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Research Article

Herbal Ice-Cream: Natural Tooth Pain Reliever

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ABSTRACT

“Herbal ice cream” it contains all natural products and they do not have any side effect to human health, Ice cream could be made more nutritious and health beneficial by adding herbs and other protein rich ingredients. it contains herbal ingredients like clove which have analgesic activity, Cinnamon which have anti-microbial activity, stevia as an herbal sweetening agent which also help to prevent tooth decay and additives like milk (base), custard powder (thickener), whipping cream (stabilizer). This Herbal ice cream helps to reduce inflammation which cause by tooth extraction or any dental operation, this herbal ice cream contains natural sweetener which does not imbalance the sugar lever in diabetic patient and also help to weight management by replacing sugar in diet. Herbal ice cream can improve patient health by removing chemicals from that product, this herbal formulation easily consumes by paediatrics and geriatrics patients.

INTRODUCTION

Herbal medicines has long been used to prevent and control disease, and it can be minimize the potential side effect of chemical product. However, side effects from herbs do exit. Most of the challenges with herbal medicine revolve around inadequate information about the effect of herbs on oral cavity, the mechanism of action and potential side effect.

Various factors boosting ice cream business in India are:

1. Rapid growth and urbanization
2. Increase in purchasing capacity

3. Increased awareness of the consumer
4. Modernized cold supply chain and storage facility
5. Evaluation of retail outlet facilities

PLAN OF WORK:


pre -formulation \longrightarrow Formulation \longrightarrow Design of Experiment Evaluation of ice cream

- Pre -formulation:

Collection of the raw materials like dried herbs from the local market. Particle size reduction and separation by sieving for even powdered form. Collection of full fat milk, boiling and chilling the milk at cool temperature in refrigerator.

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Preparation of viscosity modifier and stabilizer of ice cream

- Formulation:
 - 1.Preparation of ice cream base.
 - 2.Preparation of herbal ice cream.
- Experimental Design:
 - Evaluation of Herbal Ice cream:

EXIPIENTS USED IN HERBAL ICE CREAM:

1. Milk:

Lactose Monohydrate is a highly purified pharmaceutical excipient present in milk.

2.Stevia:

Stevia is a sugar substitute made from the leaves of the Stevia rebaudiana plant of South America. The leaves contain chemicals called steviol glycosides that have a highly concentrated sweet flavor. Stevia is about 200 to 400 times sweeter than table sugar and is a non-nutritive sweetener, which means it has no carbohydrates, calories, or artificial ingredients.

Stevioside and rebaudioside A are also the main sweet components of Stevia. Stevioside was first isolated from Stevia in 1931 and its chemical structure was established in 1952. Stevioside is a diterpene glycoside consisting of three molecules of glucose and a glucone moiety - steviol



Fig 2:Stevia

Reference:<https://commons.wikimedia.org/w/index.php?curid=4459502>[2]

3. Corn starch:

The corn starch is used in the cooking and baking as thickening agent. It is also used as binder and disintegrant in the pharmaceutical industry.

4. Clove:

The cloves contain 13 per cent tannin (gallotannic acid). Oleanolic acid has been isolated from spent cloves (residue from the distillation of essential oil. Steam distillation of clove buds yields a colourless (14.23%) or pale-yellow oil, with the characteristic odour and taste of cloves

Synonym: Caryophyllum

Biological source: Clove is obtained from dried closed flower buds of Eugenia Caryophyllus (syzygium aromaticum)

Family: Myrtaceae

Chemical constituents: Clove contains total 15-20% Volatile oil out of this 70- 90% is eugenol.Others constituents are 10-13% of tannins gallotannic acid,caryophyllenes, eugenol acetate. Due to methyl amyl ketone aroma of clove occurs so called as Syzygium Aromaticum.

Uses:Dental Analgesic, carminative, stimulant Eugenol, Vanillin (flavouring agent)



Fig 3: clove

Reference: <https://sl.bing.net/b7lGPslq3uC>[3]

5. Cinnamon:

Cinnamon has a distinctive aroma and taste that makes it commonly used as a flavoring. Besides that, cinnamon also contains bioactive compounds such as phenolic and flavonoid compounds. The main component in cinnamon extract is cinnamaldehyde and eugenol. Polyphenol content that plays a role in antioxidant activity was found

to be higher in cinnamon compared to other spices, such as ginger, turmeric, nutmeg and cardamom.

Synonym: Dalchini

Biological source: Cinnamon is obtained from dried stem outer bark of plant Cinnamon Cassia (Chinese cinnamon) and dried inner bark of the shoots of coppiced tree Cinnamon Zeylanicum (Ceylon cinnamon).

Family: Lauraceae

Chemical constituents: Cinnamon Zeylanicum 5-10% Eugenol 60-70% Cinnamal aldehyde, Cinnamon Cassia - 85-90% Cinnamon aldehyde, eugenol is absent

Uses: Carminative, Dental Analgesic, Astringent, Preparation of candy and perfume.



