

Studies on effect of artificial sweeteners on the quality of herbal beverage

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The investigation was carried out for preparation of low calorie herbal beverage (RTS) by using different artificial sweetener. The experiment was conducted in Completely Randomized Design with addition of aspartame (0.2%), sucralose (0.15%) and stevia (0.1%). The artificial sweetener with sucrose (50%) were added to aonla juice (10%), basil leaves juice (5%) and ginger juice (1%) for the preparation of herbal beverage. The acidity in aonla, basil leaves and ginger were obtained as 1.75, 0.08 and 0.7%, respectively, also the values of physico-chemical characteristics of beverage. The aonla, basil leaves and ginger and prepared beverage were analysed for chemical composition. Sample T₂ was contains prepared by using 50% sucrose + 0.15 sucralose found to be 0.37% acidity, pH 3.93, ascorbic acid 36.16 mg/100g and TSS was maintained at 7.5°Bx. The sample T₂ also found to be organoleptically acceptable over the other sample.

Key Words : Artificial sweetener, Herbal beverage, Sucralose

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INTRODUCTION

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. Aonla 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 the richest source of natural vitamin C. It provides upto 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.

Ocimum sanctum, *Tulsi* belongs to plant family *Lamiaceae*. It has made important contribution to the field of science from ancient times as also to modern research due to its large number of medicinal properties. *Tulsi* has been described as of two types- vanya (wild) and gramya (grown in homes). Although having identical usage, the former has darker leaves. *Tulsi* is a popular home remedy for many ailments such as wound, bronchitis, liver diseases, catarrhal fever, otalgia, lumbago, hiccough, ophthalmia, gastric disorders, genitourinary disorders, skin diseases, various forms of poisoning and psychosomatic stress disorders (Das and Vasudevan, 2006 and Prajapati *et al.*, 2003). It has also aromatic, stomachic, carminative, demulcent, diaphoretic, diuretic, expectorant, alexiteric, vermifuge and febrifuge properties (Anonymous, 1991).

Ginger is a rhizomatous plant which is used as a spice and medicine in various countries. It shows potential

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antipyretic, antiallergenic, analgesic, antitussive. Ginger is having stimulatory action on heart muscle results, stimulated blood circulation throughout the body (Shoji *et al.*, 1982). Ginger is also known to possess antioxidant properties (Kikuzaki and Nakatani, 1993). Some active components of ginger are reported to stimulate digestion, absorption, relieve constipation and flatulence by increasing muscular activity in the digestive tract (Stewart *et al.*, 1991).

A variety of artificial sweeteners are available in the market like, aspartame, sucralose, stevia, etc. These are the non-nutritive sweeteners which are not metabolized by the body and do not contribute any energy or calories to the diet. Sucralose is 600 times sweeter than sugar (sucrose), has taste characteristics very similar to sugar, and is extremely stable to heat and to acid media sucralose does not hydrolyse nor does it dechlorinate after ingestion and it is thus nontoxic. Sucralose offers new opportunities for palatable, low-energy, sweetened beverages and foods – although, as with all reduced- and low-energy products (Nino, 2003).

METHODOLOGY

The present investigation was carried out in Department of Food Engineering, College of Food Technology, VNMKV, Parbhani. Fresh aonla fruits, basil leaves, and sweeteners were obtained from the market area of the Parbhani.

Preparation of aonla juice :

Fresh aonla fruits were procured from local market of Parbhani. Fruit washed to remove unwanted impurities like mud, dust and dirt particles. Washed fruit were kept in alkali solution (2 % NaOH solution at 100°C) for 4 to 5 min. after that seed and segments were separated and passed through mixer with adding water. Obtained pulp was passed through muslin cloth to get clear aonla juice.

Preparation of basil juice :

Basil leaves washed with cleaned water to remove impurities and passed through grinder. Water were added and again passed through grinder. The slurry was passed through muslin cloth to get clear juice.

