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## Technology for development of aswagandha and strawberry (*Fragaria ananassa*) pulp fortified herbal ice-cream by organoleptic evaluations method

**Akhilesh Kumar Singh, DC Rai, Uday Pratap Singh and Nitish kumar**

### Abstract

The study was made with attempts to develop *ice cream* blended with strawberry pulp and sugar level in different concentrations by using whole milk. The basic aim of study was to find out the sensory parameter of *ice cream* prepared by addition of different levels of strawberry pulp and sugar. There 9 samples of *ice cream* were analyzed for sensory attributes (color & appearance, flavor, body & texture, and overall acceptability). The results show that the experimental sample of *ice cream* treatment T1 blended with 10% of strawberry pulp, 0.2% ashwagandha powder and 14% sugar was found superior in all sensory parameters among the all treatments.

**Keywords:** *ice cream*, organoleptic evaluations, ashwagandha, strawberry (*Fragaria ananassa*)

### Introduction

Ice-cream is a frozen food made from a mixture of dairy ingredients, containing at least 10% milk fat before the addition of bulk ingredients, such as flavorings and sweeteners. A gallon of ice cream must weigh a minimum of 4.5 pounds and contain at least 1.6 pounds of food solids. In addition, the minimum weight of 540g/L limits the amount of air that can be incorporated, called the overrun, which is the percentage of increase in volume over the volume of mix frozen per unit total volume, to approximately the same volume over the volume of mix (Thomas, 1981). India has distinction of largest milk producer with an estimated figure of 180 MT by 2020 and current scenario of milk production 155.54 million ton and per capita availability 337 gm/day/capita according to economic survey 2015-2016. India rank first in milk production % of world production India has 15% livestock of total livestock population in world with 50 % buffalo and 20% of world cow. Current growth rate 6.26% in milk production per annum while world milk growth rate 3.1%. Milk contributes 63% of the available animal protein Indian diet. Out of the total milk produced, 46% is utilized as liquid milk while approx 55% is converted into traditional products like ghee; *makkhan* (33%) *dahi* yoghurt (7%), *khoa* (7%) and *chhana / paneer* (3%), ice cream (0.7%) and the remaining 4% is converted mainly into western products such as ice cream, milk powder, etc., (Mathur *et al.*, 2002).

The ice cream industry is valued worth 3000 crores which likely to jump at about 7000 crores by 2018 (PHD Chamber of Commerce and Industry, 2013). The per capita consumption is around 0.3 liter per annum which is far lower than even in Pakistan (0.7 litre), China (3 litres) and the developed countries (22 litres) (IICMA, 2013). Ice cream is a complex, partly frozen, four-phase system consisting of ice crystals, air cells, emulsified fat and a continuous serum phase containing dissolved and/or colloidal sugars, salts, proteins and stabilizers (Caldwell *et al.*, 1992). Ice cream is a valuable food containing high nutritive constituents for human health. It has cooling effect; hence it is commonly preferred in the hot summer days by consumers of all ages. It provides about 4.9% protein, 13-14% fat and 20.3% carbohydrates. One hundred grams of ice cream give about 214 calories to our body. The annual output of ice cream industry throughout the world is more than 800 million liters (Hyde and Rothwell, 1972). The solids not fat content of milk is composed of approximately 55% lactose, 37% protein, 8% minerals and others, such as vitamins, acids and enzymes (Arbuckle, 1986). The amount of SNF in ice cream mixes ranges from 9-12% and usually varies inversely with fat content. SNF are critical for texture and body of ice cream (Hegaenbart, 1996). There are several reasons for the limitations, including (1) the higher lactose content in the whey solids increases the potential of crystallization of the sugar (2) the high concentration of lactose and

minerals result in the lowered freezing point (3) protein content is decreased in ice cream (Marshall *et al.*, 2003).

Emulsifier is an important food additive that is used broadly in different food product to provide good texture and appearance and also play an important role to improving nutritional value and also melting time was dependent on the ice cream formulation and especially on the nature of the emulsifier (Knightly, 1959).

