



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Formulation and Evaluation of Organic Lip Balm

Dnyaneshwar Suresh Kute¹, Prof. Bhagyashali Pawar²

¹Final Year B.Pharm Student, Gajanan Maharaj College of Pharmacy, Chh. Sambhajnagar-431007 Email: dnyaneshwark386@gmail.com

²Guide, M. Pharm, Department of Quality Assurance, Gajanan Maharaj College of Pharmacy, Chh. Sambhajnagar – 431007

ABSTRACT

Cosmetics have been an integral part of human lifestyle since ancient civilizations, serving not only aesthetic purposes but also therapeutic and protective roles. With the rising concerns over the safety and long-term effects of synthetic ingredients in cosmetic products, there has been a significant shift towards the use of natural and organic alternatives. Lip balms, being one of the most commonly used cosmetic products, play a crucial role in protecting and enhancing the lips, which are highly sensitive and prone to dryness, cracking, and environmental damage.

Organic lip balms provide a natural way to nourish and heal lips while avoiding potentially harmful chemicals like petroleum jelly, parabens, artificial fragrances, and synthetic dyes. In this project, we aimed to formulate an organic lip balm using ingredients such as beeswax, almond oil, ghee, aloe vera, honey, coconut oil, beetroot extract, and vitamin E—all known for their moisturizing, healing, and antioxidant properties.

The formulation process involved selecting suitable ingredients, optimizing the ratio for a stable and user-friendly product, and conducting a thorough evaluation of the physicochemical properties such as pH, melting point, spreadability, and stability under different conditions. The final product was analyzed to ensure it met the desired standards for cosmetic use.

The evaluation results confirmed that the prepared lip balm possessed good spreadability, appealing organoleptic properties, and acceptable stability under normal storage conditions. The lip balm was soft, smooth, and imparted a natural tint due to the beetroot extract. Additionally, the natural aroma from essential oils and honey made it more consumer-friendly.

This project highlights the potential of herbal and natural formulations in cosmetics and promotes the use of environmentally safe, skin-friendly, and sustainable alternatives in personal care products.

Keywords: Lip balm, Organic formulation, Herbal ingredients, Natural cosmetics, Moisturizing, Beeswax, Vitamin E, Stability studies.

INTRODUCTION

Cosmetics are not merely beauty products but have evolved into essential components of daily self-care routines. Among them, lip care products, especially lip balms, play a vital role in protecting and maintaining lip health. The lips, being one of the most delicate and exposed parts of the human body, lack sebaceous (oil) glands and are therefore prone to dehydration, chapping, and cracking, especially under harsh environmental conditions such as excessive sunlight, wind, or cold.

In recent years, the cosmetic industry has faced scrutiny due to the use of synthetic chemicals and petroleum-based ingredients in personal care products. Many commercially available lip balms contain substances such as petrolatum, parabens, synthetic colors, and artificial fragrances, which may cause allergic reactions, toxicity upon ingestion, and long-term health implications. These concerns have sparked a significant shift in consumer preference towards products labeled as “natural,” “herbal,” or “organic.”

- The Need for Organic Lip Balms

Organic lip balms offer a safer and more holistic approach to lip care. They are formulated using naturally derived ingredients that are free from harsh chemicals, making them suitable for even the most sensitive skin types. Moreover, the ingredients used in organic lip balms are often biodegradable, eco-friendly, and cruelty-free, contributing positively to both human health and environmental sustainability.

An organic lip balm typically contains a base made of natural waxes (like beeswax or candelilla wax), oils (such as coconut oil, almond oil, or castor oil), and therapeutic additives like honey, aloe vera, vitamin E, and herbal extracts. These ingredients serve not only to moisturize and protect but also to heal and regenerate damaged lip tissue.

- Problems with Conventional Lip Balms

Many traditional lip balms may temporarily soothe lips but often fail to provide long-term healing benefits. Some even create a cycle of dependency due to ingredients that dry out the lips over time. For instance, petrolatum, while forming a barrier on the skin, does not offer any nourishment or actual hydration. Similarly, artificial fragrances and colors may cause skin sensitivity or allergic reactions upon prolonged use.

