

Development and Storage Studies of Therapeutic Made Ready to Serve (RTS) from Blend of Aloe Vera, Aonla and Ginger Juice

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Abstract

In present investigation the efforts have been made to prepare a therapeutic ready-to-serve (RTS) made from blend of aloe vera, aonla fruits and ginger juice extracts. The study was conducted to develop formulations of Aloe vera blend by mixing it with ginger, sweet lime and aonla. Varied ratio of the Aloe vera : ginger : aonla : sweetlime in the formulated drinks (40:5:15:40), (50:5:15:30) and (60:5:15:20) were used for F1, F2 and F3 respectively. The different blends were homogenized and pasteurized at 8000 rpm for 2 min and 85°C for 10 minutes respectively. The blended therapeutic RTS were analyzed for its different physicochemical as well as sensory quality and sensory quality evaluated by adopting 9 point hedonic scale. Among different blended ratio for therapeutic RTS, sample C blended ratio of 70:15:15 was reached with highest sensory scores for overall acceptability.

Keywords

Aloe vera ; Aonla fruit; Ginger; Therapeutic RTS; Beverages

Introduction

Present scientific investigations on medicinal and therapeutic properties of *aloe vera* made it global valuable ingredient for food, cosmetic and pharmaceutical industry. The functional properties and therapeutic benefits of Aloe vera are known globally. In the cosmetic and toiletry industry, it has been used as base for lotions, soaps, shampoos, face washes and other products. It is being extensively preferred as a non-synthetic product with medicinal and therapeutic properties.

Aloe vera or *Aloe barbadensis* Miller belongs to Lileacea family traditional being utilized as traditional folk remedy. There are over 251 species of aloe vera grown around the world; However only two species viz. *A. barbadensis* Miller and *A. aborescens* are considered the most importance one for processing point of view. A fresh aloe vera leaves are used to obtain 2 components, firstly bitter yellow latex from peripheral bundle sheath called *aloe vera* sap and a mucilaginous gel from parenchymatous tissue. It can be used as a valuable ingredient for food application due to its biological and functional properties. *Aloe vera* gel has a bitter taste which can be unpleasant in raw state and its taste could be enhanced with addition of some other fruit juices.

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 aonla fruit is greenish yellow in colour with sour taste. The fruit possesses the highest level of heat and storage stable vitamin C known to man. Pectin and minerals like iron, calcium and phosphorus are also found abundantly in the fruit. It is a very powerful anti-inflammatory herb. Aonla is one of the three ingredients of the famous ayurvedic preparation, triphala, which is given to treatment for chronic dysentery, biliousness and other disorders. Aonla fruit is the richest source of natural vitamin C. It provides

up to 900 mg/100g 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. Clinical *in vivo* and *in vitro* assays have shown that fruit juice extract has antioxidant and anti-inflammatory activities and create positive effects on glycemia, insulin, dyslipidemia, blood pressure and foam cell formation; additionally, some mechanisms of these effects have been reported. 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.

Ginger scientifically known as *Zingiber officinale* belongs to the family Zingiberaceae. The sweet lime fruit is another crop which is processed commercially into various forms mainly juice, frozen concentrates, squash and RTS drinks which provide energy, moderate quantity of vitamin C, potassium, bioflavonoid and folic acid and is considered as an essential item of breakfast. 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 comparison of vitamin C content in common fruits this have been inconsistent, and may have blood thinning and cholesterol lowering properties that may make it useful for treating heart disease.

Name of the fruits	Content of Vitamin C (mg/100gram of fresh fruit juice)
Aonla	900
Guava	228
Papaya	62
Strawberry	59
Orange	53

Therapeutic Ready To Serve based blends of aloe vera, ginger juice and aonla extracts continues to receive a considerable amount of attention reflecting a increasing awareness of the potential of these products in the indian market. These beverages have great nutritional quality and increased energy value especially therapeutic properties into the beverages. These could be particularly helpful in place where there is lack of food and improper nutrition. The development of any method for its economical utilization would be of tremendous benefit to the therapeutic beverage industry, the development of nutritionally value added product could therapeutically help on improving the health of consumers. Introduction of new varieties of value added beverages might improve socio-economic status of nation.

