



Asian Journal of Chemistry; Vol. 28, No. 11 (2016), 2495-2498

ASIAN JOURNAL OF CHEMISTRY

<http://dx.doi.org/10.14233/ajchem.2016.20040>



Quality Parameters of Ice Cream Prepared by Incorporating *Asparagus racemosus* Willd. Powder

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Received: 20 April 2016;

Accepted: 30 July 2016;

Published online: 10 August 2016;

AJC-18025

The study on specific objective is to examine the various parameters tests of physico-chemical properties, sensory attributes, rheological quality, antioxidant activity, microbial load and cost analysis. The test of parameters was done of prepared ice cream after freezing process. The present study is based upon the determining and collection physico-chemical properties, sensory attributes, rheological quality, antioxidant activity and microbial load data of various parameters. Statistical analysis where analyzed by random block design and data checked out at $p < 0.05$ level. This study concentrates on experimental treatment of ice cream manufactured by this method, is subjected to organoleptic properties of ice cream. As per sampling *Asparagus racemosus* Willd. powder used in 1, 2, 3 and 4 % levels added, respectively and determined the total solid, fat, protein, carbohydrate, acidity, ash, overrun, melting time, antioxidant, rheological properties and cost increases as added levels was increase in herbal ice cream. The result revealed that best score in sensory characteristics of *Asparagus racemosus* Willd. powder included ice cream were @ 2 % followed by 1, 3 and 4 % used of herbs, respectively in selected ice cream sample. The present study was carried out to find the functional properties quantitative of *Asparagus racemosus* Willd. powder included ice cream. These herbs where used in making and enhancement of medicinal value in ice cream.

Keywords: *Asparagus racemosus* Willd., Ice cream, Antioxidant activity, Rheological properties, Sensory qualities.

INTRODUCTION

Ice cream is very popular dairy frozen dessert among consumers of all ages in India, including many countries, mainly because of its refreshing coolness and flavour. The ice creams consumption in India has over the years grown steadily [1]. Similar trend was also observed in other group of the population. The development of an herbal ice cream could provide a good dietary alternative for such consumers. Several herbs native to India possess antioxidant properties and have been traditionally used as food ingredients in Ayurveda. Products have systemic activity, anticarcinogenic, antiatherogenic, antiinflammatory and antiviral effects, as well as decreasing the capillary permeability and fragility, inhibiting platelets aggregation and stimulating immune's function [2]. However, negligible scientific information is available on nutritional as well as antioxidant potential of such food product. Nature has been a source of medicinal agents since times immemorial. The importance of herbs in the management of human ailments cannot be over emphasized. It is clear that the plant kingdom

harbors an inexhaustible source of active ingredients invaluable in the management of many intractable diseases. However, these complementary components give the plant as a whole a safety and efficiency much superior to that of its isolated and pure active components. There are several reports on the antimicrobial activity of different herbal extracts in different regions of the world studied [3-7]. Because of the side effects and the resistance that pathogenic microorganisms build against antibiotics, recently much attention has been paid to extracts and biologically active compounds isolated from plant species used in herbal medicine [8]. Approximately 20 % of the plants found in the world have been submitted to pharmacological or biological test and a substantial number of new antibiotics introduced on the market are obtained from natural or semi-synthetic resources [9]. Therefore, the current experiment was designed to affect of *Asparagus racemosus* Willd. powder on quality parameters of ice cream as *Asparagus racemosus* Willd. powder including in ice cream for natural flavour and antioxidative health benefits. The *Asparagus racemosus* Willd. powder effects on physico-chemical, sensory,

rheological, antioxidant and microbiological characteristics of ice cream were also studied.

EXPERIMENTAL

Fully matured and dried *Asparagus racemosus* Willd. powder was procured from Raj Herbal Shop, Deoband, Saharanpur, India. Whole milk, Skim milk powder, cream and others additives procured from local market, Allahabad.

Preparation of different ice cream samples: Ice cream samples were prepared as incorporated different levels of *Asparagus racemosus* Willd. powder *viz.* 1, 2, 3 and 4 %, respectively. Preparation process of the ice cream was specification and standard methods of FSSAI-2006. The best treatments/combinations of different ice creams were selected on the basis of sensory evaluation and evaluated for their functional, nutritional and organoleptic qualities.

Physico-chemical analysis: Fresh ice cream samples prepared by different levels of *Asparagus racemosus* Willd. powder were analyzed for physico-chemical properties as per standard methods. Samples of four levels powder were selected for physical and chemical parameters. While total solid, fat, protein, carbohydrate, acidity, ash, melting time and overrun were measured according to standard [10].

Sensory analysis: Sensory evaluation of the ice cream was conducted by a department panel of four semi-trained judges using in 9-point hedonic scale for different parameters like colour appearance, body texture, flavour taste and overall acceptability [11].

Texture profile analysis: Texture profile analysis of ice cream samples analyzed to texture profile analysis device according by food product texture profile analysis. Analyzed parameter by texture profile analysis as consistency, cohesiveness and index of viscosity [12].