Fig 4: cinnamon

Reference: [https://sl.bing.net/fdwX3X5VWVeq\[4\]](https://sl.bing.net/fdwX3X5VWVeq[4])

Formula for herbal ice-cream:

INGREDIENTS	QUANTITY	FUNCTION
Milk	100 ml	Base
Whipping cream	10 ml	Stabilizing agent
Stevia	2 g	Sweetening agent
Custard powder	5 g	Thickening agent
Clove	0.50 g	Analgesic
Cinnamon	0.50 g	Antibacterial agent

Formulation table for herbal ice-cream

EXPERIMENTAL WORK

Preparation of base:

1. Take 100 ml of milk boil it on medium flame for 20 min.

2. Add 2g stevia powder and 5 g of custard powder in it to make a thick paste.

3. Transfer it into an air tight container and deep freeze for 6-8 hours.



Fig 5: Preparation of Herbal ice-cream Base

Preparation of ice-cream:

1. Take 10 ml of whipping cream in a container, with the help of bitter whip and stir the cream for about 7-10 mins to get desired consistency.

2. Weigh accurately the dry drug ingredients: Cinnamon & Clove powder.

3. Now add both the dry drug ingredients and whipping cream to the ice cream base.

4. Mix them well and stir; transfer it into the container and let set and freeze for another 4 to 6 hours.



Fig 6: Preparation of Herbal ice-cream

EXPERIMENTAL DESIGN:

Initial screening studies were carried out to check the effect of on ice cream stability. The time of mixing was identified as critical process parameter and quantity of base as critical formulation parameter. Design of experiment was used systematically to evaluate and optimize the

selected process and formulation parameters at three levels (-1, 0, +1) using 32 factorial design to find out their effects on critical quality attributes of formulations. The batch size, quantity of herbal powders, base etc. were kept constant in experimental process. Regression analysis of data acquired from the experimental runs generated following equations in which F ratios were statistically significant (p0.05). These model equations fitted the data well. A positive sign indicates a synergistic effect, while negative sign indicates an antagonistic effect.

$$\text{Melting Time (min)} = 27.29 + 1.52X_1 + 1.23X_2 \text{ (Linear Model).....(1)}$$

$$\text{Moisture (\%)} = 47.45 + 0.18X_1 + 1.75X_2 - 0.014X_2 \text{ (2FI Model).....(2)}$$

Where X1 and X2 are quantity of base (ml) and mixing time (min) respectively Equations (1) and (2) represent that, increase in mixing time & moisture content (%) showed an increase in Melting Time and Moisture (%). There was a little negative interaction effect

Table 1: Results of statistical analysis of the experimental design

Responses	Sources		
	Model p value	Adj-R ²	Lack of fit test p value
Melting Time (min)	0.0024	0.9632	0.2334
Moisture (%)	0.0004	0.9745	0.9126

Table 2: Preparation of formulations using 3² factorial design

Run	Block	Factor 1 A:Qty. of Base ml	Factor 2 B:Mixing Time min	Response 1 Melting Time min	Response 2 Moisture %
1	Block 1	50.00	5.00	24.6	62
2	Block 1	100.00	7.50	29.2	69
3	Block 1	100.00	10.00	30	70
4	Block 1	75.00	10.00	28.5	68
5	Block 1	75.00	7.50	28	67
6	Block 1	75.00	5.00	25.2	65
7	Block 1	100.00	5.00	27.3	68
8	Block 1	50.00	10.00	26	67.5
9	Block 1	50.00	7.50	26.8	65

Model verification:

The desirability function was evaluated by Design-Expert software to obtain the optimized FBF nanosuspension. The model verification results are displayed in Table 3 that compare observed and predicted values of response.

Table 3: Comparison of observed and predicted values of responses of optimized batch

Factors		Predicted value		Observed value*	
Quantity of base (ml)	Mixing time (min)	Melting Time (min)	Moisture (%)	Melting Time (min)	Moisture (%)
100	7.5	30.21	70.3	29.2	69

EVALUATION PARAMETERS:

Colour:

Ice cream should have a delicate, attractive colour that suggests or is closely associated with its flavour. Almost all ice creams are slightly coloured to give them the shade of the natural product 15% fruit produces only a slight effect on colour.

Odour: Cold things have reduced aroma, because vapors do not rise from them as quickly. Heat makes molecules break off and float away in the air; these are what you smell. Also, most of ice cream is just water and sugar, neither of which have any smell.

Taste: Ice cream is sweet, and is usually flavored with fruit, spices, or candy- the flavor often influences the color (that is, chocolate ice cream is brown, strawberry and cherry flavors are pink, pistachio is green). Good ice cream has a smooth texture.

