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FORMULATION AND EVALUATION OF HERBAL ICE CREAM

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ABSTRACT

Aloe Vera, Mint, Basil and honey are medicinal plant origin materials they are used as traditionally from ancient year in various herbal medicines such Ayurveda, siddha, and Homeopathic. Ice-cream was prepared by the combination of Aloe Vera, Mint, Basil and honey at different proportions. Herbal ice cream manufactured by incorporating medicinal herbs showed textural properties. Four different formulations of ice cream were performed. Regular formulation of ice cream consisted of milk, cream, milk powder, stabilizer, emulsifier, sucrose and salt. The present study focused on examine the various parameters tests of physicochemical properties, sensory attributes, rheological quality, antioxidant activity, microbial load and cost analysis. Aloe Vera contains 75 potentially active constituents like Vitamins, Enzymes, Minerals, Sugars, Saponis, Amino acids. The test of parameters was done of prepared ice-cream after freezing process. This work for the analysis and collection of physic-chemical properties, sensory attributes, rheological quality, antioxidant activity and microbial load data of various parameters. These herbs where used to formulate and increase the medicinal value in ice-cream which is considered as healthy formulations.

KEYWORD: Herbal ice cream, Aloe Vera, Mint, Basil and honey.

1. INTRODUCTION

The Demand of herbal cosmetics due to the availability of new ingredients the financial rewards for developing successful products and maintained of quality standard. Ice cream is a dairy product prepared by suitable blending and processing of cream and other milk products, together with sugar and flavor, with or without stabilizer or colour and with the incorporation

of air during the freezing process. One of the most used instrumental methods for mixing the ingredients is mechanical stirrer. In this method, a sample of food is compressed and decompressed two times, imitating the first two chews on a food. The results obtained with this probe give different texture notes that have good correlation with the obtained by sensory methods. The instrumental TPA was developed 40 years ago and it is a very popular and used method not only in research but also in the industry as quality control of the food.

Natural origin plant material use for herbal medicines implies substantial historical use, and this is certainly true for many products that are available as „traditional herbal medicines". In many developing countries, a large proportion of the population relies on traditional practitioners and their armamentarium of medicinal plants in order to meet healthcare needs. The present investigation is an alternate to manufacture acceptable quality of Herbal ice cream using different levels of herbs with the following objectives: To analyze the rheological properties of Herbal ice cream.

2. AIM AND OBJECTIVE

Aim

Natural products from plants are rich sources used for treating a number of diseases. Most of the herbal drugs are a mixture of a number of plant ingredients. Their synergistic effect increases the efficacy of the drug in curing the diseases. In this modern era, the knowledge and experience of usage of herbs are being blend with advanced formulation technology to develop a safe and elegant herbal product, which has wider range of people acceptability. Aim of this study is to develop medicated Ice cream of model herbal for effective delivery in pediatrics patient, for the diabetic and Cardiovascular disease and specially for the weight loss therapy. To achieve the formulation of efficient herbal ice cream, following objectives are charted out.

Objective

The purpose of the present investigation is to formulate and evaluate herbal ice cream. Herbal plant Aloe Vera, Mint, Basil and honey are used for formulation of herbal ice cream. Then the formulated ice cream is evaluated for parameters like physical properties, pH, viscosity, phytochemical properties, sensory evaluation etc.

Plant profile

1) Basil (Ocimum)

Basil is a medicinal plant which known for thousand years and found in various of the world. In Indian subcontinent his medicinal herb is considered as a sacred plant (V. Sharma, A. Joshiet al., 2011). During the microscopic studies of leaves, it showed the presence of vascular bundles, trichomes, spongy parenchyma cells etc. There are three types of tulsi which are mentioned in ayurvedic texts

1) Rama or green leaf tulsi (O. gratissimum).
2) Shyama or Krishna or purple leaf tulsi (O. sanctum).
3) Vana or wild leaf tulsi (O.canum).

Sweet Basil (Ocimum basilicum L.) is used as a spice, perfume, cosmetics, fly repellent, medicine and also grown as an ornamental (Olof Ryding., 1994). They are also traditionally used in so many different formulations for the treatment of cough, cold, flu, headache etc. But now days it is also incorporated in the medicines for the treatment of wide disorders including mouth, throat, lungs, heart, blood, liver, kidney digestive system, and reproductive system.

