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Formulation and evaluation of anti-oxidant activity of apricot seed oil herbal lip balm

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Abstract
Demand for natural products has been rising recently, particularly in cosmetic sector. Since ancient times, cosmetics have been high in demand. Natural lip balms offer a healthier alternative over conventional cosmetic products which often contain chemical ingredients linked to side effects. This study focuses on selecting herbal components that provide moisturizing, healing, protective benefits, combining them into a lip balm formulation. The key ingredients include beeswax, cocoa butter, avocado oil, rosemary oil, rose oil and beetroot. Herbal lip balm is formulated by carefully blending of natural ingredients to ensure stability and uniformity. Among all the formulations obtained F6 was found to be the best formulation and was compared with that of the marketed herbal lip balm (Good vibes herbal lip balm). Evaluation of herbal lip balm includes assessing organoleptic properties, pH, melting point, spreadability, skin irritation test, rancidity test and antioxidant test. Stability test is conducted to ensure the product maintains its quality over time under various environmental conditions. In this work Apricot seed oil is used as a principle ingredient which has antioxidant activity. The natural composition of formulation supports the growing demand for effective, chemical-free cosmetic alternatives.

Keywords: Herbal lip balm, apricot seed oil, herbal cosmetics, anti- oxidant properties.

1. Introduction
Herbal cosmeceuticals is a rapidly growing category in the field of cosmetics and personal care products. An Herbal cosmetic is also known as "natural cosmetics" as there are no side effects; demand of herbal medicines is growing quickly. Herbal cosmetics are formulated, using different cosmetic ingredients to form base in which one or more herbal ingredients are used to cure various skin ailments. Many different types of herbal cosmetics are produced and utilized on a daily basis [1]. The best thing of the herbal cosmetics is that it is purely made of herbs and shrubs and free from side effects. Herbs give a way to re-establish a connection with nature, even though they might not offer instant comfort. For cosmetic purposes, people in rural and mountain areas chose natural remedies including herbs and plant extracts, such as Neem, Orange, and China rose, Lavender [2]. Traditional medicine based on herbs is still commonly used in emerging countries, where the use of complementary and alternative medicine is rapidly expanding in such countries.
The production, use, and sale of herbal medicines should be formally and legally governed by established norms and regulations, which are not well developed in many countries, in order to guarantee their quality and safety. Therefore, the sale of herbal goods should be regulated by law when used for therapeutic and medical purposes and also educate the public about the advantages and risks of herbal medicines [3].

2. Materials and Methods

Table 1: Formulation ingredients

S. No.	Name of the material	Category	Name of the supplier
1	Apricot seed oil	Base oil	Hope farm junction, Bangalore
2	Beetroot powder	Coloring agent	Ishopie store, Jaipur
3	Rosemary oil	Preservative	Krishna bhavan, Ahemedabad
4	Avocado oil	Oil	SS international, Gurugram
5	Rose oil	Flavoring agent and perfume	Green vibes Biotech
6	Bees wax	Base	Shree Krishna enviro venture Pvt. Ltd
7	Cocoa butter	Base	Shree Krishna enviro venture Pvt. Ltd

2.1 Phytochemical screening of oils

Table 2: Phytochemical screening of oils

S. No.	Name of the oil	Test and its procedure	Chemical required	Inference	Test results
1.	Rosemary oil	**Ferric chloride Test:** Add a few drops of ferric chloride solution ($FeCl_3$) to rosemary oil diluted in alcohol. A color change (bluish-green) indicates the presence of phenolic compounds like rosmarinic acid	Ferric chloride solution, Alcohol	Bluish-green colour is obtained. Indicates the presence of rosmarinic acid	
2.	Avocado oil	**Acid value Test:** Dissolve 1gm of sample in 50ml of ethanol. Add 2-3 drops of phenopthalein indicator. Titrate it with 0.1N KOH Solution until pink colour is obtained	Ethanol, KOH (0.1N), Phenopthalein indicator	Pink colour is obtained Indicates the presence of free fatty acids	
3.	Apricot seed oil	**Acid value test:** Dissolve 1gm of sample in 50ml of ethanol. Add 2-3 drops of phenopthalein indicator. Titrate it with 0.1N KOH Solution until pink colour is obtained.	Ethanol, KOH (0.1N), Phenopthalein indicator	Pink colour is obtained Indicates the presence of free fatty acids	

