Sensory Properties of *Kulfi* Blended with Ash Gourd Pulp

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ABSTRACT: *The Indian version of ice-cream "kulfi" is an indigenous frozen milk product, with good palatability, nutritious and provides pleasure of eating. Kulfi is palatable and nutritious indigenous frozen milk product. In this study attempt has been made to standardize a formulation for the preparation of kulfi blended with ash gourd (Benincasa hispida) pulp. Kulfi was prepared from buffalo milk blended with ash gourd pulp @ 5, 10 and 15 % by weight and compared with plain kulfi for sensory properties. Kulfi prepared from 5 per cent ash gourd pulp blend was superior in overall acceptance than other blend.*

Key words: Buffalo milk, ash gourd pulp, sugar

INTRODUCTION

Milk is called as complete food. Milk and milk product has great importance in human life as a nutritional product as well as traditional product. Utilization of fruits and vegetable in milk products for value addition is a great challenge to dairy processing industry. Now a day's consumers prefer value added milk products which are rich in vitamins and minerals. There is a large scope in dairy processing industry for conversion of milk into innovative fruits and vegetable based milk products. Looking to the great importance of value added milk products with fruits and vegetables research workers are trying to develop innovative methodology and technologies to develop value added milk products for satisfying consumer's demands.

Ash gourd has nutritive as well as medicinal value. Being low in calories it is particularly useful for diabetic and obese people. Fruit is not only easy to digest but also had cooling, calming and diuretic properties. It has cooling effect on human body as well as laxative. The market demand for frozen product is growing all over world and consumers. Hence looking toward the market demand and consumer preference was made to prepare the *kulfi* from ash gourd pulp. In this study, an attempt was made to prepare *kulfi* from buffalo milk blended with varying amount of ash gourd (*Benincasa hispida*) pulp. Further, the sensory characteristics of finished product were studied.

MATERIALS AND METHODS

The buffalo milk obtained from the market was standardized to 6% fat. The selected fresh, well developed, ripened ash gourd vegetable fruit was purchased from local market. Ash gourd was washed with tap water for cleaning and removal of extraneous material. The clean vegetable fruit was peeled manually with knife, cut into pieces and ground in home mixer to make pulp. Same pulp was used in *kulfi* formulation.

Treatment Details

For the preparation of milk Ash gourd *kulfi,* the treatment combinations were as follows.

T_1 - 100 parts of buffalo milk

T_2 - 5 parts of Ash gourd pulp + 95 parts of buffalo milk

T_3 - 10 parts of Ash gourd pulp + 90 parts of buffalo milk

T_4 - 15 parts of Ash gourd pulp + 85 parts of buffalo milk

The different levels were tried and compared with control (T_1)

Preparation of ash gourd pulp

The (T_1) control *Kulfi* and *Kulfi* blended with different levels of ash gourd pulp 5, 10 and 15 (T_2, T_3 and T_4) was prepared by adopting procedure described by

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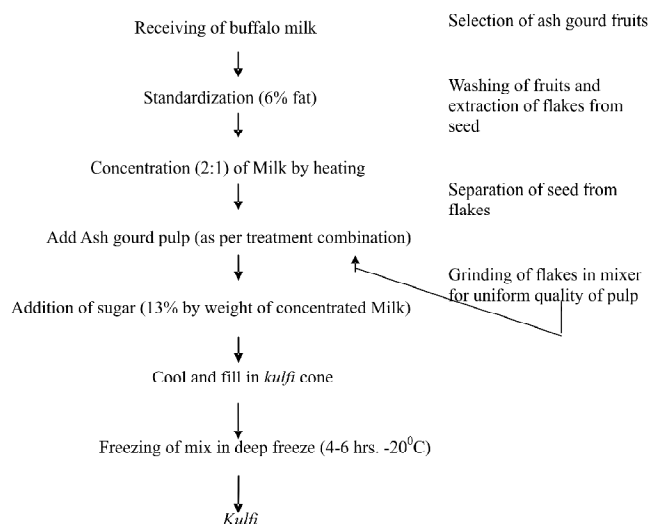Salooja (1979) and details are depicted in flow chart given below.

Figure 1: Flow chart for preparation of Kulfi blended with ash gourd pulp Selection of ash gourd fruits

Various treatment of *kulfi* blended with ash gourd pulp were subjected to sensory evaluation for colour and appearance, flavour, body and texture, sweetness. The data obtained on various parameters studied were subjected to CRD to evaluate differences among the various parameters studied.

