

Full Length Research Paper

Effect of dried ginger powder, fennel powder, cumin powder and fresh ginger extract addition on supari from aonla (*Emblica officinalis* Gaertn)

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This work was carried out to study the nutraceutical and biochemical properties of value added supari from aonla (*Emblica officinalis* Gaertn). Aonla supari was prepared by osmotic dehydration (OD) process by placing fresh aonla fruit in various concentration of brine solution (2, 3 and 4% (W/V)). Dried ginger powder, fennel powder, cumin powder and fresh ginger extract have been taken in different proportions and the final product was optimized based on their physicochemical parameters. The percentage composition of total phenol content and tannin content seems to increase after OD and drying in all the treated samples. While, it was found that, titrable acidity and ascorbic acid content decreased. Sensory evaluation and microbiological analysis was also carried out for the samples. Based on the over all acceptability and the physicochemical analysis, the samples S3 (2% salt concentration with 5 g/ml of cumin powder, 2 g/ml of dry ginger powder and 2 g/ml of fennel powder) and R3 (3% salt concentration with 5 g/ml of cumin powder, 2 g/ml of dry ginger powder and 2 g/ml of fennel powder) were optimized for further studies.

Key words: Aonla Supari, cumin powder, *Emblica officinalis*, fennel powder, osmotic dehydration, sensory evaluation.

INTRODUCTION

Today, consumer's awareness and demand for the nutritious and healthy food brought a new concept in the area of research. It covers wide range of fields in the life science, including formulation of health products/developments. These types of products are formulated for particular group of population affected with conjunctive health diseases. These products are defined as those which are rich in nutrients at the same time possess therapeutic effect against some disease. They are categorized as nutraceuticals. They can be described as 'any substance that is a food or part of a food that provides medicinal and/or health benefits, including the prevention and treatment of diseases (De Felice, 1995).

Aonla (*Emblica officinalis* Gaertn) is one among the

plant material which is rich in many nutraceutical compounds and being used in Ayurveda since ancient time. It has been used for treatment of several disorders such as common cold, scurvy, cancer and heart diseases (Rao et al., 1986) and it is believed that vitamin C (ascorbic acid) is the major constituent responsible for these activities. It shows antioxidant, anti-inflammatory, anti-mutagenic properties (Frei et al., 1989) on human beings. It is also effective in scavenging free radical.

However, some *in vivo* studies showed that antioxidant activities of aonla might not be attributed to ascorbic acid alone whereas it may be synergetic effect of other polyphenols such as ellagic acid, gallic acid, tannin, etc (Khopde et al., 2001). Aonla enhances the absorption of iron and assimilation of calcium in the diet and has many curative effects. The present research paper deals with the usage of aonla for the preparation of nutraceutical commercial products with the addition of fennel powder, cumin powder, fresh ginger extract and dry ginger

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Table 1. Formulation of dehydrated aonla supari.

Ingredient	S1	S2	S3	S4	R1	R2	R3	R4	T1	T2	T3	T4
Water (ml)	100	100	100	100	100	100	100	100	100	100	100	100
Salt (g)	2	2	2	2	3	3	3	3	4	4	4	4
Sample (g)	40	40	40	40	40	40	40	40	40	40	40	40
Dry ginger powder (g)	5	2	2	-	5	2	2	-	5	2	2	-
Fennel powder (g)	2	5	2	2	2	5	2	2	2	5	2	2
Cumin powder (g)	2	2	5	2	2	2	5	2	2	2	5	2
Fresh ginger extract (g)	-	-	-	5	-	-	-	5	-	-	-	5

S1 - 2% brine solution + 40 g aonla cubes + 5 g of dry ginger powder + 2 g of fennel powder + 2 g of fennel powder, S2 - 2% brine solution + 40 g aonla cubes + 2 g of dry ginger powder + 5 g of fennel powder + 2 g of cumin powder, S3 - 2% Brine solution + 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 5 g of cumin powder, S4- 2% brine solution +40 g aonla cubes + 2 g of dry ginger powder + 2g of fennel powder + 2g of cumin powder + 5 g of fresh ginger extract, R1- 3% brine solution + 40 g aonla cubes + 5 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder, R2 - 3% brine solution + 40 g aonla cubes + 2 g of dry ginger powder + 5 g of fennel powder + 2 g of cumin powder, R3 - 3% brine solution + 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 5 g of cumin powder, R4- 3% brine solution + 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder + 5 g of fresh ginger extract, T1- 4% brine solution + 40 g aonla cubes + 5 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder, T2 - 4% brine solution +40 g aonla cubes + 2 g of dry ginger powder + 5g of fennel powder + 2 g of cumin powder, T3 – 4% brine solution + 40 g aonla cubes + 2 g of dry ginger powder + 2 g of Fennel powder + 5 g of cumin powder, T4 - 4% brine solution + 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder + 5 g of fresh ginger extract.

powder.

