

FORMULATION AND EVALUATION OF HERBAL LIP BALM

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ABSTRACT

Cosmetics have been in high demand since ancient times, and today, there is a growing preference for products derived from natural sources. Among various cosmetic items, lip balms are some of the most commonly used products, valued for enhancing lip appearance and adding a touch of glamour to makeup. Lip balms also serve as a natural means of maintaining and promoting lip health. However, many modern lip products rely heavily on synthetic chemicals, which may cause adverse effects. Therefore, this study focuses on exploring natural ingredients suitable for formulating herbal lip balms. The review highlights key natural components—such as bases, oils, extracts, colorants, and flavoring agents—used in lip balm formulations, along with their respective benefits and drawbacks. Additionally, natural lip balms can be evaluated for their temperature stability, pleasant taste, smooth application, adherence to lips, and ease of intentional removal.

KEYWORDS: Herbal lip balm, natural cosmetics, plant-based ingredients.

1. INTRODUCTION

The Drugs & Cosmetics Act (D&C Act) 1940 and rules 1945 defines a cosmetic as any article intended to be sprayed, poured, rubbed, or sprinkled on, or introduced into, or applied to the human body or its any part for cleansing, beautifying, promoting attractiveness or altering the appearance.^[20] Cosmetics play an important role in our day-to-day life.

Nowadays, there is hike in the usage of natural products as the people are more cautious and selective towards what cosmetics they use due to their knowledge on ecological and environmental effects because of the use of daily products which are abundant in chemicals.

In addition to that, the chances of adverse reactions taking place are extremely low or even nil as the formulations consist of products from a natural origin. Lip balm also known as lip salve is basically a wax-based moisturizer containing ingredients (beneficial for the skin) to be applied on the surface to have a moisturizing and soothing effect and prevents cracked or chapped lips.

Lip formulations contain a wax or oil base, stabilizer/emulsifier, preservative, a colouring agent, a flavouring agent, and an API which could be a substance possessing anti-oxidant, moisturizing, nourishing or anti-inflammatory properties. Skin on lip known as stratum corneum is different from another skin surface. With its faster evaporating moisture rate than face skin. Lip salve is a cosmetic preparation made with the same base as of

the lipstick, but there are minute differences between the lipstick and lip balm with a lip miniaturization as a main function. Lipstick gives colour to the lips while lip balm's function is to provide protection and is done without any colours that look transparent.^[8]

2. NEED FOR STUDY

Lip cosmetics are commonly used nowadays by people of all genders around the world. The lips are an integral part of the human face and play an important role in facial expression, articulation, sensory perception, motor function, physical attraction, and affection Our lips are a crucial part of our body.^[4] Healthy lips are what give an individual a stunning appearance. Lip colour and size have long been linked to sexual attractiveness. As a result, lip augmentation has become prevalent in Western culture. The lip balm's moisturizing effect not only gives the lips an appealing look but also prevents from several lip issues and abnormalities. Wound healing is a complex dynamic phenomenon that develops an anatomic consistency and mechanism regeneration. Wounds are visible injuries that end up causing a break or opening in the skin. Proper wound healing is absolutely essential for trying to restore the skin's dysregulated anatomical stability and functional status. Inflammation, proliferation, and remodelling are the three stages of wound healing. This project aims to formulate a lip salve which aids in preventing the below mentioned conditions that an individual might go through in the life.

3. MATERIALS AND METHODS

Materials

Table 1: Composition and Functional Role of Ingredients in Natural Lip Balm Formulation.

Ingredients	Quantity Used	Uses
Vitamin E	30 ml	Antioxidant & Stabilizer
Castor Oil	22.5 ml	Moisturizing Agent
Vanillin	15 gm	Flavoring Agent
Methyl Paraben	0.9 gm	Preservative
Propyl Paraben	0.3 gm	Preservative
Turmeric Powder	3 gm	Anti-microbial & Coloring Agent
Petroleum Jelly	130 gm	Base

Methods

1. Weighing the Base

An accurate measurement of 130 grams of petroleum jelly was obtained using a digital balance and transferred into Beaker 1.