Basil is sensitive to cold; thus, it grows best in hot and dry areas. For the growth, it needs less amount of water but if its leaves get wilted from lack of water, it will recover. If 8 yellow leaves are present towards the bottom of the plant then it means plant has been stressed and it needs less water, or less or more fertilizer.

2) Aloe vera

Aloe vera extract is widely used in medicine and cosmetic industries. It provides smoothening, moisturizing, to the skin and also contains healing properties which can helps to heal the wound fastly and also helps in preventing from infection. There are over 250 species of Aloe grown in the world but only two species are grown commercially

1) Aloe barbadensis.
2) Aloe aborescens.

Common names of A. Vera

- Chinese Aloe.
- Indian Aloe.
- True Aloe.

- Barbados Aloe.
- Burn aloe.

It is a perennial herb which contains 30-50 cm long and 3-10 cm broad at the base. It is peagreen in colour and contain bright yellow tubular flower of 25-35 cm in length in as lender loose spike; stamens frequently projected beyond the perianth tube. A. vera plant is intolerant to heavy frost and snow climate. This plant is easily grow in low water area, rocky surfaces and dry places. Due to the presence of succulence this species is able to survive in low natural rain fall areas.

Aloe vera is a widely grown ornamental plant throughout the world. The A. vera is also considered as a medicinal plant. A. vera is widely cultivated throughout the world. Basically A. Vera is considered to be native only to the Southeast Africa. But now is has been naturalized in north Africa, China, India Southern Spain. This species were introduced in China and various parts of southern Europe in 17th century.

Table No. 2: Nutritional composition of Aloe vera gel (Ahmed et al., 2013).

Constituents	In g/100g
Crude fiber	0.12 ± 1.20
Protein	0.12 ± 0.01
Fat	0.01 ± 0.02
Carbohydrates	0.66
Ascorbic acid	0.004 ± 0.05

3) Mint (Mentha viris, Linn.)

It is a herbal plant which is closely related to the variety of oil yielding plants. It falls under the family of Labiatae and genus Mentha spp. Mint is specially cultivated in temperate zones of Australia, Eurasia and South Africa. The names of most common mint varieties are: -

1. Peppermint.
2. Spearmint.
3. Wild mint.
4. Curled mint.
5. American mint.

Since ancient times mint is used by the human beings for improving their health. It prvides relief from common cold, fever, flu, indigestion, motion sickness. In industries it is also used in cuisines, medicaments and cosmetics, toothpaste, chewing gum industry.

3. MATERIALS AND METHODS

List of materials

Whole milk was collected (Brand- Amul milk) from Pune. milk powder brand name „nestle every day‟ was obtained from the local market of Pune. Cream brand name Amul was Obtain from local market of Pune. Honey „parrys‟ was collected from the local market of Pune. Stabilizer was collected from the local market of Pune. Emulsifier was collected from the local market of Pune. Salt „TATA‟ was collected from the local market of Pune. Herbs Aloe Vera, Mint, Basil, were Obtain from herbal garden (VNCOP, campus & Lakhewadi).

Preparation of extracts

The herbs Aloe Vera, Mint, Basil, was cleaned and grounded with water as 1:3 ratio. Then it was filtered through stainless sieve and pasteurized at 90ºC for 10 minutes. The juice was freshly prepared on the day of ice cream produced. The Aloe Vera, Mint, Basil, was cut, and kept at - 18ºC prior to use. For ice cream producing was homogenates with herbal juice.

Preparation of herbal ice cream

The ingredients were mixed in the following order (milk, milk powder, salt, stabilizer, cream and emulsifier, finally honey) and Addition of Aloe Vera, Mint and Basil. homogenization in a Ultrasonicate at 9000 rpm for 4 min, pasteurization at 62 ◦C for 30 min, then cooling and ripening, then 0.1% of vanilla essence mixture was added, Store at low temperature (-20 oC) finally freezing and incorporation of air, finishing with ice cream hardening.

Table No. 1: Quantity of Ingredients used in the Formulation and Preparation of Herbal Ice Cream for 1 kg Mix.