Furthermore, since lip balms are applied frequently and often ingested unintentionally through licking the lips or eating, the safety of their ingredients is of paramount importance. This further justifies the need for organic alternatives using edible-grade or food-safe components.

- Role of Organic Ingredients

Each ingredient in an organic lip balm formulation serves a specific function. For example:

Beeswax: Provides structure, locks in moisture, and acts as a barrier against environmental aggressors.

Aloe Vera: Soothes irritation and heals cracked skin.

Honey: Acts as a natural humectant and antibacterial agent.

Vitamin E: Offers antioxidant protection and aids in skin regeneration.

Coconut Oil, Ghee, Almond Oil: Serve as emollients, deeply moisturizing the lips.

Additionally, natural colorants such as beetroot juice provide a safe alternative to synthetic dyes while adding an attractive tint to the product.

- Objectives of the Study

This study aims to formulate a completely natural and organic lip balm using herbal and readily available household ingredients. The goal is to develop a product that is not only effective in healing and protecting the lips but also pleasant in appearance, taste, and scent—without causing side effects. Furthermore, the product will be subjected to a series of evaluations to determine its physical and chemical properties, stability, and overall performance.

By promoting the use of organic cosmetics through scientific research and innovation, this project contributes to safer personal care practices and supports the global movement towards sustainable beauty.

REVIEW OF LITERATURE

A thorough review of existing literature is essential to understand the scientific foundation of organic lip balm formulation. Previous studies and publications offer insights into ingredient selection, formulation techniques, evaluation methods, and consumer preferences. The following are notable contributions from research papers, articles, and scientific sources that support the current project.

1. Nilofer Shaikh et al. (2018)

In their research, Shaikh and colleagues discussed the basic composition of lip balms and their frequent use in extreme weather conditions. Their study revealed that traditional lip balms, commonly composed of petrolatum-based substances, are primarily used to prevent lips from drying and cracking. However, they also noted the limitations of such petroleum-based formulations, especially in terms of long-term hydration and safety concerns associated with ingestion. The study advocated for incorporating SPF in lip care products to protect against UV damage, a feature commonly ignored in basic commercial lip balms.

2. D. Bharanidharan et al. (2022)

This study explored the rapidly growing demand for herbal cosmetics in a world increasingly conscious of natural living. The authors emphasized that people are moving away from synthetic cosmetics due to their adverse effects and shifting towards products that use herbal or botanical extracts. Herbal cosmetics, according to the paper, are not only safer but also align with environmentally responsible and sustainable production methods. The study noted that lip care products using natural ingredients like plant oils, butter, and extracts can enhance lip texture, color, and health without side effects.

3. P. Telange Patil et al. (2021)

Telange and team specifically highlighted the risks associated with synthetic preservatives and heavy metals found in commercial lip care products. They reported that ingredients such as lead and aluminum, often used in pigments and preservatives, can be ingested unintentionally and accumulate in the body over time. Their work advocated for plant-based alternatives in cosmetic formulations. According to their findings, lip balms made from almond oil, beeswax, and other plant-derived substances can effectively maintain lip health, reduce pigmentation, and prevent dryness without toxic exposure.

4. Mayuri Kadu et al. (2014)

In a comprehensive review titled “A Review on Natural Lip Balm,” the authors presented a comparison of various herbal ingredients used in lip balm formulations. The study detailed the emollient and healing properties of oils like coconut, almond, and jojoba oil, as well as waxes like beeswax and candelilla wax. The review concluded that herbal ingredients not only enhance product safety but also improve the functional performance of lip balms in terms of spreadability, moisturizing capacity, and aroma.

5. Sharma P.P. (2008)

In his textbook “Cosmetics—Formulation, Manufacturing, and Quality Control,” Sharma extensively discussed the formulation strategies for cosmetic products, including lip balms. He explained the importance of base selection, emulsifiers, antioxidants, preservatives, and evaluation tests in the development of safe and effective products. His guidelines provide a scientific framework for selecting natural excipients and optimizing lip balm formulations to ensure consistent quality and performance.