Preparation of ginger juice :

Fresh and sound quality ginger were selected for preparation of juice. Ginger was washed to remove

impurities. Then peeling and cutting was carried out. Cut pieces of ginger were passed through mixer with addition of water. The pulp were passed through muslin cloth to get clear ginger juice.

Preparation of low calorie herbal beverage RTS :

The aonla juice 10 per cent, basil leaves juice 5 per cent, ginger juice 1 per cent were blended. However for low calorie beverage sugar substitute (Aspartame, sucralose and stevia) were used. The control sample was prepared without addition of artificial sweetener (Fig. A). The treatments were given as,

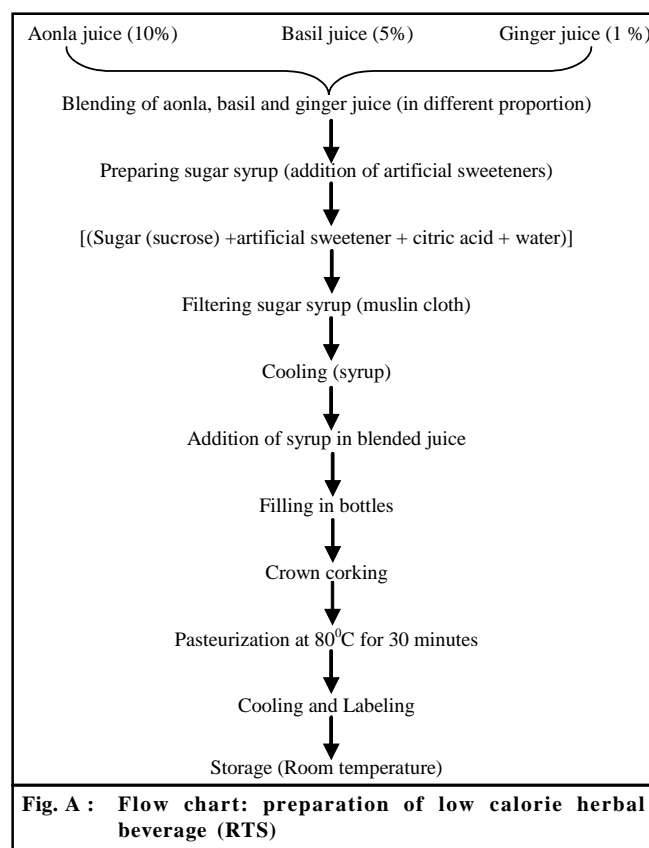
Control:

Without addition of sweetener

T₁: Sucrose 50% + Aspartame 0.2%

T₂: Sucrose 50% + Sucralose 0.15%

T₃: Sucrose 50% + Stevia 0.1%



Proximate analysis :

The TSS, pH, titrable acidity and ascorbic acid content were analyzed by Ranganna (1986).

Sensory evaluation :

The sensory evaluation of low calorie herbal beverage RTS was carried out on the basis of 9-point hedonic scale for its sensory parameter such as colour, flavour, taste and overall acceptability.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Chemical composition of aonla, basil leaves and ginger :

The data pertaining to the various chemical composition of aonla, basil leaves and ginger are tabulated in Table 1.

Table 1 showed, the moisture content of aonla, basil and ginger was 85, 78.7 and 82.06 per cent. The acidity of aonla, basil and ginger was 1.75, 0.08 and 0.7 per cent obtained. The ascorbic acid in aonla (426 mg/100g), basil (29 mg/100g) and ginger (9.21 mg/100g) were obtained. The obtained results of chemical composition are in comparable with early studied by (Parveen and Khatkar,

2015; Saxena and Chaturvedi 2015 and Akhtar *et al.*, 2013).

Effect of artificial sweetener on the physico-chemical composition of low calorie herbal beverage:

The physico-chemical properties of beverage such as TSS, pH, acidity and ascorbic acid were may be affected significantly by addition of selected sweeteners like aspartame, sucralose and stevia are low caloric and it slightly effect on TSS of beverage therefore it was suitable for preparation of low calorie herbal beverage RTS.