S. no.	Ingredients	F1	F2	F3	F4
1	Aloe Vera	25 ml	25 ml		
2	Mint and Basil	25 ml		25 ml	
3	Milk	449 ml	470 ml	465 ml	475 ml
4	Milk powder	118.5 gm	118.5 gm	118.5 gm	118.5 gm
5	Stabilizer	5 gm	5 gm	5 gm	5 gm
6	Emulsifier	5 gm	5 gm	5 gm	5 gm
7	Honey	196.5 gm	196.5 gm	200.5 gm	205.5 gm
8	Salt	1 gm	1 gm	1 gm	1 gm
9	Cream	175 gm	179 gm	180 gm	190 gm
10	Total	1000 gm	1000 gm	1000 gm	1000 gm

4. Evaluation parameters

1. Preliminary phytochemical analysis

Chemical test

Test for Carbohydrates (Molisch Test)

Test for Alkaloids (Mayer‟s Test)

Test for Steroids and Sterols (Salkowski test)

Test for Glycosides (Legal‟s test)

Test for Saponins (Foam test)

Test for Terpenoids (Copper acetate test)

Tests for Phenolic Compounds (Phenol litmus test)

Test for Gums and Mucilage (Ruthenium red test)

Test for Fixed Oils and Fatty acids (Saponification test, Litmus test)

Test for Flavonoids

Test for Tri-terpenoids

Tests for Tannins Test for Proteins and Amino acids (Biuret test, Ninhydrin test, Millon‟s test (Albumin), Casein

2. Physical & Chemical analysis

The medicated herbal ice cream was evaluated visually for the color, odor, taste, presence of any type of particles, phase separation and texture.

3. Determination of fat content

Centrifugal separation of fat (Volumetric method): Fat% was estimated by means of Gerber test. Transfer 10 ml Gerber acid to milk butyrometer with automatic measuring device. Add 10 ml of well-mixed sample of whole milk or skimmed milk. In case of milk powder either 1 gram powder is added then it is diluted with 10 ml of water or 10-time diluted reconstituted sample (10 ml) is added. Add 1 ml of amyl alcohol with auto measure and close the neck of the butyrometer firmly by inserting the stopper After thoroughly mixing the content place the butyrometer in water bath maintained at 650 C for 5 minutes. After removing from the bath and drying the butyrometer along with its contents is centrifuged it for 5 min at 11000 rpm. Again keep the butyrometer along with its in the water bath for 5 minutes and read the fat percentage by inverting the butyrometer and keeping gradually and at eye level.

4. Determination of protein content

Ten grams of sample were weighed into a 50-ml beaker and 0.8 ml of saturated potassium oxalate was added. The sample was mixed for 1 rain with a magnetic stirrer and titrated with standard 0.03 NaOH to an end point of pH 7.5 ± 0.1, using a pH meter Two milli liters of 40% formaldehyde were added and the sample was titrated back to the same end point. A blank was run, using 10 ml of water instead of 10 g of frozen dessert. The net formol titration was the milli liters of NaOH (minus the blank) required to titrate the sample after formaldehyde was added. The relationship between net milligrams of NaOH (calculated from formol titrations of ice cream) and total protein values by kjeldahl. A 5-g sample was diluted to 50 ml and a 1-ml aliquot was analyzed by a semimicro-Kjel- dahl procedure.

5. Determination of acidity of mixer content

The normal titratable acidity of mixes varies with the percentage of MSNF and may be calculated by multiplying the percentage of MSNF by the factor 0.016. Thus, a mix containing 10% MSNF would have a normal titratable acidity of 0.188% lactic acid. The normal pH of ice cream mix is about 6.3. The acidity and pH are related to the composition of the mix – an increase in MSNF raises acidity and lowers pH.

6. Determination of freezing point

The freezing point of ice cream is dependent on the concentration of soluble constituents and varies with composition. The freezing temperature can be calculated with considerable accuracy and can also be determined in the laboratory with a cryoscopy or vapour pressure osmometer. Generally, the differences in type and amount of sweetener solids and lactose concentration used in the mixes are primarily responsible for the differences in freezing points of mixes. The initial freezing point of ice cream mix is highly dependent on the sweetener content of the mix. When latent heat is removed from water and ice crystals are formed, a new freezing point is established for the remaining solution since it has become more concentrated in respect to the soluble constituents. A typical freezing curve for ice cream shows the percentage of water frozen at various temperatures.