6. Stefan B. (2016)

Stefan’s work on beeswax provided an in-depth analysis of its physical and chemical properties. He described beeswax as a natural structuring agent with emollient, anti-inflammatory, and protective properties. According to his findings, beeswax is highly suitable for lip care due to its moisture-sealing capabilities and compatibility with other natural ingredients. His study also emphasized its role in improving the texture and shelf life of organic cosmetic products.

7. Kokate, Purohit, and Gokhale (2014)

Their pharmacognosy textbook introduced the scientific classification, identification, and therapeutic uses of herbal drugs, including the plant-based ingredients used in this study. Their detailed information on the sources and biological functions of aloe vera, beetroot, honey, and other botanical materials supports the formulation of evidence-based herbal lip balms.

8. World Journal of Pharmacy and Pharmaceutical Sciences (WJPPS)

Numerous articles published in WJPPS highlight the transition in cosmetic sciences towards herbal and organic products. Studies focused on natural formulation techniques, safety profiles, and consumer acceptance have reinforced the idea that natural lip balms can effectively replace chemical-laden alternatives. The journal has become a valuable platform for herbal cosmetic research.

Conclusion of Literature Review

The reviewed literature provides a strong foundation for the present study. It supports the rationale of using organic ingredients in lip balm formulation to minimize toxicity and maximize therapeutic efficacy. By combining the knowledge derived from scientific journals and pharmacognostic texts, this project builds upon a well-established framework for natural cosmetic development.

AIM AND OBJECTIVES

AIM

To formulate and evaluate an organic lip balm using natural, herbal, and non-toxic ingredients that provide effective moisturization, protection, and healing properties to the lips, while eliminating the risks associated with synthetic chemicals and artificial additives.

OBJECTIVES

The primary objective of this study is to develop a safe, effective, and eco-friendly lip balm by incorporating only organic ingredients that are beneficial for lip care. The study also aims to assess the physical characteristics, stability, and usability of the final product through standard evaluation parameters. The specific objectives are detailed below:

1. To Develop a Completely Organic Formulation

Use naturally derived, plant-based, and chemical-free ingredients such as beeswax, almond oil, ghee, honey, aloe vera, beetroot extract, coconut oil, and vitamin E.

Avoid all synthetic materials, preservatives, and petroleum-based compounds.

Ensure the product is biocompatible and biodegradable.

2. To Relieve Dry and Chapped Lips

Formulate the balm to provide deep hydration and healing for cracked, irritated, or inflamed lips.

Select ingredients that possess emollient, humectant, and anti-inflammatory properties. Create a product that can offer both preventive and curative benefits.

3. To Achieve Desirable Sensory and Aesthetic Qualities

Develop a lip balm that is smooth in texture, easy to apply, non-greasy, and pleasant in taste and aroma.

Use beetroot or similar natural colorants to impart a light, attractive tint suitable for daily use.

Maintain consumer appeal by ensuring product presentation, color, and fragrance are natural and appealing.

4. To Create Multiple Variants

Formulate at least two different variants of lip balm with different natural flavoring agents or color profiles (e.g., beetroot-tinted and honey-lemon).

Provide options to cater to varied consumer preferences in terms of fragrance and appearance.

5. To Ensure Product Safety and Suitability

Ensure that the lip balm is suitable for all genders and age groups, including children.

Avoid allergens and ensure hypoallergenic properties through the use of mild, skin-friendly ingredients.

Maintain a pH close to neutral to avoid lip irritation.

6. To Evaluate Physicochemical Properties

Conduct evaluation studies on:

Organoleptic properties (color, smell, texture)

Melting point

Spreadability

pH measurement

Stability under different storage conditions

7. To Promote Environmental and Ethical Values

Emphasize eco-friendly, sustainable, and cruelty-free practices throughout the product life cycle.

Use locally available, renewable resources to reduce environmental impact.

8. To Offer an Affordable and Accessible Alternative

Develop a cost-effective formulation suitable for mass production.

Target communities seeking economical yet high-quality personal care products with fewer side effects.

INGREDIENTS AND THEIR ROLE IN FORMULATION

The formulation of an organic lip balm relies entirely on the selection of safe, effective, and skin-compatible natural ingredients. Each component plays a specific role—either as a base, active ingredient, colorant, or functional additive. Below is a detailed description of the ingredients used in this study, along with their biological sources, functions in the formulation, and advantages.