2. Preparation of Oil Phase

Measured volumes of castor oil (22.5 ml) and vitamin E oil (30 ml) were taken using a graduated cylinder and combined in Beaker 2.

3. Heating Both Phases

Beaker 1 and Beaker 2 were placed in a thermostatically controlled water bath and heated to a consistent temperature range of 70°C to 80°C to ensure thorough melting and mixing.

4. Incorporation of Turmeric

After approximately five minutes of heating, 3 grams of turmeric powder were added slowly to Beaker 2 with constant stirring to achieve even dispersion.

5. Addition of Flavoring Agent

Simultaneously, 15 grams of vanillin were added to

Beaker 1 to serve as a flavoring component.

6. Homogenization

Heating and stirring of both beakers were continued until all contents were uniformly mixed.

7. Mixing of Phases

The contents of Beaker 2 (containing the oil and turmeric) were gradually poured into Beaker 1 (containing petroleum jelly and vanillin), with continuous stirring to ensure a uniform blend.

8. Preservative Addition

Measured quantities of methyl paraben (0.9 gm) and propyl paraben (0.3 gm) were introduced into the combined mixture to act as preservatives.

9. Pouring and Cooling

While still in the molten state, the final mixture was poured into lip balm containers and left to cool at room temperature until solidification occurred.



Fig. 1: Formulated Batches.

Description

- **Visual:** A small, round, transparent plastic container with a yellow screw-on lid.

- **Contents:** Filled with yellow-colored herbal lip balm, visible through the transparent walls.
- **Surface:** Smooth and even, indicating a uniform and well-set formulation.

4. EVALUATION PARAMETERS

Organoleptic Properties

The formulation was studied for physical appearance, colour and odour. These characteristics were evaluated by physical observation. Texture and homogeneity were tested by pressing a small quantity of the formulation between the thumb and index finger.^[48] The presence of coarse particles and consistency were used to evaluate the texture and homogeneity of the formulations.^[13]

Test of spread ability: Spread ability may be expressed by the extent of the area to which the topical application spreads when applied to the affected parts on the skin. The therapeutic efficacy of the formulation also depends upon its spreading value. Sample was applied between two glass slides and they were pressed together to obtain a film of uniform thickness by placing weight for 5 mins.^[52]

The spread ability (S) can be calculated using the formula: $S = m * L/T$

Where, S = Spread ability.

m = Weight tied to the upper glass slide

L = Length moved on a glass slide.^[9]

Measurement of pH: The pH of lip balm was determined in order to investigate the possibility of any side effect. An acidic or alkaline pH may cause irritation

of lip, it was determined keep the pH as close to neutral as possible.^[12] The pH study was carried out by dissolving 1 gm of sample into 100 ml water. The pH measurement was done using pH paper.^[49]

Irritation Test: Irritation test was conducted to determine the reactions produced by the skin after basting.^[8] Irritation test was observed in the presence of a positive reaction in the form of itching, swelling and redness. Lip salve safe dosage will not cause irritation and is harmful to the skin when used.^[2]

Stability Studies: - Stability of drug can be defined as the time from date of manufacture and the packaging of the formulations, until its chemical or biological activity is not less than a predetermined level of labelled potency and its physical characteristics have not changed appreciably.^[6] The purpose of stability testing is to provide evidence on how to quality of the drug substance or drug product varies with time under the influences of variety of environmental factors such as temperature, humidity and light, enabling recommended storage conditions and shelf-life.^[50] Stability studies were carried out for one month/30 days at room temperature (25.0 ±3.00C), refrigeration (4±2.00C). And oven temperature (40.0±2.00C).^[51]

Formulation Batches

Table 2: Evaluation Parameters of Different Natural Lip Balm Formulations (F1–F5)

