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Formulation and Evaluation of Herbal Lip Balm Using Natural Ingredients

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KEYWORDS

Herbal lip balm, hibiscus powder, beeswax, herbal cosmetics, natural moisturizer, antioxidant, lip care formulation.

ABSTRACT

The present study was aimed at the formulation and evaluation of herbal lip balm using natural ingredients possessing moisturizing, antioxidant, healing, and protective properties. Herbal cosmetics are gaining significant importance due to increasing awareness regarding the harmful effects of synthetic cosmetic products. Lips are highly sensitive and prone to dryness, cracking, and chapping because they lack sebaceous glands. Therefore, the development of a safe and effective herbal lip care formulation is essential.

In the present work, four different formulations (F1–F4) of herbal lip balm were prepared using hibiscus powder, beeswax, kokum butter, almond oil, vitamin E capsule, rose water/rose oil, and strawberry flavoring agent by the heating and mixing method using a double boiler system. Hibiscus powder was used as a natural coloring and antioxidant agent, beeswax provided hardness and protective action, kokum butter acted as a moisturizer, while almond oil improved nourishment and spreadability. Vitamin E was incorporated as a natural antioxidant to improve stability and healing properties.

The prepared formulations were evaluated for various physicochemical and cosmetic parameters including organoleptic properties, pH determination, spreadability, skin irritation test, melting point, stability study, consistency, and washability. The results showed that formulation F4 exhibited better physicochemical properties compared to other formulations. F4 showed smooth texture, pleasant odor, dark pink color, good spreadability, suitable pH range (5.5–7.0), melting point around 60–70°C, absence of irritation, and excellent stability without phase separation or color change.

The study demonstrated that herbal ingredients can successfully produce a stable, safe, effective, and eco-friendly lip care formulation with minimum side effects. The formulated herbal lip balm provided moisturizing, soothing, and protective effects and may serve as a promising alternative to synthetic petroleum-based lip care products.

1. INTRODUCTION

Cosmetics have been used since ancient times for beautification and personal care. In recent years, the demand for herbal cosmetics has increased due to growing concerns regarding the harmful effects of synthetic chemicals used in conventional cosmetic products. Herbal cosmetics contain natural ingredients derived from plants, herbs, oils, waxes, and extracts that provide therapeutic and cosmetic benefits with fewer side effects [1-3].

Lips are delicate structures lacking sebaceous glands, making them highly susceptible to dryness, cracking, and environmental damage. Lip balms are semisolid cosmetic preparations designed to moisturize, protect, and heal lips. However, many commercially available lip balms contain synthetic chemicals, artificial fragrances, preservatives, and petroleum-based ingredients that may produce irritation or adverse effects upon prolonged use [4-7].

Herbal lip balm is a natural cosmetic preparation formulated using herbal ingredients such as beeswax, kokum butter, almond oil, hibiscus powder, rose water, and vitamin E. These ingredients provide moisturizing, antioxidant, soothing, and protective effects to the lips. Herbal lip balms are considered safer, eco-friendly, and suitable for regular use [8-10].

The present study focuses on the formulation and evaluation of herbal lip balm using natural ingredients to develop a safe and effective lip care product with good stability, spreadability, and moisturizing properties.

2. AIM AND OBJECTIVES

Aim

To formulate and evaluate an herbal lip balm using natural ingredients for effective moisturization, protection, and nourishment of lips.

Objectives

1. To prepare herbal lip balm using natural ingredients.
2. To study the role and importance of herbal ingredients used in the formulation.
3. To develop a safe and effective herbal cosmetic product.
4. To evaluate physicochemical properties of the prepared lip balm.
5. To study the advantages of herbal cosmetics over synthetic products.

3. MATERIALS AND METHODS

3.1. Materials

The herbal lip balm formulations were prepared using natural ingredients possessing moisturizing, antioxidant, protective, soothing, and healing properties. All ingredients used were of pharmaceutical or cosmetic grade and collected from reliable sources. The composition of different formulations (F1–F4) is shown below.

Table 1: Composition of Herbal Lip Balm

Sr. No.	Ingredient	Role in Formulation	F1	F2	F3	F4
1	Hibiscus Powder	Natural coloring agent	1 tsp	1.5 tsp	1 tsp	1 tsp
2	Kokum Butter	Moisturizer and texture enhancer	15 g	8 g	12 g	12 g
3	Almond Oil	Softens and hydrates lips	15 ml	20 ml	10 ml	15 ml
4	Vitamin E Capsule	Antioxidant	1 cap	1 cap	1 cap	1 cap
5	Beeswax	Provides hardness	8 g	7 g	10 g	10 g
6	Rose Water / Rose Oil	Cooling and soothing effect	3–5 drops	3–5 drops	5–6 drops	3–5 drops
7	Strawberry Flavoring Agent	Pleasant aroma and taste	4 ml	3 ml	7 ml	5 ml