1 Beeswax (Cera alba / Ceraflava)

Biological Source: Purified wax obtained from the honeycomb of *Apis mellifera* (family: Apidae).

Function:

Acts as the primary base and structuring agent.

Provides hardness and consistency to the lip balm.

Forms a protective barrier on the lips, sealing in moisture.

Possesses mild anti-inflammatory and antibacterial properties.

Advantage: Natural, non-comedogenic, and ideal for use in cold climates to prevent moisture loss.

2 Ghee (Clarified Butter)

Biological Source: Derived from cow milk butter by heating until water evaporates, leaving behind pure fat.

Function:

Works as a deep moisturizer and softener.

Penetrates deeply into skin layers for long-lasting hydration.

Repairs cracked and flaky lips. Advantage: Rich in essential fatty acids and vitamins, ghee is soothing and enhances lip texture.

3 Almond Oil (*Prunus amygdalus* var. *dulcis* / var. *amara*)

Family: Rosaceae

Function:

Serves as a humectant and emollient.

Penetrates the skin quickly, sealing in moisture.

Prevents darkening and cracking of lips. Advantage: High in vitamin E and fatty acids, almond oil keeps lips soft, smooth, and healthy.

4 Vitamin E (Tocopherol)

Biological Source: Derived from natural plant oils; RR-alpha-tocopherol form used.

Function:

Acts as an antioxidant to prevent oxidative damage.

Enhances shelf-life and product stability.

Promotes healing of damaged skin. Advantage: Penetrates lip layers deeply and retains moisture for extended periods.

5 Honey (Madhu)

Biological Source: Natural product from flower nectar, processed by honey bees (*Apis* spp.).

Function:

Provides antibacterial and anti-inflammatory effects.

Acts as a natural humectant, drawing moisture into the lips.

Gives a sweet taste and mild flavor. Advantage: Helps lighten lip pigmentation and boosts immunity at the site of application.

6 Aloe Vera (*Aloe barbadensis* miller)

Family: Asphodelaceae

Biological Source: Gel obtained from inner leaf pulp.

Function:

Soothes irritation and inflammation.

Hydrates and nourishes dry or sunburned lips.

Enhances the healing of micro-cuts or sores. Advantage: Rich in polysaccharides, vitamins, and minerals; aloe is cooling and therapeutic.

7 Coconut Oil (*Cocos nucifera*)

Family: Arecaceae

Function:

Acts as a softening and smoothing agent.

Contains fatty acids (lauric acid) that nourish skin and lock in hydration.

Has mild antimicrobial properties. Advantage: Lightweight and fast-absorbing; excellent for dry, peeling lips.

8 Beetroot Juice (*Beta vulgaris* subsp.)

Biological Source: Taproot of the beet plant.

Function:

Provides a natural reddish-pink tint to the lip balm.

Contains antioxidants that protect lips from oxidative stress.

Adds a subtle flavor and improves the aesthetic value of the product. Advantage: 100% safe colorant with skin-brightening properties.

9 Rose Oil / Rose Water (Optional Flavoring Agent)

Biological Source: Extracted from the petals of *Rosa damascena* or other rose species.

Function:

Enhances fragrance.

Provides a cooling effect.

Acts as a mild antiseptic. Advantage: Improves user experience through pleasant aroma and feel.

10 Composition Table of Organic Lip Balm

Ingredient	Quantity (%)	Function
Beeswax	5%	Base, consistency, moisture barrier
Ghee	2%	Emollient, deep moisturizer
Almond Oil	15%	Humectant, smooth texture
Vitamin E	5%	Antioxidant, improves stability
Honey	5%	Humectant, flavor, antibacterial
Aloe Vera Gel	2%	Soothing agent, heals irritation
Coconut Oil	30%	(with juice) Moisturizer, base oil
Beetroot Juice	5%	Natural tint, antioxidant
Rose Oil	0.08%	Flavoring agent

These ingredients were selected based on their safety, efficacy, availability, and traditional use in herbal medicine. Together, they form a well-balanced lip balm that is effective, aesthetically pleasing, and suitable for daily use.