Sr.No	Evaluations	F1	F2	F3	F4	F5
1	Colour	Yellow	Yellow	Brownish yellow	Yellow	Light Yellow
2	Odour	Sweet	Pleasant	pleasant	Sweet	Pleasant
3	Texture	Smooth	Semi-Solid	Liquid	Smooth	Semi-solid
4	Appearance	Liquid	Liquid	Liquid	Semi-solid	Hard
5	pH	6-7	5-6	7-8	6-7	8-8.5
6	Melting Point	65°C	72°C	68°C	69°C	72°C
7	Spread ability Test	1.2 gm cm/sec	1.7 gm cm/sec	1.4 gm cm/sec	1.5 gm cm/sec	1.7 gm cm/sec

Out of the five formulations assessed, Formulation F4 was identified as the most optimized due to its well-balanced physical and sensory characteristics. It presented a smooth texture and a semi-solid consistency, making it ideal for effective lip balm application and structural integrity. The pH value of 6–7 closely aligns with the natural pH of the lips, promoting skin compatibility and reducing the risk of irritation.

Additionally, F4 displayed a melting point of 69°C, indicating reliable thermal stability during storage. Its spreadability rate of 1.5 gm/cm/sec allows for smooth and even application without excessive greasiness or liquidity. The formulation's yellow color and pleasant sweet fragrance contribute positively to its sensory appeal.

Table 3: Description of Evaluation Parameters for Lip Balm Formulations.

Parameter	Description
Colour	Observing the visual appearance of the formulation to ensure consistency and acceptability. May indicate ingredient compatibility or degradation.
Odour	Smell of the product, which should be pleasant and acceptable to users. Unpleasant odour may suggest spoilage or poor-quality raw materials.
Texture	Feel of the product when touched. It should be appropriate to the product type (e.g., smooth for creams, semi-solid for balms).
Appearance	General look of the formulation (e.g., clear, opaque, liquid, solid). Helps assess phase separation, uniformity, and product appeal.
pH	Measures the acidity or alkalinity. Important for skin compatibility and

	product stability. Ideal skin-compatible pH is usually between 5 and 7.
Melting Point	Temperature at which the formulation melts. Critical for product stability and ease of application, especially in balms and solid formulations.
Spreadability Test	Assesses how easily the product spreads on the skin. Higher values indicate better spreadability, affecting ease of use and consumer satisfaction.

RESULT AND DISCUSSION

Organoleptic Evaluation

Table 4: Organoleptic Evaluation of Lip Balm Formulation.

Sr.no	Parameters	Observation
1	Colour	Yellow
2	Odour	Sweet, Pleasant
3	Texture	Smooth
4	Apperance	Semi-solid

The formulated herbal lip balm showed favorable and appealing organoleptic properties during its evaluation. Its bright yellow color is primarily due to turmeric powder, a natural ingredient valued for both its antimicrobial effects and its coloring ability. The lip balm emitted a sweet and pleasant fragrance, attributed to the presence of vanillin, which adds to its sensory quality and provides a calming scent upon use. The texture was found to be smooth and consistent, indicating effective mixing of key ingredients such as petroleum jelly, castor oil, vitamin E, and other additives. This smoothness contributes to easy application and uniform distribution on the lips. The semi-solid form of the balm is appropriate for topical use, offering stability at room temperature while being soft enough to apply without difficulty. Overall, these sensory and physical characteristics suggest that the formulation is well-accepted in terms of appearance, feel, and user satisfaction.

pH

pH of A1 – 6 to 7

The pH of the prepared herbal lip balm (A1) was measured to be between 6 and 7, which is well within the recommended range for safe application on the lips. This near-neutral pH closely aligns with the natural pH of the skin and mucosal surfaces, generally between 5.5 and 7, ensuring good skin compatibility. Maintaining this balance is essential, as deviations toward higher or lower pH values may cause irritation, dryness, or even hypersensitivity reactions. A pH in this range also supports the stability of key components, such as vitamin E and turmeric, and can contribute to resisting microbial contamination. Therefore, the lip balm's pH indicates it is gentle, non-irritating, and safe for routine use on sensitive lip tissue.

Irritancy Test

Table 5: Irritancy Test Results of Lip Balm Formulation.