Aloe vera leaves, ginger and aonla fruit are the cheapest sources from every non-urban area in India and they are currently underutilized fruits, but have tremendous potential in the world market. Many trial have been reported on utilization of aloe vera, aonla and ginger juice extracts in different blends with other fruits and made out various types of beverages and its products. Blended drinks are good substitute for development of new products to provide advantage of taste, nutrition as well as medicinal properties. It has been stated that utilization of *aloe vera* gel or juice in the formulation of a beverage with other fruit juices. Hence, current work was carried to desired level of *aloe vera*, aonla and ginger juice extracts in development of blended therapeutic Ready To Serve with desirable properties.

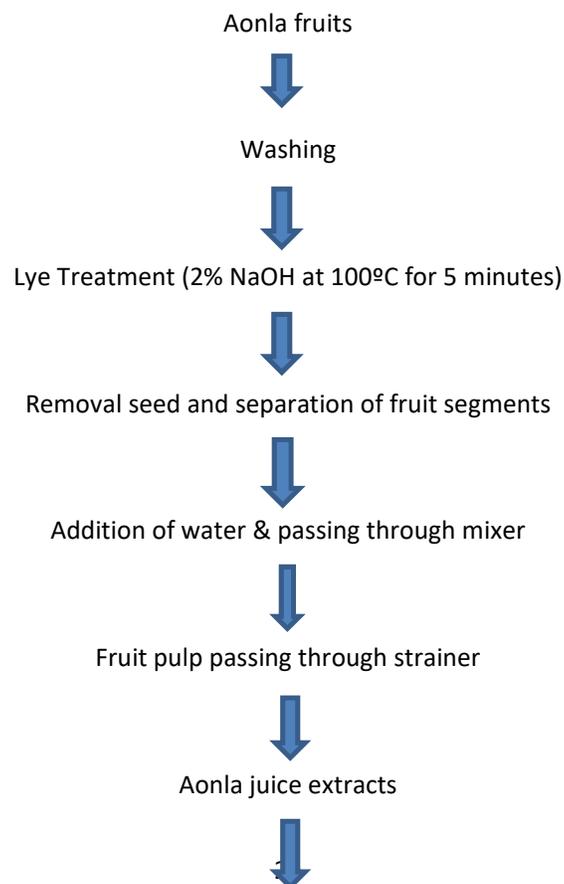
Materials and Methods

○ **Preparation of Aloe vera juice**

The chemical composition of juices depends majorly upon the method of juice extraction. *Aloe vera* gel was extracted using cold extraction method and processed into juice as per the method reported by Satwadhar et al. freshly harvested *aloe vera* leaves were dipped into 500 ppm of potassium metabisulphite (KMS) solution and washed thoroughly with distilled water and kept for flash cooling to 5°C for gel stabilization. Further leaves were cut vertically into two halves and gel was separated using stainless steel knife, it was allowed to precipitate for 12hrs and then homogenized using mixer grinder and enzymatically treated with 1% pectolytic enzyme at 50°C for 20 minutes. Then it was filtered and pH was adjusted to 3.0 by adding citric acid and ascorbic acid to control browning while high heat treatment. Further it was deaerated, pasteurized, flash cooled and stored. During the pasteurization pectolytic enzyme was inactivated. The obtained juice was packed at refrigerated temperature until future use.