3.2. Description of Ingredients

A.3.2.1 Hibiscus Powder

Hibiscus powder was used as a natural coloring and antioxidant agent. It contains anthocyanins, flavonoids, tannins, and mucilage that help nourish and protect lips [11]. Hibiscus also provides a natural pinkish tint to the lip balm. Figure No. 1 represents Hibiscus Flower

Figure No. 1. Hibiscus Flower

Functions

- Natural colorant
- Antioxidant activity
- Softening and moisturizing effect

3.2.2 Beeswax

Beeswax is a natural wax obtained from honeycombs of honey bees. It acts as a stiffening agent and forms a protective barrier over lips, preventing moisture loss. Figure No. 2 represents Bees Wax [12].

Figure No. 2. Bees Wax

Functions

- Provides hardness
- Improves consistency
- Prevents dehydration of lips
- Enhances stability of formulation

3.2.3 Kokum Butter

Kokum butter is obtained from seeds of *Garcinia indica*. It is rich in fatty acids and provides intense moisturization and smoothness to lips [13]. Figure No. 3 represents Kokum Butter.

Figure No. 3. Kokum Butter

Functions

- Prevents dryness
- Improves texture
- Provides emollient effect
- Enhances spreadability

3.2.4 Almond Oil

Almond oil contains oleic acid, linoleic acid, vitamins A, D, and E. It acts as a nourishing and moisturizing agent [14]. Figure No. 4 represents Almond Oil.

Figure No. 4. Almond Oil

Functions

- Nourishes lips
- Repairs dry and cracked lips
- Improves smoothness
- Enhances lubrication

3.2.5 Vitamin E

Vitamin E is a fat-soluble antioxidant that protects oils and butter from oxidation and rancidity [15]. Figure No. 5 represents Vitamin E Capsule.

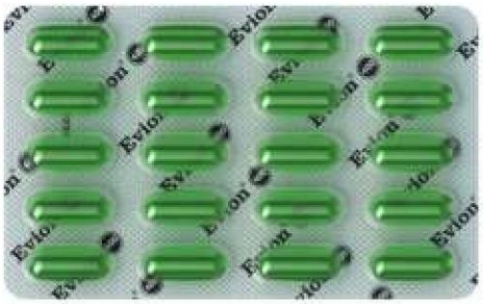

Figure No. 5. Vitamin E Capsule

Functions

- Antioxidant
- Improves shelf life
- Prevents oxidative degradation
- Promotes healing of damaged lips

3.2.6 Rose Water

Rose water was added for fragrance and soothing effect. It also provides mild antimicrobial and

cooling properties [16]. Figure No. 6 represents Rose Water.

Figure No. 6. Rose Water

Functions

- Provides pleasant fragrance
- Cooling and soothing effect
- Enhances freshness
- Improves product acceptability

3.2.7 Strawberry Flavoring Agent

Strawberry flavor was used to improve aroma, taste, and consumer acceptability [17]. Figure No. 7 represents Strawberry Falvouring Agent.

Figure No. 7. Falvouring Agent

Functions

- Enhances sensory appeal
- Masks waxy odor
- Improves user satisfaction

Method of Preparation

The herbal lip balm was prepared using the heating and mixing method.

Procedure

1. Beeswax was melted using a double boiler method.
2. Kokum butter was added to the melted beeswax and mixed uniformly.
3. Almond oil was incorporated slowly with continuous stirring.
4. Hibiscus powder was added gradually to obtain natural color.
5. The mixture was allowed to cool slightly.
6. Vitamin E capsule content and rose water were added.
7. Strawberry flavoring agent was incorporated.
8. The homogeneous mixture was poured into suitable containers and allowed to solidify.

4. EVALUATION OF HERBAL LIP BALM

The prepared herbal lip balm was evaluated for the following parameters:

4.1 Organoleptic Properties

The formulation was evaluated for color, odor, texture, and appearance.

4.2 Spreadability Test

Spreadability was determined by applying the lip balm on a glass slide and observing uniformity of application.

4.3 pH Determination

The pH was determined using a digital pH meter.

4.4 Skin Irritation Test

The formulation was applied on the skin and observed for irritation or redness.

4.5 Melting Point

The melting point was determined using capillary tube method.

4.6 Stability Study

The prepared formulation was stored at room temperature and refrigerated conditions to evaluate stability.