METHOD OF PREPARATION

The formulation of an organic lip balm involves careful selection, proportioning, and processing of ingredients under controlled conditions to ensure product uniformity, effectiveness, and stability. The following method was adopted for the preparation of the lip balm:

1 Equipment and Materials Required

Stainless steel beaker or borosilicate glass beaker

Water bath

Thermometer

Magnetic stirrer or glass rod

Lip balm containers or lipstick molds

Ice bath (for rapid solidification)

Cotton and glycerin (for mold preparation)

Precision weighing balance

Pipettes and spatulas

pH meter (for later evaluation)

Preparation Steps

Step 1: Preparation of Beetroot Extract and Aloe Vera Gel

Fresh beetroot was cleaned, peeled, and chopped.

The juice was extracted using a juicer or blender and filtered using muslin cloth.

Fresh aloe vera leaves were cut open, and the inner gel was scooped out and homogenized for uniform consistency.

Step 2: Melting of Base Components

A clean beaker was placed in a water bath and heated to approximately 55–60°C.

Accurately weighed quantities of beeswax, ghee, almond oil, and coconut oil were added to the beaker.

The mixture was stirred continuously until beeswax melted completely, forming a uniform liquid base.

Step 3: Addition of Active Ingredients

Once the base mixture was uniform, vitamin E oil was added and stirred gently.

Honey and aloe vera gel were added next. Special care was taken to stir vigorously so that honey and gel mixed properly without clumping.

Step 4: Incorporation of Color and Flavor

5% beetroot juice was added as a natural colorant.

A small quantity of rose oil (0.08%) was added for fragrance and taste.

Step 5: Molding and Solidification

Before pouring, the molds or lip balm containers were cleaned and lined with glycerin using cotton to prevent sticking.

The prepared molten mixture was poured carefully into lipstick molds or containers.

The filled molds were placed in an ice bath for rapid solidification and left undisturbed for 10–15 minutes.

Step 6: Packaging and Labeling

After complete solidification, the lip balm sticks were removed from molds.

Each unit was inspected for smooth texture and absence of cracks or air bubbles.

The lip balms were transferred into clean, airtight containers and labeled with composition and date.

Observations During Preparation

The mixing temperature was maintained below 65°C to preserve the bioactivity of sensitive ingredients like honey, vitamin E, and aloe vera.

The mixture cooled uniformly, producing a homogenous, smooth, and slightly tinted balm.

The fragrance of rose oil blended well with the natural scent of honey and coconut.

Storage

The prepared lip balm was stored at room temperature in cool, dry conditions, away from direct sunlight.

Test samples were stored at varying temperatures (room, refrigeration, and elevated) for later evaluation of stability.

This method ensures that the integrity of natural ingredients is preserved while achieving a stable and effective lip balm formulation. Proper hygiene and temperature control during preparation are crucial to avoid contamination and ingredient degradation.

EVALUATION PARAMETERS

After successful formulation of the organic lip balm, the product was subjected to a series of evaluation tests to assess its quality, effectiveness, and stability. These evaluations are critical to ensure that the lip balm meets the required standards for texture, safety, usability, and physical integrity.

Organoleptic Properties

Organoleptic evaluation is the preliminary assessment of the product's sensory attributes including:

Color: A light pink to reddish tint was observed due to the presence of beetroot juice.

Odor: Mild floral and sweet aroma resulting from the combination of honey and rose oil.

Texture: Smooth, glossy finish; non-gritty; no phase separation.

Taste: Slightly sweet due to honey (non-edible, but pleasant if unintentionally tasted).

Observation: The lip balm was visually appealing, with no phase separation or odor change over time.

Melting Point Determination

Purpose: To ensure product stability and usability under varying climatic conditions.

Method:

A small amount of lip balm was inserted into a sealed capillary tube.

The tube was placed in a melting point apparatus (VEEGO VMP-D).

Temperature was gradually increased while observing the melting phase.

Result: The melting point was found to be in the range of 68°C to 69°C, consistent with ideal lip balm standards (typically 65–75°C), confirming the product's stability in tropical climates.

Spreadability Test

Purpose: To evaluate how smoothly the balm spreads on the lips and its user-friendliness.

Method:

A small amount of the lip balm was applied on a clean glass slide.