MATERIALS AND METHODS

Aonla fruits were obtained from local market Tambaram, Tamilnadu, India. The procured fruits were washed thoroughly under running tap water. The seeds were de-cored from the fruits. The de-cored fruit was cut into cubes using knives (a de-cored fruit is cut into 6 segments and each of the segment was cut into 5 equal halves, thus yielding 30 cubes per 1 de-cored fruit). The cubes of size between 7 mm length and 4 mm thickness were soaked in the prepared solution. The cubed pieces were immersed in solutions containing different concentration of salt and other ingredients in a glass jar. The glass jar was closed with an air tight cap to prevent contamination. The osmotic dehydration was carried out by soaking aonla cubes overnight for time duration of 20 to 24 h at room temperature. After 24 h the samples were taken out and the brine was completely drained off from the fruit.

The osmotic solution was prepared for different samples by varying the salt concentration and the ingredients. The ingredients like fennel powder, cumin powder, fresh ginger extract and dry ginger powder were selected based on their therapeutic value and curative effect. The bioactive compound present in the spices plays major role against infection and indigestion. The pretreatments, divided into 3 categories such as pretreatment I (PI) with 2% brine, pretreatment II (PII) with 3% brine solution and pretreatment III (PIII) with 4% brine were named as S, R and T respectively. The sample to solution ratio was taken as 1:2.5 (w/v) along with other ingredients (Table 1).

PI: S1- 40 g aonla cubes + 5 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder; S2 - 40 g aonla cubes + 2 g of dry ginger powder + 5 g of fennel powder + 2 g of cumin powder; S3 – 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 5 g of cumin powder; S4 – 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder + 5 g of fresh ginger extract.

PII: R1- 40 g aonla cubes + 5 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder; R2 - 40 g aonla cubes + 2 g

of dry ginger powder + 5 g of fennel powder + 2 g of cumin powder; R3 – 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 5 g of cumin powder; R4 – 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder + 5 g of fresh ginger extract.

P III: T1- 40 g aonla cubes + 5 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder; T2 - 40 g aonla cubes + 2 g of d ginger powder + 5 g of fennel powder + 2 g of cumin powder; T3 – 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 5 g of cumin powder; T4 – 40 g aonla cubes + 2 g of dry ginger powder + 2 g of fennel powder + 2 g of cumin powder + 5 g of fresh ginger extract.

The osmotically treated fruits were dried in tray drier (ITC, India). The fruit pieces were spread on the trays and were dried at 60 °C for 3 h and further dried at 50 °C for 3 h to control loss of nutrients by rapid heat treatment. The drying time and drying temperature were optimized by subjecting the final product to sensory evaluation. The physico-chemical analysis was carried out by following methods: Moisture content (Janardhanan,1982); total phenol content by Sadasivam and Manickam (1992) method; tannin content by Burns (1963) method; titrable acidity by Ranganna (1978) method; ascorbic acid by Loeffler and Ponting (1942) method and crude fibre content by Muller et al. (1980) method. Microbial studies for both yeast and bacteria were conducted in dehydrated aonla supari as described by Kanika (2007).

Data was exported from excel and analyzed using the Statistical Package for Social Sciences (SPSS) Version 4.6. The fresh sample versus after osmotic dehydration and fresh sample versus after drying were compared using student t- test. Differences in means were considered statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION

Data of physico - chemical analysis for the aonla supari has been shown in the Table 2. Total phenol content of the aonla supari increased to considerable level after OD and drying due to removal of moisture from the product. It

Table 2. Physicochemical parameters for formulated aonla supari.