2.2 Method of preparation

The herbal lip balm was formulated as per general method of lip balm formulation. In this formulation, bees wax and cocoa butter is melted in a beaker at 70 °C on a water bath. Similarly, apricot seed oil, avocado oil and rosemary oil were taken in another beaker and melted at 70 °C on a water bath in decreasing order of their melting point. The coloured pigment (beetroot) was added to the oil phase until a homogenous mixture was obtained. Then it was added to the wax phase at the same temperature. The mixture was cooled to 40 °C and rose oil was added. The molten mixture was then poured into lip balm containers [21].

Table 3: Formulation table

Ingredients	F1	F2	F3	F4	F5	F6	F7	F8
Beeswax	4.4g	2g	2g	2g	2g	2g	3g	1g
Cocoa butter	-	-	4g	4g	4g	2g	4g	4g
Apricot seed oil	1.6ml	1.6ml	1.6ml	1.6ml	2ml	2ml	1ml	1.8ml
Avocado oil	1.6ml	1.6ml	1ml	1ml	0.6ml	1.2ml	0.6 ml	1.2ml
Beetroot powder	0.8g	2g	0.6g	0.6g	0.6g	1g	0.6g	0.8g
Rosemary oil	0.8ml	1.4ml	0.4ml	0.4ml	0.4ml	1ml	0.4ml	0.8ml
Rose oil	0.8ml	1.4ml	0.4ml	0.4ml	0.4ml	0.8ml	0.4ml	0.4ml

3. Evaluation tests and their procedures

3.1 Organoleptic properties

The Organoleptic properties of lip balm such as colour, odour, appearance are observed and studied.

3.2 Determination of pH

The pH of lip balm was determined to avoid any further side effect on lip's skin. The pH study was performed by using pH paper. The small amount of lip balm is applied on the pH paper and colour was observed & compared against pH scale [5].

3.3 Melting point

Scrape a small portion (around 1-2 grams) of the lip balm using a spatula. Place the sample in a clean Petri dish. Position the thermometer so that it can monitor the surface temperature of the hotplate near to the sample. Place the dish with the sample directly on the center of the hotplate. Turn on the hotplate and set to a low heat setting. Allow the sample to heat gradually. Do not overheat. Closely observe the lip balm and note the temperature at which it begins to soften. The melting point is recorded when the entire sample melts into a liquid. Note the temperature at which full melting occurs. Repeat the procedure 2-3 times to get the consistent results and calculate the average melting point.

3.4 Spread ability test

In order to visually assess the homogeneity in the formulation, the product was applied repeatedly to a glass slide while it remained at room temperature. This process is known as Spread ability. For this examination,

- G-Good consistency, uniform, perfect application.
- U-Uniform, appropriate application.
- NU-Not Uniform, inappropriate application [24].

3.5 Skin irritation test

The prepared lip-balm was applied to the skin. Any symptoms such as itching, irritation and redness, were observed for a duration of 5 hours. The test was carried out (n = 5).

- I-Irritation
- N-No reaction [15].

3.6 Rancidity test

As the preparations are done by incorporating natural oils and fats, it's necessary to check the preparations for oxidative degradation. This property can be checked by determining Peroxide value. The peroxide values of the all the 3preparations should be less than 10. This indicates the formulations are devoid of rancidity.