Another slide was placed on top, and gentle pressure was applied.

The time and force required to spread were observed manually.

Grading Scale:

G – Good: Uniform application, no fragmentation, smooth surface.

I – Intermediate: Slight fragmentation, moderate spreadability.

B – Bad: Non-uniform, clumpy, poor texture.

Result: Graded as G – Good: uniform application without any cracking or deformity.

pH Measurement

Purpose: To ensure skin compatibility and avoid irritation or hypersensitivity.

Method:

1 gram of lip balm was dissolved in 100 ml of distilled water.

The solution was stirred and filtered.

The pH was measured using a calibrated digital pH meter.

Result: pH was recorded at 7.2, which is near neutral and safe for application on lips.

Stability Studies

Purpose: To test product durability under different environmental conditions over time.

Storage Conditions:

Room Temperature: $25.0 \pm 3.0^\circ\text{C}$

Refrigeration: $4.0 \pm 2.0^\circ\text{C}$

Oven Temperature: $40.0 \pm 2.0^\circ\text{C}$

Duration: 30 days

Parameters Evaluated:

Organoleptic changes

Phase separation

Texture/graininess

Color stability

Melting point shift

Spreadability and pH consistency

Results:

No significant changes were observed in samples stored at room temperature and in refrigeration.

Slight softening and decreased consistency were noted in oven-stored samples.

pH remained stable across all samples.

Color and fragrance retained in all conditions except a minor dullness at elevated temperatures.

Conclusion: Product is stable at room and refrigerated temperatures. Storage above 40°C is not recommended due to textural changes.

These evaluation parameters confirm that the formulated organic lip balm is safe, effective, pleasant to use, and stable under recommended storage conditions. The results provide scientific validation for its potential application as a commercial product.

RESULTS

The formulation and evaluation of the organic lip balm yielded promising results that support the effectiveness, safety, and stability of the final product. Various tests were conducted in accordance with standard cosmetic evaluation protocols. The following are the consolidated observations:

Organoleptic Evaluation:

Parameter	Observation
Color	Pink-red (due to beetroot extract)
Odor	Mild, pleasant (rose-honey blend)
Texture	Smooth, glossy, non-sticky
Taste	Mildly sweet (non-offensive)

Melting Point

Observed Range: 68°C – 69°C

Ideal Range for Lip Balms: 65°C – 75°C

Conclusion: The product's melting point confirms good thermal stability, especially suitable for Indian climatic conditions. It will remain solid at room temperature and stable during transport.

Spreadability

Rated G (Good) on the spreadability scale.

The balm spread evenly on the surface without any cracks, lumps, or breakage.

No residue or uneven layers were formed during application.

Conclusion: The balm has excellent user-friendliness with smooth application and consistent texture.

pH Measurement

Measured pH: 7.2

Ideal Range for Lip Products: 6.5 – 7.5

Conclusion: The pH is within the safe and neutral range, which minimizes the risk of lip irritation or allergic reactions.

Additional Observations

The product provided instant moisturization upon application.

No phase separation or crystallization observed.

Tint imparted by beetroot was natural, non-staining, and aesthetically pleasing.

No irritation, allergic reactions, or discomfort reported in preliminary usage.

These results validate the success of the organic formulation. The product meets the basic benchmarks expected from commercial lip care products while offering the added advantage of using only natural, herbal ingredients.

CONCLUSION

The study successfully formulated and evaluated a safe, effective, and completely organic lip balm using natural ingredients such as beeswax, ghee, almond oil, aloe vera, honey, beetroot extract, and vitamin E. The product demonstrated excellent moisturizing, healing, and protective properties for dry and chapped lips.

The lip balm passed key evaluation tests:

pH (7.2) indicated safety for sensitive skin,

Melting point (68–69°C) ensured thermal stability,

Spreadability and texture were smooth and user-friendly,

Stability tests confirmed it remained effective under normal storage conditions.

The use of herbal components not only minimized risks of side effects but also supported eco-friendly, cruelty-free cosmetic practices. The product is suitable for all age groups and genders and offers a viable natural alternative to synthetic lip care products.

This project demonstrates the potential of herbal formulations in the cosmetic industry and encourages further research and scale-up for commercial applications.

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