Sample	** Total phenol content (g/100 g)			Tannin content (g/100 g)			** Titrable acidity (%)			Ascorbic acid content (g/100 g)		
	Fresh	After OD	After drying	Fresh	After OD	After drying	Fresh	After OD	After drying	Fresh	After OD	After drying
Control	0.16	- ^a	0.306	0.25	-	0.4	0.42	-	0.276	295.02	-	-
S1	0.16	0.24	0.328	0.25	0.27	0.35	0.42	0.25	0.144	295.02	35	0
S2	0.16	0.19	0.322	0.25	0.28	0.33	0.42	0.26	0.156	295.02	33.33	0
S3	0.16	0.25	0.324	0.25	0.33	0.38	0.42	0.30	0.132	295.02	26.6	0
S4	0.16	0.22	0.304	0.25	0.31	0.41	0.42	0.22	0.132	295.02	25	0
R1	0.16	0.18	0.286	0.25	0.3	0.35	0.42	0.26	0.144	295.02	30	0
R2	0.16	0.25	0.29	0.25	0.26	0.36	0.42	0.27	0.132	295.02	30	0
R3	0.16	0.28	0.328	0.25	0.31	0.37	0.42	0.24	0.108	295.02	18.33	0
R4	0.16	0.27	0.304	0.25	0.3	0.43	0.42	0.24	0.108	295.02	31.66	0
T1	0.16	0.17	0.308	0.25	0.32	0.38	0.42	0.28	0.156	295.02	20	0
T2	0.16	0.26	0.304	0.25	0.31	0.38	0.42	0.27	0.156	295.02	18.33	0
T3	0.16	0.24	0.31	0.25	0.33	0.4	0.42	0.30	0.144	295.02	23.33	0
T4	0.16	0.25	0.296	0.25	0.32	0.41	0.42	0.24	0.120	295.02	16.66	0

Ingredients for individual samples / control are same as mentioned elsewhere in the manuscripts. All the values are means of triplicate determinations. * - values are significantly different statistically ($p < 0.05$)

a- Not determined.

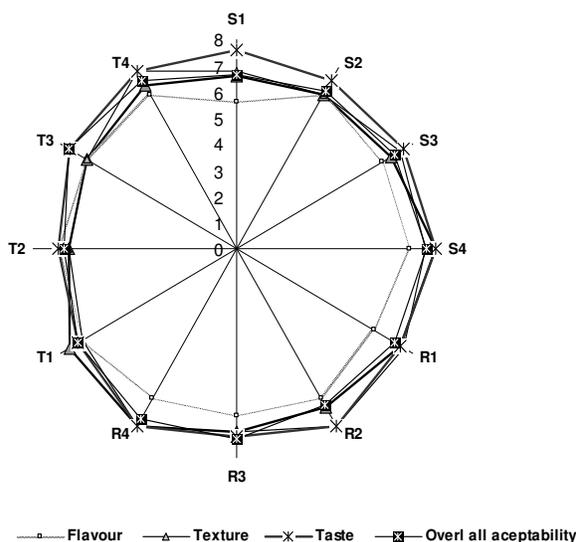


Figure 1. Changes in sensory evaluation of formulated aonla supari.

was observed that the samples prepared from dry ginger powder, fennel powder and cumin powder have greater impact on the total phenol content (TPC). But it is not in the case with the sample treated with fresh ginger extract. The same effect was observed for tannin content of aonla supari. It is obvious that fresh ginger extract contains more amount of moisture content than other dry ingredients. So tannin and total phenol content of the ingredients depends on the moisture content and initial

composition of the ingredients used for the preparation of *aonla supari*. The data indicated that high significant differences in the tannin content ($p < 0.05$) in the final product in comparison to fresh fruits. But there was no significant difference with respect to the ascorbic acid content, titrable acidity and total phenol content of the samples.

Titrable acidity (TA) on citric acid and ascorbic acid content (AAC) decreased after OD and drying. Decrease in the TA and AAC was due to leaching out of the content from aonla. Also, there is formation of complex compounds such as citrate and ascorbate in aonla with salt and other ingredients (fennel powder, cumin powder, fresh ginger extract and dry ginger powder) in the brine solution. The results were corroborated with earlier studies conducted by Lal et al. (2004) and Sagar and Kumar (2006).

The microbial analysis for dehydrated aonla supari indicated that they are free from microbial contamination irrespective of the treatments. Sensory evaluation score in the Figure 1 showed that the samples treated with 4% (w/v) salt, 2% (w/v) fennel powder and dry ginger powder and 5% (w/v) cumin powder scored high in comparison to other samples by panelists. It was concluded that the sample T3 was optimized as one of the ideal samples by above mentioned studies and it can be effectively replaced as a supari nutraceutical supplement.

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