Procedure for calculation of peroxide value [22]

1 g of herbal lip balm is added to conical flask. Then add chloroform and acetic acid mixture in 2:3 ratio. Add 0.5 ml of saturated potassium iodide solution. Leave the mixture for 5minutes, add 30 ml of distilled water. Add few drops of starch indicator. Titrate the mixture against 0.01N sodium Thio sulphate solution, Continue the titration until blue colour disappears.

$$PV = \frac{(V \times N) \times 1000}{W}$$

V=Volume of sodium this sulphate used
N=Normality of sodium this sulphate
W= Weight of sample.

3.7 Anti-oxidant test

The lip balm product is applied to leaves as part of the antioxidant test. The level of darkness on the leaves is noted every hour. A few hours later, it gets darker. If there are a lot of antioxidant ingredients, it takes too long and gets darker [23].

3.8 Stability test

The prepared herbal lip balm was placed for stability studies at room temperature for 15 days, 30 days, 45 days. The samples were characterized for organoleptic properties, pH, melting point, spread ability, skin irritation, rancidity, anti-oxidant test [23].

4. Results and Discussion

The prepared formulations of lip balm were subjected to various evaluation tests to determine the various parameters which involve color, textures, odour, melting point, physical stability, skin irritancy etc. The results of the all-evaluation tests of prepared formulations in comparison with the marketed formulation were given in Table 4.

Fig 1: Organoleptic properties (F3 – F8)

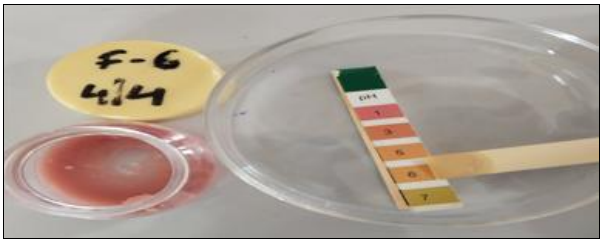

Fig 2: pH (F6)

Fig 3: Spreadability (F3-F5)

Fig 4: Spread ability (F6-F8)

Fig 5: Rancidity Test (F6)

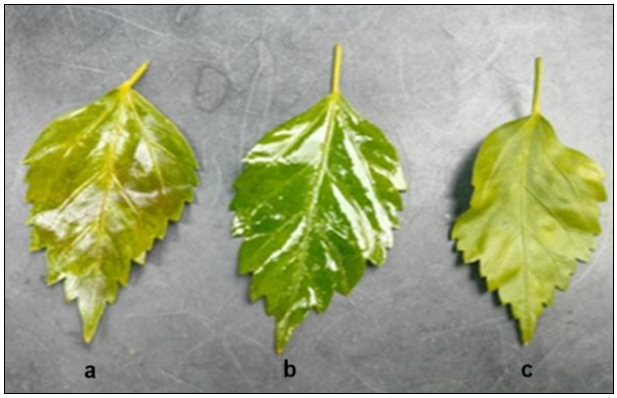

Fig 6: Anti-Oxidant Test (F6)

- Leaf applied with marketed herbal lip balm
- Leaf applied with the prepared formulation (F6)
- Normal Leaf

Table 4: Evaluation results of lip balm formulations

S. No	Parameter	F1	F2	F3	F4	F5	F6	F7	F8	Marketed Herbal lip balm
1.	Colour	Pale yellow	white	No	Pink	Pink	Pink	Flamingo pink	Salmon	White
2.	Odour	Characteristic	Characteristic	Characteristic	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
3.	Appearance	Too hard	Too hard	Hard	Moderate Smooth	Moderate Smooth	Smooth	Hard	Hard	Smooth
4.	pH	3	4	5	5	6	6	5	5	6
5.	Melting point	58^0C	61^0C	59^0C	60^0C	64^0C	65^0C	68^0C	60^0C	66^0C
6.	Spreadability	NU	NU	NU	U	U	G	U	NU	G
7.	Skin irritation	I	I	N	N	N	N	N	N	N
8.	Rancidity	8	9	9	7	8.5	6.6	7.2	7.5	6.8
9.	Anti-oxidant activity	No	No	No	No	Pass	Pass	No	No	Yes