Antioxidant activity: Antioxidant activity in ice cream samples were analyzed to standard methods *viz.* diphenyl picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP) test. The ferric reducing antioxidant power (FRAP) test was conducted according to the method described [13]. Antioxidant activity of herbal ice cream was determined using stable radical, 1,1-diphenyl-2-picrylhydrazyl (DPPH), as described [14].

Microbiological analysis: The microbiological analysis were recorded using selected standard methods *viz.* standard plat count, yeast & mould count and coliform count tests. The ice cream samples were analyzed for standard plate count (SPC) using media nutrient agar, coliform count using media McConkey agar and yeast & mould count using media potato dextrose agar [15].

Cost analysis: Cost of ice cream per Kg analyzed to all calculated amount of ingredients using for ice cream samples.

Ice cream ingredients calculation was calculated according by standard method [16].

Statistical analysis: All analytical parameters were recorded in triplicates and the means value of each parameter were described. The data were assessed by random block design [17].

RESULTS AND DISCUSSION

The results indicate that the *Asparagus racemosus* Willd. powder based ice cream showed physico-chemical properties, sensory attributes, rheological quality, antioxidant activity and microbial load. The ice cream manufactured by different concentrations of *Asparagus racemosus* Willd. powder in 1, 2, 3 and 4 %, respectively.

Effect of different levels of *Asparagus racemosus* Willd. powder on the physico-chemical properties of ice cream:

The averages value of total solid, fat, carbohydrate, protein, ash, overrun and melting time of freshly manufactured ice cream are presented in Table-1. The effect of included *Asparagus racemosus* Willd. powder in ice cream was found to exercise significant ($p < 0.05$) influence in the total solid, fat, carbohydrate, protein, ash, melting time and overrun both being slightly but significantly for all experimental samples. There was proportionate increase in the total solid, fat, carbohydrate, protein, ash melting time and overrun in experimental samples with increasing level of incorporations of *Asparagus racemosus* Willd. powder ($p < 0.05$). The maximum chemical composition and physical properties of ice cream samples were founded 4 % level inclusion of *Asparagus racemosus* Willd. powder followed by 3 %, 2 %, 1 % level inclusion of *Asparagus racemosus* Willd. powder, respectively. Further, addition of *Asparagus racemosus* Willd. powder significantly increased the chemicals characteristic of experimental ice cream. The compositional attributes of all samples are well above maximum and minimum values specified for ice cream by 'food safety standard authority of India' (2011).

Effect of different levels of *Asparagus racemosus* Willd. powder on the sensory attributes, texture profile analysis and antioxidant activity of ice cream:

The ice cream of best sample *i.e.* 2 % *Asparagus racemosus* Willd. powder included ice cream was evaluated for various sensory qualities, rheological properties and antioxidant activity and were also other levels of powder included ice cream and the data sowed in Table-2. The maximum score of overall acceptability was found in 2 % powder included ice cream while minimum score was recorded of 4 % powder included ice cream. Statistical analysis of overall acceptability data was found no significantly ($p < 0.05$). Rheological properties 2 % *Asparagus racemosus* Willd. powder included ice cream were found averages and

TABLE-1
AVERAGE VALUE OF CHEMICAL AND PHYSICAL ATTRIBUTE OF *Asparagus racemosus* Willd. ICE CREAM

<i>Asparagus racemosus</i> Willd. powder (%)	Chemical attributes (%)						Physical attribute	
	Total solids	Fat	Protein	Carbohydrate	Ash	Acidity	Overrun (%)	Melting time (mL/min)
1	38.44	10.05	3.84	23.84	0.71	0.20	68.68	0.65
2	39.43	10.09	4.06	24.52	0.76	0.21	69.47	0.63
3	40.41	10.13	4.30	25.17	0.81	0.21	70.09	0.61
4	41.28	10.17	4.51	25.75	0.85	0.22	71.30	0.59

TABLE-2
AVERAGE VALUE OF SENSORY ATTRIBUTES, TEXTURE PROFILE ANALYSIS & ANTIOXIDANT ACTIVITY OF ICE CREAM

<i>Asparagus racemosus</i> Willd. powder (%)	Sensory attributes (Score)				Rheological properties (\pm S.D.)			Antioxidant activity	
	Flavour and taste	Body and texture	Colour and appearance	Overall acceptability	Consistency	Cohesiveness	Index of viscosity	DPPH activity (%)	FRAP activity (μ M)
1	7.60	7.68	7.52	7.55	2844.875	-180.96	-398.93	24.28 \pm 0.01	0.22 \pm 0.03
2	7.64	7.48	7.52	7.56	1756.774	-92.41	-195.14	26.44 \pm 0.00	0.25 \pm 0.03
3	6.68	7.04	7.64	7.28	1945.236	-110.04	-244.43	26.92 \pm 0.01	0.28 \pm 0.03
4	6.28	6.76	7.56	7.14	1934.593	-108.66	-238.96	28.37 \pm 0.00	0.31 \pm 0.03