7. Determination of pH

In determining the pH of the experimental ice cream, 20 ml of it was put in a porcelain dish wherein the probe of a 3 in 1 multifunctional moisture, pH and light meter was placed to get the readings.

8. Determination of melting time

The 250 ml of the ice cream product was put in a porcelain dish and has been subjected to hot plate testing for total melting for the sample was recorded.

9. Determination of texture, taste of the product

Physical properties of the experimental ice cream like texture, taste and appearance were assessed by 20 respondents of ages 18-25 years old.

10. Determination of viscosity

Viscosity of ice cream mix after aging was measured using a viscometer (Brookfield viscometer equipped with spindle number 1) at 70 rpm.

11. Determination of overrun

Overrun were calculated by the method given in Sommer (1951) as per IS2802:1964. A known volume of mixture was weighed accurately (W1) and then the same volume of frozen dessert was weighed (W2) and the overrun was determined as follows: % Overrun = [(W1 – W2)/W2] × 100

12. Determination of total solid content

A digital refractometer was used to measure the total soluble solid of ice cream. The lens of the digital refractometer was calibrated using distilled water. Then, one drop of liquid ice cream was placed on the prism of the refractometer and the value was recorded. The samples were measured in triplicate, and the results obtained were expressed as mean ± SD.

13. Determination of carbohydrate content:

The Lane-Eynon method is an example of a titration method of determining the concentration of reducing sugars in a sample. A burette is used to add the carbohydrate solution being analyzed to a flask containing a known amount of boiling copper sulfate solution and a methylene blue indicator. The reducing sugars in the carbohydrate solution react with the copper sulfate present in the flask. Once all the copper sulfate in solution has reacted, any further addition of reducing sugars causes the indicator to change from blue to white. The volume of sugar solution required to reach the end point is recorded.

14. Determination of moisture

Place the lid on the dish, transfer the covered dish from the hot air oven to the desiccator. Allow it to cool to room temperature and weigh it. Put approximately 1 g of the dried milk

sample in the dish, cover the dish with the lid and weigh the covered dish accurately and quickly. Uncover the dish and put it with its lid in the hot air oven maintained at 102 ± 2°C for 2 h. Replace the lid, transfer the covered dish to the desiccator, allow it to cool to room temperature (for approximately 30 - 45 min) and weigh it accurately and quickly. Heat the uncovered dish and lid in the hot air oven at 102 ± 2°C for further 1 h, replace the lid, allow the covered dish to cool to room temperature in the desiccator and weigh it. Repeat the process of drying, cooling and weighing, until the successive weighing do not differ by more than 0.5 mg. It is usually found that drying is complete after the first 2 h.

Moisture % by mass = 100 (M1 - M2) / M1 – M

Where, M = mass in g, of the empty dish; M1 = initial mass in g, of the dish and lid with the material taken for analysis; M2 = final mass in g, of the dish and lid with the material after drying. The maximum deviation between duplicate determinations should not exceed 0.06% by mass of moisture.

15. Sensory evaluation

Sensory evaluation of jelly was done, following parameters were considered like color, taste, flavor, consistency and overall acceptability. On the basis of this evaluation following results came out.

5. RESULTS

1. Preliminary phytochemical analysis

Table No. 2: Preliminary phytochemical analysis.

Sr. no.	Chemical test	Aloe Vera	Mint and Basil	Ice cream	Herbal ice cream
1	Carbohydrates			+	+
2	Alkaloids	+	+	-	+
3	Steroids and sterols	+	+	-	+
4	Glycosides	-	-	-	+
5	Flavonoids	+	+	-	+
6	Saponins			-	-
7	Amino acid	+	+	+	+
8	Protein			+	+
9	Tri-terpenoids	+	+	-	-
10	Terpenoids	-	-	-	+
11	Casein	-	-	+	+
12	Albumin	-	-	+	+
13	Gums and mucilage	-	-	-	-
14	Phenolic compound	+	+	-	+

15	Tannins	+	+	-	+
16	Fixed oils and fatty acids	+	+	+	+

2. Physical & Chemical observation

1. Physical observation

Table No. 3: Physical observation.