The data tabulated in Table 2 showed the TSS of control sample found to 15⁰Bx. The TSS of samples T₁, T₂ and T₃ were obtained as 7.5⁰Bx, 7.5⁰Bx and 7⁰Bx. There was decrease in TSS as sugar substitute added in beverages. Similar results were reported by Byanna and Gowda (2012).

The pH of control sample of low calorie herbal beverage RTS was 4.20. The pH of sample T₁, T₂ and T₃ were found to be 3.91, 3.93 and 3.91, respectively. The control sample has the highest pH among all the

Table 1 : Chemical composition of aonla, basil leaves and ginger

Parameters	Aonla	Basil	Ginger
Moisture (%)	85	78.7	82.06
Ash (%)	0.6	2.8	1.3
Acidity (%)	1.75	0.08	0.7
Ascorbic acid (mg/100g)	426	29	9.21

Table 2 : Effect of artificial sweeteners on physico-chemical composition of low calorie herbal RTS beverage

Sample	TSS (°Bx)	pH	Acidity (%)	Ascorbic acid mg/100 ml
Control	15	4.20	0.32	38.34
T ₁	7.5	3.91	0.37	36
T ₂	7.5	3.93	0.37	36.16
T ₃	7	3.89	0.39	36.33
S.E.±	0.1925	0.0267	0.0027	0.1667
C.D. (P=0.05)	0.0334	0.0803	0.0082	0.5017

*Each value is average of three determinations

Table 3 : Effect of artificial sweeteners on sensory characteristics of low calorie herbal beverages

Samples	Sensory attribute			
	Colour	Flavour	Taste	Overall acceptability
Control	8.6	8.7	8.9	8.8
T ₁	8.8	8.4	8.6	8.5
T ₂	8.8	8.5	8.7	8.7
T ₃	7.8	8.1	8.0	8.0
S.E.±	0.0167	0.0667	0.0419	0.0585
C.D. (P=0.05)	0.0502	0.2007	0.1263	0.1762

samples T₁, T₂, and T₃. The higher pH of control sample were due to the addition of sugar while the pH of sample T₁, T₂, and had low pH as compare to the pH of control sample. Similar result found in study reported by Sasikumar and Vivek (2015). The acidity of control sample of RTS beverage was 0.32 per cent. The acidity of sample T₁, T₂ and T₃ were 0.37, 0.37 and 0.39. The acidity of control found to be lower whereas slightly increasing trend in acidity were seen in other sample. Increasing trend in acidity were also study reported by Mansoor *et al.* (2016).

The ascorbic acid content in control sample was recorded to be higher 38.34 mg followed by sample T₂ (36.16 mg/100ml). while it was lowest in sample T₁ (36 mg/100ml) also ascorbic acid content found to be higher in sample T₃ similar results was recorded by Sasikumar and Vivek (2015).

Effect of artificial sweeteners on sensory characteristics of low calorie herbal beverages :

The data in Table 3 showed that the maximum score for overall acceptability was recorded for control sample (8.8) followed by sample T₂ (8.7). From the Table 3 it was clear that the sample T₂ (8.7) with added 50 per cent sucrose and 0.15 per cent sucralose ranked best among prepared sample.

Sample T₃ contains 0.1 per cent stevia which acquire less sensory score in terms of colour, flavour, taste and overall acceptability as compare to other sample. It may be due to the colour of stevia sweetener. Stevia gives bitter after taste was also greatly depend upon the level of stevia. Preliminary study indicated a slight bitter after taste in RTS beverages when the amount of stevia added was more than 0.5%.

Conclusion :

It could be concluded that, the artificial sweetener are organoleptically acceptable in the preparation of beverages. The artificial sweeteners were also found to affects on the pH, acidity and TSS of the herbal beverage. Sample T₂ (50 % sucrose + 0.15% sucralose) were highly organoleptically accepted among the prepared samples without any side effect on human health.

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