5. RESULTS AND DISCUSSION

5.1 Results

The prepared herbal lip balm formulations (F1–F4) were evaluated for various physicochemical and cosmetic parameters such as organoleptic properties, spreadability, pH determination, skin irritation test, melting point, stability study, and washability. The evaluation was performed to determine the quality, safety, stability, effectiveness, and acceptability of the prepared formulations,

Among all formulations, formulation F4 showed better stability, acceptable pH, smooth texture, and

absence of irritation compared to the other formulations. The results are summarised in table 2.

Table 2. General Evaluation Results of Optimized Herbal Lip Balm

Sr. No.	Evaluation Test	Observation	Interpretation
1.	Color	Light Brown / Natural Pinkish Brown	Attractive natural appearance due to hibiscus
2.	Odor	Pleasant	Acceptable fragrance due to rose water and flavor
3.	Appearance	Smooth and glossy	Uniform and elegant formulation
4.	Texture	Soft and homogeneous	Easy application on lips
5.	Consistency	Good	Suitable semisolid consistency
6.	Spreadability	Excellent	Easily spreadable without fragmentation
7.	pH	6.3	Suitable for lip skin
8.	Melting Point	65°C	Stable under normal storage conditions
9.	Skin Irritation Test	No irritation observed	Safe for topical use
10	Stability Study	Stable	No significant changes during storage
11	Washability Test	Easily washable	Good user acceptability

5.2.1 Organoleptic Evaluation

Organoleptic evaluation was carried out to determine the physical appearance, color, odor, and texture of the prepared lip balm formulations. The color of formulations varied from faint pink to dark pink depending upon the concentration of hibiscus powder and flavoring agents used in the formulation. All formulations showed pleasant odor and smooth texture. Table 3 summarise Organoleptic Evaluation of Formulations. Figure No. 8. Represents all the formulas prepared.

Table 3. Organoleptic Evaluation of Formulations

Formula Code	Colour	Odour	Texture
F1	Faint Pink	Pleasant	Smooth and Soft
F2	Faint Pink	Pleasant	Smooth and Soft
F3	Faint Pink	Pleasant	Smooth and Soft
F4	Dark Pink	Pleasant	Smooth and Soft

Figure No. 8. Represents all the formulas prepared.

The prepared formulations exhibited attractive appearance and acceptable cosmetic properties. Hibiscus powder imparted natural pink coloration to the lip balm formulations. Formulation F4 showed comparatively darker pink color due to better distribution of coloring agent and optimized ingredient ratio.

All formulations possessed pleasant odor because of the addition of rose water and strawberry flavoring agent. Smooth and soft texture indicated proper mixing and homogenization of oils, butter, and waxes during preparation

The absence of gritty particles and phase separation confirmed the uniformity and stability of the prepared formulations.

Significance

- Attractive color improves consumer acceptance.
- Pleasant fragrance enhances product appeal.
- Smooth texture ensures comfortable application.

5.2.2 Texture and Consistency

The consistency of the lip balm was found to be satisfactory. Beeswax provided hardness and structural integrity, whereas kokum butter and almond oil improved softness and smoothness of the formulation.

Initially, slight graininess was observed during preliminary batches due to rapid cooling and uneven crystallization of fatty acids. However, controlled cooling at room temperature helped in obtaining a uniform and smooth semisolid formulation.

Significance

- Proper consistency prevents breakage during application.
- Smooth texture improves spreadability and comfort.
- Uniform consistency indicates proper mixing of ingredients.

5.2.3 Spreadability Test

Spreadability is an important parameter that determines ease of application of lip balm over lips. The formulations were applied repeatedly over a glass slide to observe uniformity, fragmentation, and deformation during application.

Observation

All formulations showed good to excellent spreadability without excessive fragmentation or deformation. The optimized formulation spread uniformly and retained its shape during application.

Good spreadability was obtained due to the balanced ratio of beeswax, kokum butter, and almond oil. Almond oil improved lubrication and smoothness, whereas beeswax provided structural integrity to the formulation.

Formulation F4 exhibited excellent spreadability because of optimum wax-oil ratio and proper consistency. No excessive hardness or brittleness was observed.

Significance

- Good spreadability improves user comfort.
- Uniform spreading ensures even moisturizing effect.
- Proper spreadability indicates suitable wax-oil ratio.

5.2.4 pH Determination

The pH of herbal lip balm formulations was determined using a digital pH meter. Maintenance of appropriate pH is important to avoid irritation and dryness of lips.

Table 4. pH Determination of Formulations

B. Formula Code	*C. pH Range*
F1	1.5 – 3.0
F2	3.5 – 5.0
F3	7.5 – 9.5
F4	5.5 – 7.0

Among all formulations, F4 exhibited pH range nearest to physiological lip pH and was therefore considered most suitable for topical application. Formulations F1 and F2 showed acidic pH, whereas F3 showed alkaline pH, which may not be ideal for sensitive lip tissue.