Sensory Properties of *kulfi* blended with ash gourd pulp

The control *kulfi* (T_1) and *kulfi* blended with ash gourd pulp T_2, T_3 and T_4 was served to semi trained panel of judges to evaluate the quality of control and treated samples of *kulfi* on the basis of sensory attributes colour and appearance, body and texture, sweetness, flavour and overall acceptability) and results thus obtained using 9 point Hedonic scale are presented in Table.

Colour and appearance score in *kulfi*

The results related to colour and appearance of control *kulfi* (T_1) and *kulfi* blended with ash gourd pulp 5, 10 and 15 parts (T_2, T_3 and T_4) are presented in Table 1.

Table 1
Colour and appearance score of *kulfi* blended with ash gourd pulp

Treatment	Replication						Mean score
	I	II	III	IV	V	VI	
T_1	7.82	7.96	7.98	7.90	7.92	7.88	7.91[a]
T_2	7.56	7.52	7.50	7.54	7.58	7.60	7.55[b]
T_3	7.20	7.38	7.24	7.26	7.34	7.28	7.28[c]
T_4	7.08	7.12	7.14	7.08	7.10	7.06	7.10[d]
SE ± 0.020				CD at 5% = 0.061			

Values with superscripts are significantly different at P <0.05

It was revealed from the results that control *kulfi* T_1 had significantly higher score (7.91) for colour and appearance than *kulfi* blended with ash gourd pulp T_2, T_3 and T_4 (7.55, 7.28 and 7.10), respectively. The score decrease significantly in T_2, T_3 and T_4 at higher levels of ash gourd pulp as 5, 10 and 15 parts in *kulfi* as compared to control *kulfi* T_1.

In agreement with present finding Kale (2011) studied the kesar mango pulp *Kulfi* and reported sensory score as colour and appearance 7.17 to 7.83 per cent, Sonawane (2011) studied the bottle gourd pulp *kulfi* and reported sensory score as colour and appearance 7.24 to 7.53 per cent, and Wagh (2011) studied the custard apple pulp *kulfi* and reported sensory score as colour and appearance 7.96 to 8.46 per cent, respectively.

Body and texture score in *kulfi*

Results related to body and texture of control *kulfi* (T_1) and *kulfi* blended with ash gourd pulp 5, 10 and 15 parts (T_2, T_3 and T_4) are presented in Table 2.

Table 2
Body and texture score of *kulfi* blended with ash gourd pulp

Treatment	Replication						Mean score
	I	II	III	IV	V	VI	
T_1	8.52	8.50	8.54	8.56	8.60	8.62	8.56[a]
T_2	7.64	7.82	7.80	7.78	7.74	7.68	7.74[b]
T_3	7.52	7.68	7.66	7 7.56	7.60	7.54	7.59[c]
T_4	6.46	6.42	6.48	6.40	6.48	6.44	6.45[d]
SE ± 0.018				CD at 5% = 0.063			

Values with superscripts are significantly different at P <0.05

Mean body and texture score of control *kulfi* T_1 and *kulfi* blended with ash gourd pulp T_2, T_3 and T_4 were 8.56, 7.74, 7.59 and 6.45, respectively. The result showed that score of control *kulfi* was significantly higher than *kulfi* blended with ash gourd pulp. Significantly decrease in score of body and texture of *kulfi* blended with ash gourd pulp as compared to control *kulfi* may be due to the higher proportion of moisture content (96.50 per cent) in ash gourd pulp.

In agreement with present finding Kale (2011) studied the kesar mango pulp *Kulfi* and reported sensory score as body and texture 7.42 to 7.58 per cent, Sonawane (2011) studied the bottle gourd pulp *kulfi* and reported sensory score as body and texture 6.80 to 7.80 per cent, and Wagh (2011) studied the custard apple pulp *kulfi* and reported sensory score as body and texture 7.82 to 8.28 per cent, respectively.

Sweetness Score in *kulfi*

Mean score of sweetness for control *kulfi* (T_1) and *kulfi* blended with ash gourd pulp 5, 10 and 15 parts (T_2, T_3 and T_4) are presented in Table 3.