Herbal supplements have been used for thousands of years in the years in the east as mentioned in our Vedas. According to World Health Organization (WHO), more than 80% of the world's population relies on the traditional medicinal for their primary health care needs. The antioxidants are the chemical substance that reduce or prevent oxidation and have ability to counter against cancer; arteriosclerosis, heart diseases. The most used synthetic antioxidants in foods are Butylated Hydroxyanisole (BHA), Butylated Hydroxytoluene (BHT), etc. But the possible toxicity has been a subject of study for many years (Barlaw, 1990). Recently, research on phytochemicals from medicinal plants and their effects on the human health have been intensified. Many of the Indian medicinal plants are considered potential source of antioxidant compounds. *Ashwagandha* (*Withania somnifera*) is one of the most valued medicinal plant and widely used in Indian traditional health care systems for curing various diseases. It is also one of the members of GRAS (Generally regarded as safe) category of plants that can be used for therapeutic purposes (Bolleddula *et al.*, 2003). Roots of *Ashwagandha* has been extensively used in many indigenous preparations for its medicinal values such as anti-aging, aphrodisiac, cardio tonic, anti-stress, anti-inflammatory, antioxidants, hydro-regulatory, anti-peroxidative, hemopoietic, rejuvenating, antitumor etc. (Mishra *et al.*, 2000). *Ashwagandha* exerts these properties because of its biochemical constituents like alkaloids and steroidal lactones (Elsakka *et al.*, 1990).

Strawberry (*Fragaria ananassa*) is an important fruit of family Rosaceae, occupies an important place among the small fruit plants and is grown throughout the world. Deep red in color with a unique shape, highly perishable fruit has a pleasant flavor. It is rich in vitamin C, sugar, organic acids, anthocyanin, phosphorus, iron, other minerals, vitamins, etc. and its flavor is characterized as fruity, sweet and tart. It is utilized for the production of purees, juice concentrate, juice, jams, preserves and rose red wine.

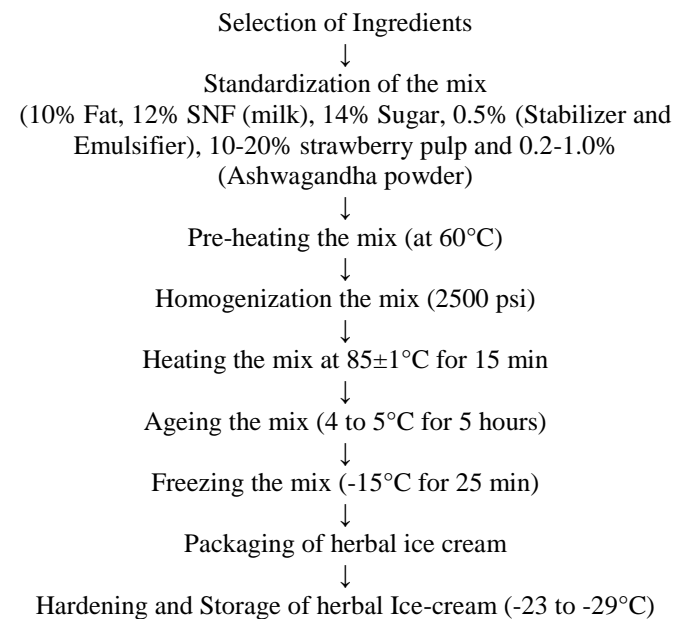
### Treatment details

Ice-cream was prepared by using three different levels of strawberry pulp and Ashwagandha powder control treatment i.e. without strawberry pulp. The treatment combinations used for the study were (Table 1).

### Materials and method

Buffalo milk was obtained from the dairy farm of the Banaras Hindu University and standardized to 6% fat and 9% SNF. Good quality and well developed strawberry and sugar were procured from the local market of Varanasi, Uttar Pradesh. Strawberry was procured from local market of Varanasi. Control and experimental *Ice-cream* were prepared by the method suggested by Aneja *et al.* 2002 [2]. Control ice-cream (T0) was made from buffalo milk (100%) without addition of strawberry whereas experimental samples of *ice-cream* were prepared by using strawberry @ 10%, 15% and 20% with different Ashwagandha powder level (0.2%, 0.5% and 1.0%) Fig1.

The product was evaluated by conducting sensory evaluation of panel of 5 semi-trained judges using 9 point hedonic scale. The data collected on different aspects were tabulated and analyzed statically using the methods of One-way analysis of variance (ANOVA).



**Fig 1:** Process diagram for manufacturing the *Ashwagandha* enriched strawberry ice cream

### Result and Discussion

The sensory quality of *ice-cream* samples prepared from different levels of strawberry pulp and sugar were evaluated by a panel of 5 semi trained judges using 9 points Hedonic scale given by Amerin *et al.*, 1965 [1] on the basis of sensory parameters such as color & appearance, flavor, body & texture, and overall acceptability of strawberry pulp enriched *ice-cream*.