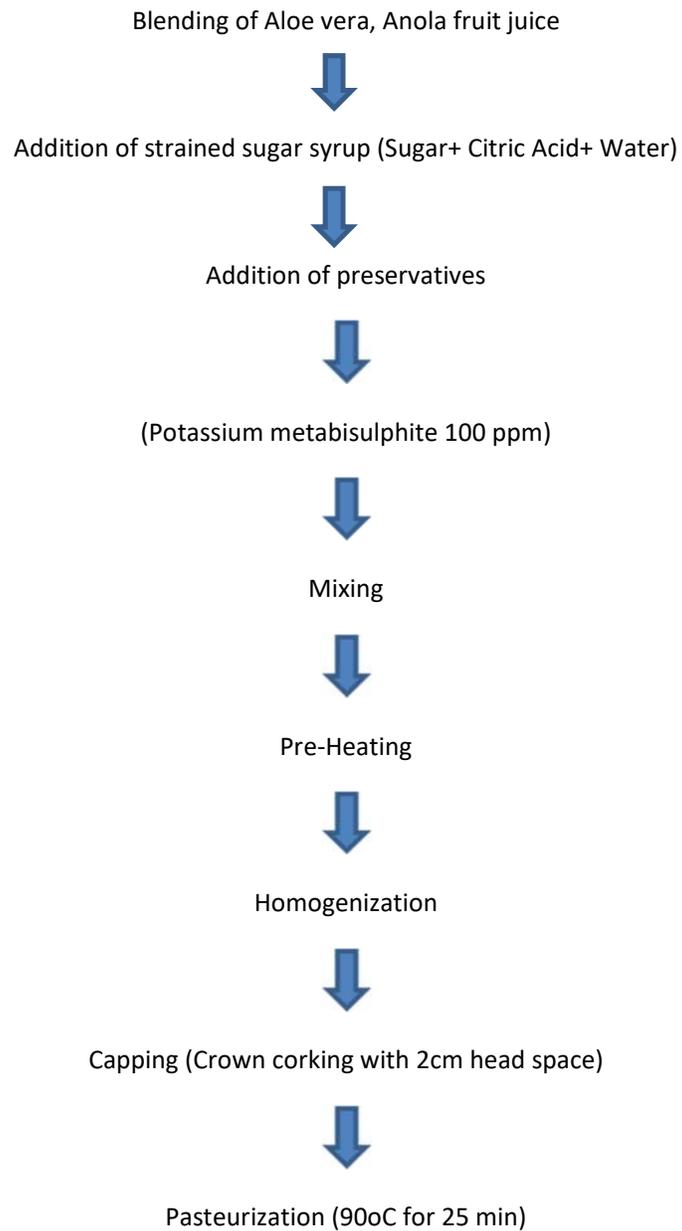
○ **Preparation of aonla and ginger juice**

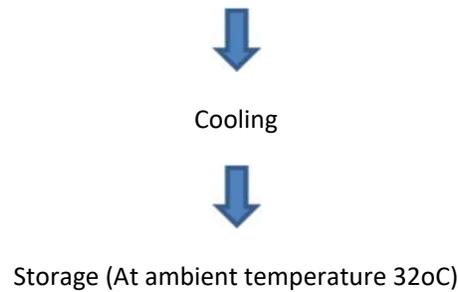
Fresh, fully ripe, sound aonla and ginger were used for extraction of juice. Each fruit was cleaned, thoroughly washed, blanched and blended in a laboratory blender to a pulp and the juice was extracted by filtering through muslin cloth and packed at refrigerated temperature simultaneously.



Storage (at refrigerated temperature)

(Fig 2: Process Flow chart for Aonla fruits juice)





