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Studies on Physicochemical Properties of Herbal Ice-Cream with Addition of Ginger (*Zingiber officinale*) Juice.

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ABSTRACT

With the current upward trend in national and international health awareness among the consumers, the demand for herbal food has increase. A study was conducted to develop an ice-cream by partial addition of ginger juice and to evaluate its effect on, Physicochemical and microbial quality of the product. For control, Ice-cream mix was standardized to 10% milk fat, 15% sugar, cream, SMP and 0.5% stabilizer and emulsifier to obtain 37.5% total solids and treatment (T_1) was standardized to 10% fat, 2% ginger juice, 0.3% stabilizer and 0.2% emulsifier. (T_2) was standardized to 10% fat, 15% sugar, 0.3% stabilizer, 0.2% emulsifier, 4% ginger juice. (T_3) was standardized to 10% fat, 0.3% stabilizer, 0.2% emulsifier and 6% ginger juice. The ice-cream samples of different treatments are analyzed for physicochemical (fat, total solids, acidity, protein, moisture, ash). Microbiological analysis was carried out to assess the shelf life by SPC and coliform tests. The treatments containing 6% level of ginger juice score the highest value. Thus, as far as product acceptability judged by physicochemical properties, the treatment can be rated as T_3> T_2> T_0> T_1. On the basis of result obtained it can be concluded that the ginger can be successfully used for the preparation of herbal ice-cream, without sacrificing its palatability and therapeutic values.

Keywords: Herbal Ice-cream, Ginger juice, Physicochemical.

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INTRODUCTION

Ice-cream is a frozen dairy product made by suitable blending and processing of cream and other milk products, together with sugar and flavour, with or without stabilizer or colour and with the incorporation of air during the freezing process [5]. It is palatable, healthful and relatively inexpensive food. One serving of a good vanilla Ice-cream supplies approximately 200 calories, 3.9g protein, 0.31g calcium, 0.104g of phosphorus, 0.14g of iron, 548 IU Vitamin A, 0.038mg thiamine and 0.236mg ribo flavin [1]. Demand for Ice-cream is increasing day by day. Not only children but adults and elders also enjoy the delicacy of Ice-cream. Previously the consumption of Ice-cream was seasonal in India but now-a-days it became a regular item of the diet and demanded throughout the year. Ginger (*Zingiber officinale*) is a native plant in the Southeast Asia but is grown in many tropical regions of the world. The plants are commonly used as spice for flavoring and herbal medicine and the treatment of gastrointestinal infections. Ginger is a strengthening food that has been used through the ages to boost health. It has a fresh lemon like smell and pungent warm taste. Valued highly for its healing properties, ginger has enjoyed an excellent reputation in Indian traditional medicine. The medicinal properties of ginger prevent cough and cold is well documented. As a flavour, ginger adds a clean freshness of its own while lifting the other flavours in a recipe. Ginger flavoured Ice-cream can also be considered as an herbal Ice-cream as it offers many health benefits [3]. There is a need for an herbal ice-cream as it will enhance the therapeutic value of the product which otherwise does not have a therapeutic appeal. Therefore, keeping in mind the functional and therapeutic properties an attempt has been made to explore the use of ginger for manufacturing herbal Ice-cream by using the method of manufacture as lay down by Arbuckle [2].

METHOD AND MATERIALS

Table 1: Details of different treatments using ginger juice for preparation of Control and Herbal Ice-cream

Materials	Different treatments (Control and Herbal Ice-cream)			
	T_0	T_1	T_2	T_3
Ginger juice	-	2%	4%	6%

Standardization of mix
↓
Homogenization at 150 kg/cm^2 in1st stage and 50 kg/cm^2 in 2nd stage at 60-62^{0}C
↓
Pasteurization at 68.3^0 C for 30 min.
↓
Cooling and ageing of mix at 5^0 C for 6 hrs. (Ginger juice added)
↓
Freezing in a batch freezer -4^0 C to a overrun of 70%in 8 min.
↓
Packaging
↓
Hardening to -18^0 C
↓
Herbal Ice-cream

Figure 1: Flow chart for preparation of Control and Herbal Ice-cream

First of all, a calculated amount of milk and cream was placed in a stainless steel container and mixed with the help of wooden ladle and heated by placing the pan in a container containing water over direct fire to 50°C. Mixing of solid ingredients were done by keeping skim milk powder, sugar and stabilizer together. Standardized mix was homogenized at 150kg/cm^2 in first stage and 50 kg/cm^2 in second stage at 60-62°C. Then pasteurization of the mix was done at 68.3°C for 30 minutes. After that cooling and ageing of the mix was done at 5°C for 6 hours. At this point Ginger juice was added @ 2% (T_1), 4% (T_2) and 6% (T_3) into the mix. Freezing in a batch freezer is done at -4°C in 8 minutes. It was then packed and sent for hardening at -18°C. Now the product is ready to be marketed. The samples were tested for physicochemical parameters (fat, total solids,

moisture, protein, ash and acidity) and microbial parameters (SPC and coliform) as per procedure given in the food chemistry manual of Allahabad Central University.

Statistical analysis

The data obtained on different aspects as per plan were tabulated and statistically analyzed as per Chandel [4].

RESULT AND DISCUSSION

Table 2 Shows average of different parameters studied.