Effect of different variables on sensory evaluation of optimized *Ashwagandha* enriched strawberry Ice Cream:-

Table 2 Shows that the color & appearance score was the highest in treatment T<sub>1</sub> (8.78) than the lowest score was recorded in treatment T<sub>9</sub> (6.27). The flavor score of prepared Ice cream was highest in treatment T<sub>6</sub> (7.67) and the lowest in treatment T<sub>9</sub> (6.17). The maximum and minimum score for body & texture was recorded in treatment T<sub>0</sub> (8.57) and T<sub>9</sub> (6.17) respectively. The overall acceptability score was highest in treatment T<sub>1</sub> (8.74) and the lowest value recorded in treatment T<sub>9</sub> (6.80). It is clear from table 2 that the score obtained by treatment T<sub>1</sub> for sensory parameters as color & appearance, flavor, body & texture and overall acceptability was (8.78, 7.61, 8.02, 8.74 respectively) highest whereas the score obtained by Control sample (T<sub>0</sub>) for color & appearance, flavor, body & texture and overall acceptability was (8.48, 7.54, 8.57, 8.38 respectively) very near to the treatment T<sub>1</sub>. It is revealed from the above result that the difference in the value obtained by treatment T<sub>1</sub> was Non - Significant ( $p < 0.05$ ) to the value obtained by T<sub>0</sub> (Control) treatment. From the obtained result, it is revealed that as the levels of strawberry pulp and sugar increases, the score for sensory parameters (Color & Appearance, Flavor, Body & Texture and Overall Acceptability) of strawberry enriched *ice-cream* was also increases up to a certain limit and thereafter it decreases gradually. The present findings can be supported by Kolhe (2003) [8]; Gargade (2004) [5]; Sawant *et al.* (2007) [9].

**Yield of ice-cream**

The yield of *ice-cream* was significantly ( $p < 0.05$ ) increased with strawberry level, highest yield is recorded in T9 (28.66%) and lowest among treatment is of T1 (25.27%) which was higher than control T0 (24.36%). The differences among the groups were significant ( $p < 0.05$ ) between different

treatment. This result may show that increase the level of strawberry pulp and sugar may increase the yield of strawberry *ice-cream*. This was due to higher moisture content (90.33%) in papaya pulp resulting into increase the yield of treatments enriched with strawberry pulp as compare to lower moisture in control sample.

**Table 1:** Treatment details

Treatment	Ashwagandha powder	Strawberry pulp
<b>T0 Control product</b>		
T1	0.2%	10%
T2	0.5%	10%
T3	1.0%	10%
T4	0.2%	15%
T5	0.5%	15%
T6	1.0%	15%
T7	0.2%	20%
T8	0.5%	20%
T9	1.0%	20%

**Table 2:** Sensory evaluation of strawberry pulp enriched *ice-cream* and its yield

Treatment	Colour & Appearance	Flavor	Body and texture	Overall acceptability	Yield
T <sub>0</sub>	8.48	7.54	8.57	8.38	24.36
T <sub>1</sub>	8.78	7.61	8.20	8.74	25.27
T <sub>2</sub>	8.31	7.41	7.67	8.19	25.42
T <sub>3</sub>	7.32	6.61	7.63	7.68	25.65
T <sub>4</sub>	7.98	6.41	7.89	8.17	26.24
T <sub>5</sub>	7.73	6.61	7.87	7.28	26.63
T <sub>6</sub>	6.84	6.20	7.14	7.18	26.84
T <sub>7</sub>	8.12	6.06	7.10	8.06	27.32
T <sub>8</sub>	7.51	6.18	6.78	7.31	28.42
T <sub>9</sub>	6.27	6.17	6.17	6.80	28.66
CD 5%	0.99	0.79	0.74	0.82	0.86
SE(m)	0.32	0.25	0.24	0.26	0.28

**Conclusion**

On the basis of above findings it can be concluded that the superior quality of *Ashwagandha* enriched strawberry Ice Cream can be prepared by addition of 10% of strawberry pulp, 0.2% Ashwagandha powder and 14% of sugar as the overall acceptance for treatment combination T1 was highest in all sensory parameters.

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