Table 3
Sweetness score of *kulfi* blended with ash gourd pulp

| Treatment | Replication | | | | | | Mean score |
	I	II	III	IV	V	VI	
T_1	8.42	8.46	8.48	8.44	8.50	8.52	8.47[a]
T_2	8.04	8.10	8.06	8.10	8.12	8.08	8.08[b]
T_3	7.22	7.18	7.32	7.28	7.30	7.24	7.26[c]
T_4	6.74	6.86	6.94	6.92	6.82	6.78	6.84[d]

SE ± 0.01	CD at 5% = 0.067

Values with superscripts are significantly different at P <0.05

It was observed from the results that T_1 scored highest score for sweetness (8.47) than T_2, T_3 and T_4 (8.08, 7.26 and 6.84), respectively. The results showed that score for sweetness of control *kulfi* is significantly higher than *kulfi* samples blended with 5, 10 and 15 parts ash gourd pulp. Among the treated samples sweetness content decreased significantly as the per cent level of added ash gourd pulp increased from 5 to 15. This might be due to higher moisture content (96.50 per cent, Chaudhari, 1996) and slight bitter taste of ash gourd pulp.

In agreement with present investigation Kale (2011) studied the kesar mango pulp *Kulfi* and reported sensory score as sweetness 7.50 to 7.92 per cent, Sonawane (2011) studied the bottle gourd pulp *kulfi* and reported sensory score as sweetness7.78 to 8.54 per cent, and Wagh (2011) studied the custard apple pulp *kulfi* and reported sensory score as sweetness 7.45 to 8.30 per cent, respectively.

Flavour Score in *kulfi*

The mean flavour score for control *kulfi* (T_1) and *kulfi* blended with ash gourd pulp 5, 10 and 15 parts (T_2, T_3 and T_4) are presented in Table 4.

Table 4
Flavour score of *kulfi* blended with ash gourd pulp

| Treatment | Replication | | | | | | Mean score |
	I	II	III	IV	V	VI	
T_1	8.46	8.38	8.54	8.50	8.48	8.60	8.49[a]
T_2	8.18	8.30	8.24	8.28	8.34	8.22	8.26[b]
T_3	7.42	7.40	7.44	7.46	7.50	7.46	7.45[c]
T_4	6.82	6.80	6.86	6.90	6.88	6.84	6.85[d]

SE ± 0.017	CD at 5% = 0.066

Values with superscripts are significantly different at P <0.05

Flavour score of control *kulfi* (T_1) and treated samples T_2, T_3 and T_4 ranged from 8.49 to 6.85. Control (T_1) scored highest (8.49) followed by T_2, T_3 and T_4 (8.26, 7.45 and 6.85), respectively. However, flavour score of control sample T_1 differs significantly from T_2, T_3 and T_4 at higher level of ash gourd pulp in *kulfi*.

In agreement with present investigation Kale (2011) studied the kesar mango pulp *Kulfi* and reported the sensory score as flavour 7.33 to 7.67 per cent, Sonawane (2011) studied the bottle gourd pulp *kulfi* and reported sensory score as flavour 7.54 to 8.40 per cent, and Wagh (2011) studied the custard apple pulp *kulfi* and reported sensory score as flavour 7.45 to 8.30 per cent, respectively.

OVERALL ACCEPTABILITY SCORE IN *KULFI*

Mean overall acceptability score for control *kulfi* (T_1) and *kulfi* blended with ash gourd pulp 5, 10 and 15 parts (T_2, T_3 and T_4) are presented in Table 5.

Mean overall acceptability score for control *kulfi* (T_1) was 8.36 and *kulfi* blended with ash gourd pulp T_2, T_3 and T_4 was 7.91, 7.40 and 6.81, respectively. The overall acceptability score decreased significantly at 5, 10 and 15 parts of ash gourd pulp as compared to control. However, for T_1 scored highest than T_2, T_3 and T_4, respectively. The result indicated that the overall acceptability score had decreasing trend with increased per cent level of ash gourd pulp in *kulfi* from 5 to 15.

Table 5
Overall acceptability score of kulfi blended with ash gourd pulp

| Treatment | Sensory Properties | | | | Overall acceptability |
	Colour and Appearance	Body and Texture	Sweetness	Flavour	
T_1	7.91	8.56	8.47	8.49	8.36[a]
T_2	7.55	7.74	8.08	8.26	7.91[b]
T_3	7.28	7.59	7.26	7.45	7.40[c]
T_4	7.10	6.45	6.84	6.85	6.81[d]

SE ± 0.141	CD at 5% = 0.435

Values with superscripts are significantly different at P <0.05

In agreement with present finding Kale (2011) studied the kesar mango pulp *Kulfi* and reported sensory score as overall acceptability 7.35 to 7.75 per cent, Sonawane (2011) studied the bottle gourd pulp *kulfi* and reported sensory score as overall acceptability 7.34 to 8.07 per cent, and Wagh (2011) studied the custard apple pulp *kulfi* and reported sensory score as overall acceptability 7.75 to 8.38 per cent, respectively.

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