Table 2: Physiochemical parameters of control and herbal ice-cream

Parameters (%)	Control and herbal ice-cream				F Value	CD
	T_0	T_1	T_2	T_3		
Fat	10.10	10.16	10.22	10.28	7.2*	0.88
Total solids	37.73	37.58	38.40	38.46	2.379**	-
Moisture	62.27	62.00	61.60	38.54	2.337**	-
Protein	3.67	3.67	4.05	4.29	0.124**	-
Ash	0.58	0.65	0.66	0.68	3.791*	0.073
Acidity	0.19	0.19	0.21	0.23	4.688*	0.025

* Significant at 5 % level, ** Non-significant at 5 % level

Moisture percentage

The moisture percentage of different treatments did not differed significantly. The highest moisture percentage was found in T_0 (62.27), followed by T_1 (62.00), T_2 (61.60) and T_3 (61.54). There was no significant difference found in average moisture content (%) of control and herbal ice-cream samples. F value was 2.337, indicating significant effect of treatment on moisture percentage (Fig. 2).

Fat percentage

There were significant differences found in the average fat percentage of different treatments. T_3 had highest score of (10.28%), followed by T_2 (10.22%), T_1 (10.16%) and T_0 (10.10%). There was significant difference found in average fat content of control and herbal ice-cream samples. F value was 7.2, indicating significant effect of treatment on fat percentage (Fig. 2).

Total solids

The total solid percentage of different treatments did not differ significantly. The highest total solids percentage was found in T_3 (38.40) followed by T_2 (38.13), T_1 (38.00) and T_0 (37.73). There were no significant difference found in average total solids content of control and herbal ice-cream samples. F value was 2.379, indicating no significant effect of treatment on total solids (Fig. 2).

Protein percentage

The protein percentage also did not differ in different treatments. The highest protein percentage was found in T_3 (3.74) followed by T_2 (3.67), T_1 (3.64) and T_0 (3.64). F value was 0.124, indicating no significant effect of treatment on protein percentage (Fig. 2).

Ash percentage

The ash percentage in different treatments differed significantly. The highest ash percentage was found in T_3 (0.68), followed by T_2 (0.66), T_1 (0.65) and T_0 (0.58). F Value was 3.791, indicating significant effect of treatment on ash percentage (Fig. 2).

Acidity

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The acidity percentage differed significantly in different treatments. The highest acidity was found in T_3 (0.23), followed by T_2 (0.21), T_1 (0.19) and T_0 (0.19). There were significant differences found in average acidity (%) of control and herbal ice-cream sample. F value was 4.688, indicating significant effect of treatment on acidity (Fig. 2).

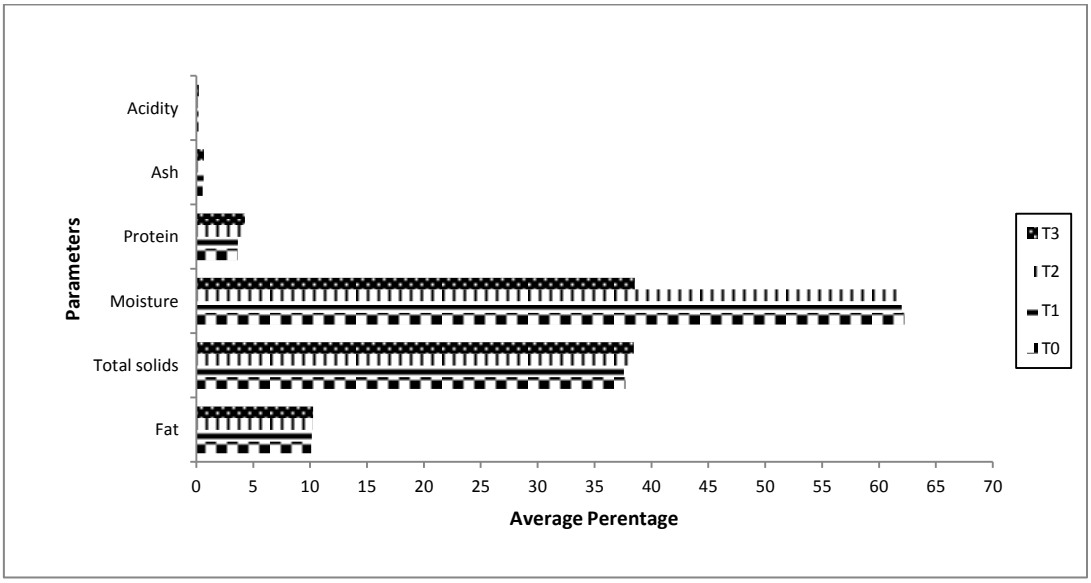

Figure 2: Average of different physicochemical parameters and yield of control and herbal ice-cream

Average of different Microbial Parameters of control and herbal ice-cream

Standard Plate count

As per table-3, the minimum standard plate count of control and herbal ice-cream was obtained from T_3 (7.60), whereas the maximum Standard Plate Count was found in T_0 (8.80), followed by T_1 (8.60), and T_2 (8.40). There was no significant difference found in average standard Plate Count of kalakand of control and experimental samples. There were no significant differences found among the treatments. F value was 2.96, indicating no significant effect of treatment on standard plate count.

Coliform count

There were no coliform found in all the treatments, thus indicated proper hygiene was followed.

Table 3: Microbial parameters of control and herbal ice-cream

Parameters	control and herbal ice-cream				F Value	CD
	T_0	T_1	T_2	T_3		
SPC(10^3)cfu/gm	8.80	8.60	8.40	7.60	2.96**	-
Coliform count (10^1)cfu/gm	Nil	Nil	Nil	Nil	-	-

* Significant at 5 % level, ** Non-significant at 5 % level

CONCLUSION

The treatments containing 6% level of ginger juice score the highest value. Thus, as far as product acceptability judged by physicochemical properties, the treatment can be rated as $T_3 > T_2 > T_0 > T_1$. On the basis of result obtained it can be concluded that the ginger can be successfully used for the preparation of herbal ice-cream, without sacrificing its palatability and therapeutic values.

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