The colour of formulation (F4-F7) was observed to be pink colour. The formulation (F1, F2, F3) was observed to be pale yellow to white colour due to non-uniform mixing of colouring agent. The texture of products was found to be smooth in F6 and moderate smooth in F4, F5. The formulations F1, F2, F3, F7, F8 was found to be too hard which may be due to more amount of beeswax compared to cocoa butter. The prepared formulations possessed pleasant odour except F1, F2, F3 which have shown characteristic odour due to the usage of improper ratio of oils. The prepared formulations and marketed one exhibited pH range of 5-6. Whereas F1, F2 had pH of 3 and 4 respectively. The formulations F1 and F2 caused skin irritation when applied to the skin since their pH was acidic in nature. The formulations shown melting point range of 64 °C to 68 °C, whereas F1, F2, F3, F4, F8 had melting point range below 60 °C. All formulations were evaluated for rancidity. Because the preparations include natural oils and fats, oxidative deterioration must be monitored. This quality can be tested by finding the peroxide value. The peroxide values of all preparations were found to be less than 10. This indicates formulations are devoid of rancidity. It appears that leaf applied with F5, F6 herbal lip balm formulations are protected from sunrays, free radicals present in the atmosphere. The leaves applied with F1-F4, F7, F8 are wrinkled.

Table 5: Formulation F6 vs Marketed Herbal lip balm

S. No.	Parameters	F6	Marketed lip balm
1.	Colour	Pink	White
2.	Odour	Pleasant	Pleasant
3.	Appearance	Smooth	Smooth
4.	pH	6	6
5.	Melting point	65 °C	65 °C
6.	Spreadability	G	G
7.	Skin irritation	N	N
8.	Rancidity	6.6	6.8

4.1 Stability studies

Table 6: Stability studies

Parameter	15 Days	30 Days	45 Days
Colour	Pink	Pink	Pink
Odour	Pleasant	Pleasant	Pleasant
Appearance	Smooth	Smooth	Smooth
pH	6	6	6
Melting point	65 °C	65 °C	65 °C
Spreadability	G	G	G
Skin irritation	N	N	N
Rancidity	6.6	6.6	6.6
Anti-oxidant	Pass	Pass	Pass

Stability studies were conducted to evaluate the physical and chemical stability of the formulated herbal lip balm when stored at room temperature (approximately 25 °C ± 2 °C) over a defined period. The objective was to assess any potential changes in the product's appearance, texture, fragrance, pH, spread ability, and overall acceptability under ambient storage conditions.

The lip balm samples were stored in airtight containers away from direct sunlight and evaluated at regular intervals (e.g., 15, 30, and 45 days). No significant changes were observed in the tested parameters during the study period, indicating that the herbal lip balm remained stable at room temperature. The formulation retained its intended properties and was found to be suitable for use under normal storage conditions.

5. Summary and Conclusion

The present study successfully formulated & evaluated herbal lip balm using apricot seed oil as a principle ingredient enriched with other natural components such as avocado oil, cocoa butter, rosemary oil, beetroot powder. The optimized formulation (F6) displayed, desirable physicochemical properties like appropriate pH, melting point and texture, effective skin compatibility without causing irritation, good antioxidant activity, supporting its protective role for lips. A 45-day stability study was conducted to assess the product's consistency over time. The formulation was monitored for any physical or chemical changes during storage. The optimized formulation (F6) was compared with the marketed herbal lip balm. The prepared formulation proved to be equally effective, offering therapeutic benefits alongside cosmetic appeal. This research not only validated the use of apricot seed oil as a potent base with anti-oxidant property for lip care formulations but also provides evidence that natural formulation can compete with or outperform conventional commercial products in terms of safety, efficacy and stability. The findings encourage further explanation into the commercialization of herbal lip care products and underline the growing potential of phytochemical based cosmetics. Moreover, the approach aligns with current consumer trends towards green, sustainable and toxin- free personal care products reinforcing the value of this research in the modern cosmetic industry.

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