Organoleptic evaluation**

Sensory evaluation was made through panel of 10 semi-trained judges. The panel evaluated the acceptance level of beverage for color, flavor, taste and overall acceptability. A 9-point hedonic scale was used for this purpose [5]. The data obtained were subjected to statistical analysis using analysis of variance technique and comparison of means by LSD test [5].

**Statistical analysis**

The data generated in the experiments were recorded and subjected to statistical analysis using standard procedure [12]. The standard errors (SE) and critical differences (CD) at 5% level of significance were worked out for comparison of treatments and presented in the respective tables.

**Result and Discussion**

**Proximate analysis of Aonla and ginger**

The data pertaining to the various chemical and physical characteristics of Aonla and mango ginger are presented in table 2, 3 and 4. It clearly indicates that Aonla were as expected rich in ascorbic acid. The results obtained with respect to chemical characteristic are in agreement with the earlier studies [13].

**Physical properties of fresh Aonla fruits and ginger**

| Physical Parameters          | Aonla | Ginger |
|------------------------------|-------|--------|
| Shape                        | Oval To Round | Longitudinal |
| Colour                       | Light Green Yellowish | To Light brown to Dark Brown |
| Length                       | 2.95 cm | 6.18 cm |
| Breadth                      | 2.77 cm | 3.575 cm |
| Weight of Fruit              | 16.80 gm | 37.69 gm |
| Juice                        | 55%   | 45%    |

Table 2: Physical properties of fresh aonla fruits & ginger.

**Chemical composition of Aonla and ginger per 100g**

| Physical Parameters          | Aonla | Ginger |
|------------------------------|-------|--------|
| Moisture (%)                 | 81.8  | 80.9   |
| Ash (%)                      | 0.5   | 1.2    |
| Acidity (%)                  | 2.5   | 0.6    |
| Vitamin-C (mg)               | 450   | 2      |

Table 3: Chemical composition of Aonla & ginger per 100g.

**Effect of storage on physico-chemical parameters of low calorie herbal Aonla ginger RTS**

**Beverage:** Effect of addition of ginger on physico-chemical parameters of Low calorie herbal aonla

RTS beverage and changes during storage was studied and obtained...
results is presented in table. Physico-chemical properties of beverages such as TSS, pH, ascorbic acid, acidity and overall acceptability were affected significantly by changing the ingredient. A reducing trend was observed in ascorbic acid whereas an increasing trend was observed in acidity content during storage. Significant change was observed in TSS content of the samples during 60 days of storage. Increase in percentage acidity might be due to the slight growth of micro-organism in the beverage [13,12].

Chemical parameters of low calorie herbal Aonla ginger RTS at 0 days

The sample B contains similar value for vitamin C and the TSS, while slight variation was occurred in acidity and pH as compared to sample A. Moreover the TSS of control was found to be increased than sample A and B, may be due to the addition of sugar, while in sample A and B the TSS was lowered due to the addition of aspartame and saccharin respectively in place of sugar.

Chemical parameters of low calorie herbal Aonla ginger RTS after 30 days

Chemical parameters of low calorie herbal Aonla ginger RTS after 60 days

Sensory evaluation

The beverages prepared by blending of aonla and ginger in different combination with sugar, aspartame and saccharin were analyzed for various sensorial attributes for their acceptance by using 9 point hedonic scale. The sensory scores obtained with respect to color, flavor, taste and overall acceptability are presented in (Figure 1 to 3). It is observed that beverage sample (A) prepared by addition of aspartame was liked most by sensory panel members as compared to the other combinations. The color, flavor and taste of sample A beverage maintained the highest organoleptic score other than the sample B and control sample beverages respectively. The storage study of aonla-ginger beverage revealed that all the characteristics i.e. appearance, color, flavor, taste and overall acceptability of sensory evaluation was in decreasing trend. This might be due to changes occurred during storage of beverage [12].

| Sample | Color | Taste | Aroma | Flavor | Appearance | Overall acceptability |
|--------|-------|-------|-------|--------|------------|-----------------------|
| Control | 5 | 8 | 8 | 8 | 8 | 8 |
| Sample A | 9 | 9 | 9 | 8 | 8 | 9 |
| Sample B | 8 | 7 | 7 | 8 | 7 | 7 |

| F-test | S.Ed | C.D |
|--------|------|-----|
| Control | S | S | NS |
| Sample A | S | S | S |
| Sample B | S | S | S |

Table 7: ANOVA for sensory analysis.

Conclusion

In the present investigation, attempts have been made to prepare and standardize the method for low calorie Aonla-Ginger RTS Beverage. The nutritious beverages with better storage life could be developed by
addition of aonla and ginger to certain extent. After preparation the quality of product was evaluated with the help of various experiments, like moisture content, ash content, ascorbic acid, pH etc. The quality of product was found good for a period 60 days. Herbal RTS prepared by Aonla- Ginger by using the artificial sweeteners like aspartame was proved to be the best among samples prepared and found to be organoleptically most accepted. The sweetness of the Product seems to be highly appreciated characteristic that must be related to the consumer habits.

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