TABLE-3
AVERAGE VALUE OF STANDARD PLATE COUNT AND YEAST & MOULD COUNT IN ICE CREAM AT DIFFERENT DAYS

<i>Asparagus racemosus</i> Willd. powder (%)	Days													
	0 th	7 th	14 th	21 st	28 th	35 th	42 nd	49 th	56 th	63 rd	70 th	77 th	84 th	91 st
Mean of standard plate count $\times 10^3$ CFU/g														
1	5.6	6.8	11.8	14.2	22.6	26.8	29.8	33.6	42.4	50.6	55.2	64.8	69.2	73.20
2	5.0	6.6	11.6	12.4	22.2	23.6	29.2	32.6	40.8	48.4	54.4	63.8	68.2	72.40
3	4.6	6.4	11.0	12.2	21.0	24.6	28.4	30.8	40.8	47.6	50.4	61.6	67.6	71.80
4	4.0	5.6	10.8	11.0	20.6	23.4	27.2	30.4	39.2	46.6	48.8	59.8	65.8	70.00
Yeast & mould count $\times 10^1$ CFU/g														
1	0.00	0.00	0.00	0.40	1.00	1.20	2.40	3.40	3.60	4.00	4.00	4.80	5.40	8.00
2	0.00	0.00	0.00	0.60	0.80	1.00	2.00	3.00	3.40	3.40	3.40	4.40	5.40	7.60
3	0.00	0.00	0.00	0.00	0.80	0.80	1.60	2.60	3.00	2.60	3.60	3.80	4.00	6.20
4	0.00	0.00	0.00	0.00	0.20	0.80	1.40	2.40	2.40	2.40	2.80	3.00	3.60	5.60

minimum consistency value of 1 % and maximum value of 3 % powder added ice cream ($p < 0.05$). The maximum antioxidant activity were founded 4 % level inclusion of *Asparagus racemosus* Willd. powder followed by 3 %, 2 %, 1 % level inclusion of *Asparagus racemosus* Willd. powder, respectively. Statistical analysis of antioxidant activity data was found no significantly ($p < 0.05$).

Effect of different levels of *Asparagus racemosus* Willd. powder on the Microbial quality of ice cream: The results indicate that initially there was an increase of 4×10^3 to 6.4×10^3 CFU/g standard plate count in all the samples during the first day of storage. There after gradual increase was observed in samples ranging from $(4 \text{ to } 76.20) \times 10^3$ CFU/g within 91 days of storage data value sowed in Table-3. The minimum standard plate count in ice cream prepare by 4 %, 3 %, 2 % and 1 % level of *Asparagus racemosus* Willd. powder at 0 to 91 day was found @ 4 % followed by 3 %, 2 % and 1 % inclusion *Asparagus racemosus* Willd. powder in ice cream. Statistical analysis of standard plate count of 4 % inclusion of *Asparagus racemosus* Willd. powder in ice cream 0 to 91 day was found high significantly difference ($p < 0.05$). The standard of the standard plate count with progressive storage may be attributed to the use of dairy ingredients that might have contributed to the microbial load of the ice cream not more than 250×10^3 cfu/mL [16,18,19].

Yeast & Mould Count analyzed at different level of *Asparagus racemosus* Willd. powder used in ice cream gives high antifungal value which was confirmed by method used for the Yeast & mould Count. Result at 0 and 7 day was nil Yeast & mould Count in total treatment. The minimum Yeast & mould Count of ice cream were found at 14 to 91 day was found 4 % level of *Asparagus racemosus* Willd. powder followed by 3, 2 and 1 % used of *Asparagus racemosus* Willd. powder in ice cream. Statistical analysis factorial design of Yeast and

mould Count of 4 % inclusion of *Asparagus racemosus* Willd. powder in ice cream at 14 to 91 day was found high significant difference ($p < 0.05$). Reported that yeast and mould with progressive storage may be attributed to the use of dairy ingredients that might have contributed to the microbial load of the ice cream was yeast 1×10^3 cfu/mL and mould 1×10^2 cfu/mL [20] and also yeast and mould count in ice cream of yeast 1.5×10^5 cfu/mL and mould 1.2×10^3 cfu/mL [21].

Coliform count of ice cream was recorded at different 7 days interval (0 to 91 days). The coliform count is used as an index of sanitation during the handling and processing of milk products. Coliforms are killed by pasteurization, thus when present in milk product, they are regarded as post pasteurization contaminants resulting from poor sanitation. In the present investigation coliforms were found to be absent in all the samples (fresh and stored). This indicates that proper hygienic precautions had been taken during the production, packaging and storage of ice cream.

Cost of *Asparagus racemosus* Willd. used ice cream: Cost of ice cream was calculated by cost of ingredients using in ice cream. Maximum cost was found 143.31 rupees per kg of 4 % *Asparagus racemosus* Willd. powder included ice cream, 130.95 rupees per kg cost of 3 %, 118.72 rupees per kg 2 % and minimum cost 106.00 rupees per kg was 1 % *Asparagus racemosus* Willd. added ice cream. The cost wise *Asparagus racemosus* Willd. ice cream treatment combinations were also more economical as compared to the ice cream available in present day market.

ACKNOWLEDGEMENTS

The authors are grateful to Dairy Department of "Sam Higginbottom Institute of Agriculture Technology & Science" for their educational support of the present research work.

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