Flavour: There are over 1,000 flavors of ice cream and many more keep getting each year. Vanilla,Chocolate,Strawberry,Mint chocolate chip,Cookies & cream are few icectream flavours. Texture: ice cream should generally be smooth and soft. It should melt pleasantly and not too quickly in the mouth. Negative spots in this context are noticeable ice crystals, sandy texture or coarseness. All ice cream have the same basic parts: ice crystals, air, fat, sweeteners, and

Phase separation: Ideally there should be no phase separation in icecream. When looking at ice cream at a microscopic level it is found that ice cream is made up of four phases: ice, air, fat and a concentrated aqueous solution.

pH: of ice-cream the pH value of normal ice cream is about 6.2-6.3 Dairy products like butter, hard cheeses, cottage cheese, and ice cream are also acid-forming. Use the pH metre for the determination.

Melting Point: of ice-cream The melting point of icecream is at about 10°F ice cream is half melted. Water, on the other hand melts at —about 32°F The exact melting point of ice cream depends on what's added to the ice cream base. While milk has a stable melting point of 31 degrees Fahrenheit, extra ingredients like sugar, colorings and cookie pieces alter how the atoms interact with each other, thereby changing how it melts.

Viscosity: of ice-cream Ice cream viscosity is determined by the non-frozen phase viscosity and the ice fraction generated during its freezing. For an ice cream liquid mixture, apparent viscosity

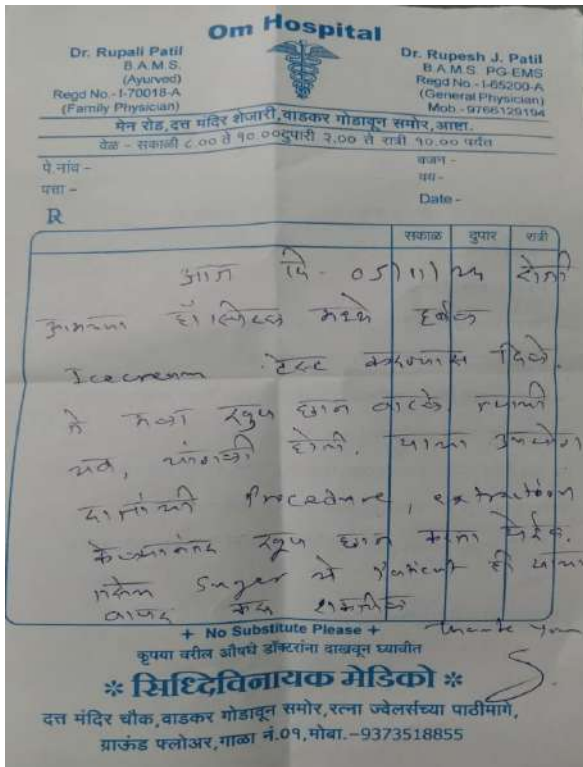
values have been reported between 0.1 and 0.8 Pa·s,

Overrun: of ice-cream Overrun refers to the degree of expansion resulting from the amount of air incorporated into the product during the freezing process. Ice cream normally has an overrun of around 100%, meaning that air makes up 50% of its volume.

Melt-down test: It have a solid 30 minutes before finding soup in your bowl. In a frozen state, the ice cream structure is mainly stabilized by ice crystals and the high viscosity of the unfrozen serum phase. The melting process the meltdown rate is highly dependent on the fat agglomerates in the unfrozen serum phase

Moisture content: Ice cream should contain 55-65% water. Ice cream mixture with high water content will resulted in a low total solid content in general and proportionately higher water that available to freeze when hardened at the same temperature compared to the ice cream mixture with low water content and high total solid.

Product review



RESULTS AND DISCUSSION

Appearance & Colour:

The appearance was found to be smooth and creamy; white yellowish in colour

Taste: Taste was found to be sweet creamy and aromatic.

Odour: The ice-creams were aromatic and smells like aromatic herbs incorporated in the Milk

Texture: The texture is smooth and creamy due to the cream and air incorporation.

Flavour: The satisfying Vanilla flavour was found for all formulations.

Viscosity: The average viscosity of the formulations was 198 cps. The ideal viscosity of the ice-cream is between 185-200cps ° Phase

separation: There was no phase separation found for all formulations.

pH of ice cream: The average pH of all ice-creams was found to be 6.2.

Moisture content: Moisture content is an important parameter in the ice cream. Average moisture content of all formulations was found 58%

Melt down: The complete meltdown of ice cream is after 45min.

Overrun: Overrun refers to the degree of expansion resulting from the amount of air

incorporated into the product during the freezing process. Ice cream normally has an overrun of around 100%, meaning that air makes up 50% of its volume. All results were satisfying the standard value.

CONCLUSION:

The herbal ice-creams were effectively formulated and evaluated. Research was conducted to prepare herbal ice-cream with effective outputs. The objective was to develop improved herbal based ice-cream with health benefits is achieved. The product was formulated with herbal components:, Cinnamon, Clove & Stevia . All the evaluation tests were found satisfactory.

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