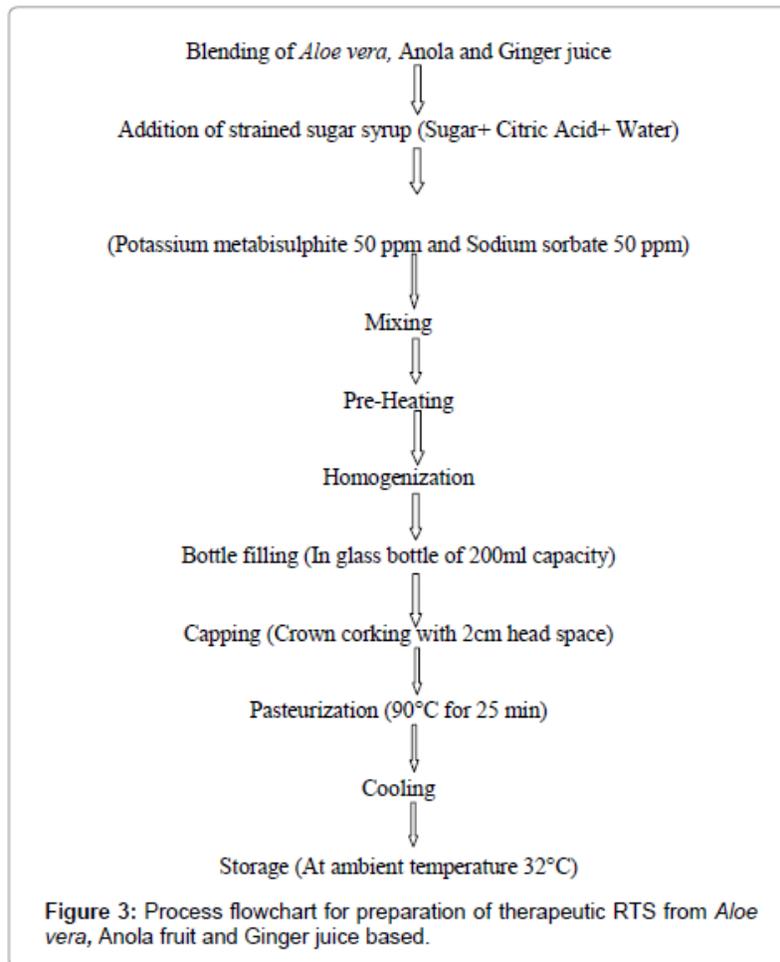
(FIG 3: Process flowchart for preparation of therapeutic RTS from Aloe vera, Aonla fruit and Ginger juice based)

Physico-chemical qualities

Physicochemical qualities of the Ready To Serve beverages were analyzed using preferred standard of Association of Official Analytical Chemists (AOAC) methods (2005). The difference in juice extract percentage may be due to variety, growing stage and maturity of fresh fruits. On the basis of obtained results, it could be preferred that fresh fruits and well matured with certain physical properties should be preferred for extraction of juices for maximum %. The titrable acidity was determined by titrating the RTS beverages of various pulp concentrations with standard alkaline and the conclusion were expressed as percentage of anhydrous citric acid. Ascorbic acid content of beverages was titrimetrically estimated by indophenol dye method. The pH was determined by an Electronic pH meter (Mettler Toledo, UK). Lane-Eynon method was performed to determine the total sugar content of the beverages. Hand-held refractometer (ATAGO-S-28E model) was used to estimate the total soluble solids (TSS) and the values were expressed as °Brix. The analyses were replicated three times.

Standardization of blended therapeutic RTS beverage preparation

Blended therapeutic Ready To Serve beverages were prepared using 15% of blended juice extracts of aloe vera, aonla fruit and ginger, 15% of total soluble solid (TSS) and 0.3% of acidity at the time of preparation in all the formulated blends. The blended juice of different proportion of aloe vera, aonla fruit and ginger juices 50:25:25(A), 60:20:20(B), 70:15:15(C) and 80:10:10(D) respectively with 15% of sugar, 0.3% of acidity as percentage of anhydrous citric acid and 50 ppm of KMS and 50 ppm of sodium sorbet in one liter of distilled water. The controlled RTS beverage having ratio 50:50 of aonla fruit and ginger juice without *aloe vera* juice (Control). The undamaged, disease free, mature and ripe fruits were obtained from Pantnagar. District of Udham Singh Nagar, Uttarakhand.



Sensory quality evaluation

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The beverage samples were evaluated as described by Larmond for their sensory characteristics namely appearance, color, taste, flavor and overall acceptability by a trained panels comprising of 20 panelists drawn from faculty members and post graduate students of the Department.