Sr. No	Parameters	Observations
1	Irritancy	No
2	Redness	No
3	Swelling	No

The irritancy test performed on the herbal lip balm formulation confirmed that it is safe for topical use and does not cause any adverse skin reactions. As detailed in Table 5, there were no visible signs of irritation, redness, or swelling throughout the observation period. This absence of negative reactions suggests that the chosen ingredients—castor oil, vitamin E, turmeric, and petroleum jelly—are skin-friendly and do not lead to dermal sensitivity. Additionally, the lack of inflammatory symptoms like redness or swelling indicates the formulation is gentle and well-suited for sensitive areas, such as the lips. These findings support the conclusion that the lip balm is non-irritating and dermatologically safe, making it appropriate for frequent use without risk of skin discomfort or damage.

Spread-ability Test

The spreadability test is an important measure to assess how easily a semi-solid product like lip balm can be applied to the lips. As shown in Table 6, the herbal lip balm formulation A1 exhibited a spreadability value of 1.50 gm-cm/sec. This indicates that the balm spreads well, allowing it to be applied smoothly and evenly with minimal effort. The result suggests a well-balanced formulation in terms of viscosity and softness, meaning it is neither too stiff nor overly oily. Good spreadability ensures uniform application, enhances user comfort, and improves the balm's moisturizing and therapeutic benefits.

Figure 2 depicts the spreadability test, which was likely performed using the slip and drag technique. In this method, a fixed weight spreads the balm between two glass slides, and the time taken to separate the slides is recorded. The smooth and consistent movement seen during the test further confirms the balm's effective application properties. In summary, the spreadability findings indicate that the formulation is practical for everyday use, providing both ease and comfort during application.

Table 6: Spreadability Test Results of Lip Balm Formulation.

Formulation	Observation (gm cm/sec)
A1	1.50

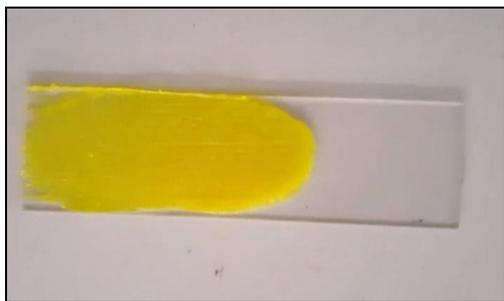


Fig. 2: Spreadability Test of Natural Lip Balm Formulation.

Stability Studies

Stability studies play a vital role in evaluating the physical and chemical stability of a formulation over time under defined environmental conditions. Table 7 presents the stability findings of the lip balm formulation stored at $25\pm 3.0^{\circ}\text{C}$, which represents typical room temperature.

The lip balm's color remained unchanged as yellow, indicating no visible pigment degradation or discoloration during the storage period. Preserving the original color is crucial for maintaining consumer confidence and product quality.

The balm's sweet fragrance was also retained, implying that the aromatic ingredients or essential oils remained stable and did not undergo oxidation or spoilage that could lead to off-odors.

In addition, the melting point was recorded at 69°C , consistent with its initial measurement. This parameter is important because it reflects the thermal stability and consistency of the formulation. A steady melting point suggests that the lip balm will remain solid and retain its intended texture during normal storage and use, without softening or melting prematurely.

In summary, these stability results demonstrate that the lip balm formulation maintains its physical and chemical integrity at room temperature, ensuring its safety, efficacy, and consumer appeal over its shelf life.

Table 7: Stability Study Results of Lip Balm Formulation.

Parameters	$25\pm 3.0^{\circ}\text{C}$
Colour	Yellow
Odour	Sweet
Melting point	69°C

CONCLUSION

From the above project, one can conclude that formulated lip balm shows excellent moisturizing and hydrating properties. Both the formulations did undergo various evaluation tests. From the above-mentioned results, we can deduce that both the lip balms have smooth texture, uniformity and a pleasant odour. This product is compatible with all skin types and did not

result in any sort of rash, swelling or redness after application on lips. Turmeric and cocoa powder though used only as colouring agents in the formulations also possess anti-microbial, antifungal, antioxidant and anti-inflammatory properties which have an added benefit to the product. So, we can conclude that the lip balm was well formulated and evaluated.

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