Sr. No.	Parameters	F1	F2	F3	F4
1	Color	White	Pink Light	Light yellow	Light green
2	Odour	Milk odour	Milk odour	Milk odour	Milk odour
3	Taste	Creamy	Creamy	Creamy	Creamy
4	Flavour	Vanilla	Strawberry	Banana	Mint
5	Texture	Good	Good	Good	Good
6	Phase separation	No	No	No	No

2. Physio chemical attributes

Table No. 4: Physio chemical attributes.

Sr. no.	Parameters	F1	F2	F3	F4
1	Melting time g/min	0.65	0.66	0.63	0.60
2	Overrun %	91	90	85	93
3	Ph	6.8	6.5	6.5	7.0
4	Totel solid content %	38.12	35.16	36.12	38.55
5	Ash %	0.87	0.71	0.75	0.65
6	Moisture %	70.31	68.81	66.75	85.13
7	Insoluble particle %	1.23	1.25	1.26	0.95
8	Freezing point °c	3.2	3.8	3.5	2.7
9	Visocity	1554	1707	1760	2312

Chemical attributes

Table No. 5: Chemical attributes.

Sr. no.	Parameters	F1	F2	F3	F4
1	Carbohydrate	25.12	21.38	21.74	24.70
2	Protein	4.91	4.12	3.96	3.45
3	Fat	10.92	10.22	10.46	11.34
4	Acidity	0.26	0.37	0.31	0.27

3. Sensory evaluation

Table No. 6: Sensory evaluation.

Sr. no.	Parameters	F1	F2	F3	F4
1	Color	10	10	9	8
2	Taste	9	9	8	7
3	Flavour	9	8	8	7
4	Body and texture	9	9	9	8
5	Consistency	8	8	8	8
6	Appearance	9	9	9	8
7	Overall Acceptability	9	8	8	8

1: extremely dislike, 2: strongly dislike, 3: moderate dislike, 4: slight dislike, 5: neutral, 6: slight like, 7: moderate like, 8: strongly like, 9: extremely like, 10: excellent

4. Determination of texture, taste of the product

Table No. 7: Rating scale for the texture of the experimental product.

Sr. No	F	Description	Interpretation
1	F1	Smoothness of the product is observed	Excellent
2	F2	Smoothness of the product is observed	Excellent
3	F3	Slight roughness of the product can be observed	Very good
4	F4	Slight roughness of the product can be observed	Very good

Taste of the experimental product

Table No. 8: Taste of the experimental product.

Sr. No	Batch	Description	Interpretation
1	F1	The ice cream is delicious.	Excellent
2	F2	The ice cream is delicious	Excellent
3	F3	The ice cream is slightly delicious	Very good
4	F4	The ice cream is slightly delicious	Very good

5. Appearance of the experimental product

Table No. 9: Appearance of the experimental product.

Sr. No	Batch	Description	Interpretation
1	F1	The product is very appealing, delightful, and looks like a real ice cream	Excellent
2	F2	The product is very appealing, delightful, and looks like a real ice cream	Excellent
3	F3	The product is very appealing, delightful, and looks like a real ice cream	Excellent
4	F4	The product is slightly appealing and some parts are not properly polished but still look like ice cream.	Very good

6. Moisture content in formulation

Sr. no.	Parameters	F1	F2	F3	F4
1	Moisture %	0.05	0.07	0.08	0.06

CONCLUSION

Aim of the present study was to develop and evaluation of Herbal ice cream using various different ingredients with higher, medium and lower concentration. Herbal ice cream is prepared by using two different extracts with different concentration. Batches (F1 – F4) of prepared herbal ice cream were subjected to the evaluation for appearance, PH, viscosity, ash, acidity, fat, protein, carbohydrate, etc., In the present study, the Herbal ice cream loaded with

extract of Aloe Vera, Mint, Basil were successfully formulated using Honey, milk powder, salt, emulsifier, stabilizer. The optimized formulations showed acceptable physio-chemical properties. Herbal ice cream studies were conducted on such as Preliminary phytochemical analysis, Microbiological analysis. The sensory evaluation was obtained for all batches in the range 8.16 – 9.08. all the formulation have uniformity of content. All the herbal ice cream Formulation could be effectively employed for oral delivery for pediatric dosage form.

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