Storage studies

The therapeutic Ready To Serve beverage with best blending combination and their proportion (on the basis of sensory evaluation) were stored in glass jars and kept at refrigerated temperature and changes were determined during storage at monthly intervals up to 6 months. TSS, pH and acidity during storage was measured by standard method and overall acceptability was measured on 9 Point Hedonic Scale by 20 semi-trained panel faculty members.

Result and Discussion

- Yield of Aloe vera gel

The *Aloe vera* gel is relatively new novel ingredient processing into beverages. Hence, it was preferred to collect the data pertaining to yield of gel from different structure of leaf obtained. The results are presented in table.

Sr. No	Structure of Leaf	Physical Properties		
		Weight of leaf (g)	Weight of Gel (g)	Gel yield (%)
1	Long developed	112.4	51	45.4
2	Medium developed	106.7	45	42.2
3	Small developed	93.5	39	41.7
4	Small spotted	89	31.3	34.7

It is observed from (Table 2) that long developed *Aloe vera* leaves recorded maximum weight (112.4 g) as gel yield (45.37%) while minimum weight of leaf (89g), weight of gel (31.3 g) and gel yield (34.71%) was measured for small spotted leaves. The difference in leaf structures and gel yield may be due to different growing stages, morphology and maturity profile of *aloe vera* leaves. On the basis of obtained results, it could be advised that long fully developed *aloe vera* leaves should be used for extraction of gel for maximum yield.

○ **Physical properties of aonla fruit and ginger juices**

Physical Parameters	Aonla Fruit	Ginger
Shape	Oval to Round	Longitudinal
Color	Light green with yellowish	Light brown to Dark brown
Length	2.1cm	4.8cm
Breadth	2.5cm	3.1cm

Weight of fruit	17gm	38.6gm
Juice	53%	37%

Prepared *aloe vera*, aonla and ginger juices were analyzed for their physical parameters.

Table 3: Physical properties of fresh *aloe vera*, aonla fruits and ginger juice.

Physical properties of fresh fruits of aonla and ginger juice observed from (Table 3) that recorded the juice extract (53%) and (37%) respectively. The difference in juice extract percentage may be due to variety, growing stage and maturity of fresh fruits. On the basis of obtained results, it could be suggested that fresh fruits and well matured with certain physical properties should be preferred for extraction of juices for maximum percentage.

Chemical properties of *aloe vera*, aonla fruits and ginger juices

Chemical properties of *aloe vera*, aonla fruits and ginger juices have direct effect on ultimate quality and storage stability of therapeutic RTS beverages. *Aloe vera*, aonla fruits and ginger juice were analyzed for different chemical properties such as Moisture, pH, acidity, TSS, Vitamin C. The obtained data on chemical properties of *aloe vera*, aonla fruits and ginger juice extracts is presented in table below.

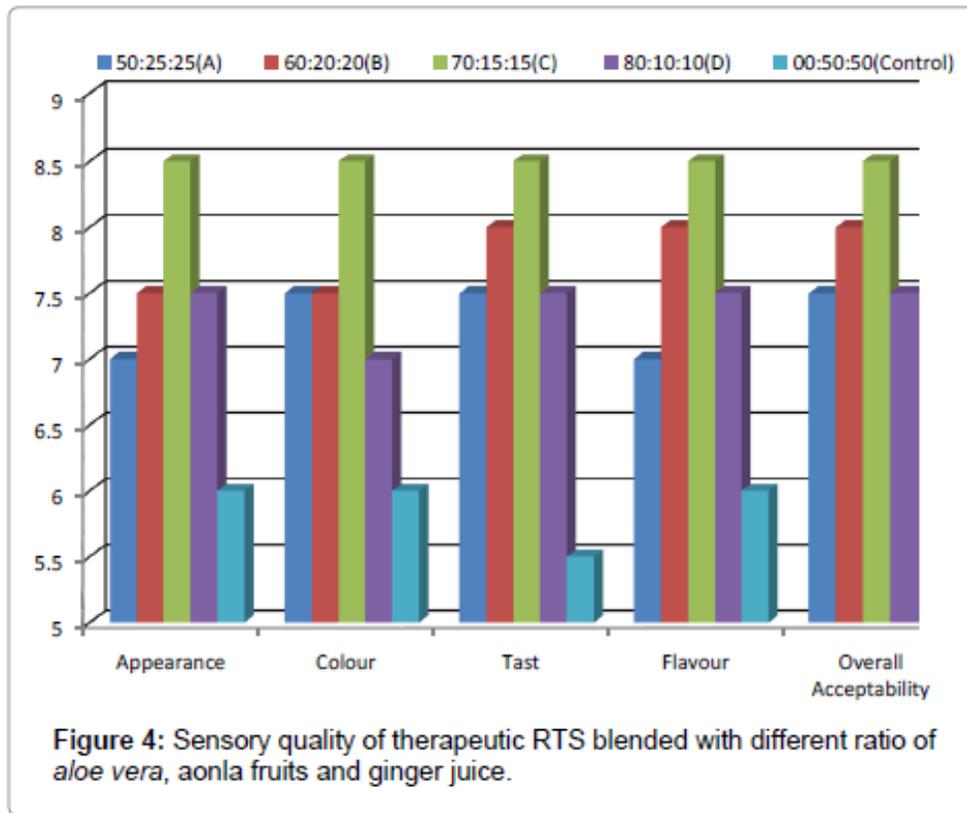
Sr. No	Constituents	<i>Aloe vera</i> Juice	Aonla Juice	Ginger Juice
1	Moisture (%)	97.6	82.5	81.9
2	pH	4.4	3.1	3.9
3	Acidity (%)	1.2	2.6	0.6
4	TSS (°Bx)	2.1	2.8	2.4
5	Vitamin C (mg)	7	900	2

Table 4: Chemical properties of *aloe vera*, aonla and Ginger juice.

It could be observed from the (Table 4) that moisture content of *aloe vera* (*A Bvera*) gel more than aonla fruits and ginger juices, from this point of view it could be predicted that chance of spoilage will be more when moisture content is increased. Aonla fruits and ginger juices fall under the category of low acidic fruits while *aloe vera* gel is observed to be acidic fruit.

Sensory quality evaluation of blended RTS beverage

Sensory quality of Ready To Serve blend beverage were determined on 9 Point Hedonic Scale and presented in [figure](#) .It could be observed from the figure that appearance, color, taste, flavor and overall acceptability of beverage improved with increase in concentration of *aloe vera* gel up to the level of 70% with decrease in concentration of aonla fruits juice upto the level of 15% and 15% of ginger juice extracts were excellent sensory score.



Storage studies

The data on changes in chemical properties and overall acceptability of blended juices of *aloe vera*, aonla fruits and ginger on therapeutic Ready To Serve during 6 months of storage is presented in **table**.

Sr. No	Storage period (month)	TSS (°Brix)	Acidity (%)	pH	Overall acceptability (out of 10)
1	0	12.0	0.30	4.90	8.50
2	1	12.1	0.31	4.88	8.41
3	2	12.4	0.32	4.85	8.33
4	3	12.8	0.32	4.80	8.25
5	4	13.2	0.33	4.76	8.12
6	5	13.7	0.34	4.68	7.92
7	6	14.4	0.36	4.50	7.81

Summary and Conclusion

In present survey, efforts were made to develop blended therapeutic Ready To Serve blends using *aloe vera*, ginger juices and aonla fruits. Long developed aloe vera leaves were found suitable for extraction of amla gel due to its greater yield of 45.37%. Aloe vera gel contained high moisture content while aonla fruits juice dominated in its vitamin C content. Sensory quality revealed that *aloe vera* gel could be successfully incorporated with amla fruits and ginger juices in development of blended therapeutic Ready To Serve blends with improved sensorial quality profile up to the level of 70% while with 15% amla fruits juice and 15% of ginger juice extracts. The storage studies revealed that blended therapeutic Ready To Serve made from aloe vera gel, ginger juices and aonla fruits extracts could be successfully stored for the period of 4 months without significant change in sensory qualities.

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