The optimized pH of F4 may be due to balanced proportions of oils, waxes, and herbal ingredients.

Significance

- Prevents irritation and inflammation
- Maintains natural lip environment
- Suitable for regular use

5.2.5 Melting Point Determination

The melting point of lip balm formulations was determined using capillary tube method.

Table 5. Melting Point of Formulations

Formula Code	**Melting Point**
F1	Around 30–40°C
F2	Around 40–50°C
F3	Around 60–70°C
F4	Around 60–70°C

The melting point of F4 was found to be within the ideal range for lip balm formulations. Beeswax contributed significantly to the hardness and thermal stability of the formulation.

F1 and F2 showed lower melting point due to lower concentration of beeswax, which may lead to softening during storage. F3 and F4 showed better thermal stability because of higher wax concentration.

Significance

- Ensures product stability during storage
- Prevents melting in warm environmental conditions
- Maintains proper consistency during use

5.2.6 Skin Irritation Test

The skin irritation test was performed by applying the prepared formulations on the back of the palm for 15 minutes and observing any redness, itching, or irritation. Figure No. 9. Represents Skin Irritation Test. Table 6 summarise Skin Irritation Test results.

Table 6. Skin Irritation Test

Formula Code	*D. Observation*

F1	***E.*** *No redness or irritation*
F2	***F.*** *Irritation observed*
F3	***G.*** *Redness observed*
F4	***H.*** *No redness, itching, or irritation*

Figure No. 9. Skin Irritation Test

Formulation F4 showed no redness, itching, or irritation and was considered safe for topical application. F1 also showed acceptable safety profile, whereas F2 and F3 produced irritation and redness due to unsuitable pH and imbalance in formulation components.

The absence of irritation in F4 indicates compatibility of herbal ingredients with skin and confirms the non-toxic nature of the formulation.

Significance

- Confirms safety of formulation
- Indicates suitability for sensitive skin
- Demonstrates non-toxic nature of herbal ingredients

5.2.7 Stability Study

Stability studies were performed at room temperature (27±1°C) and refrigerated temperature (4±1°C) for four weeks. The formulations were evaluated weekly for color, odor, texture, pH, and phase separation.

Table 7. Stability Study of Formulations

Formula Code	Stability Observation
F1	Colour change observed
F2	Phase separation observed
F3	Bad odour observed
F4	No colour change, no phase separation, no bad odour

Formulation F4 showed excellent stability throughout the study period without any color change, phase separation, or unpleasant odor. This stability may be attributed to the balanced composition and antioxidant activity of vitamin E.

F1 showed color instability, F2 exhibited phase separation due to poor compatibility of ingredients, and F3 developed bad odor possibly due to oxidative degradation.

Significance

- Indicates good shelf stability
- Prevents rancidity of oils
- Confirms suitability for long-term storage

5.2.8 Washability Test

Washability test was carried out to evaluate ease of removal and water resistance of the prepared lip balm formulations.

Table 8. Washability Test

Formula Code	Observation
F1	Easily removable
F2	Easily removable
F3	Easily removable
F4	Easily removable

All formulations were easily removable using lukewarm water and mild soap. Moderate water resistance was observed due to the presence of beeswax and oils.

The formulations did not leave excessive residue after washing, indicating good consumer acceptability and convenience during regular use.

Significance

- Easy removal improves user convenience
- Moderate water resistance increases product retention
- Suitable for daily cosmetic use

6. CONCLUSION

The present study was successfully carried out to formulate and evaluate herbal lip balm using natural ingredients such as hibiscus powder, beeswax, kokum butter, almond oil, vitamin E, rose water, and strawberry flavoring agent. The main objective of the study was to develop a safe, stable, effective, and eco-friendly herbal cosmetic formulation that can provide moisturization, nourishment, and protection to lips without producing harmful side effects associated with synthetic cosmetic products.

Four different formulations (F1–F4) were prepared by the heating and mixing method using a double boiler system. The prepared formulations were evaluated for various physicochemical and cosmetic parameters including organoleptic properties, spreadability, pH determination, skin irritation test, melting point, stability study, and washability.

The evaluation results demonstrated that all formulations possessed acceptable cosmetic properties;

however, formulation F4 showed superior performance compared to other formulations. F4 exhibited:

- Smooth and soft texture
- Pleasant odor
- Attractive dark pink color
- Excellent spreadability
- Suitable pH range
- Good melting point
- No redness, itching, or irritation
- Excellent stability without phase separation or color change

The presence of beeswax provided hardness and protective action, while kokum butter and almond oil improved moisturization and softness of lips. Hibiscus powder acted as a natural coloring and antioxidant agent, whereas vitamin E enhanced stability and healing properties of the formulation.

The study also highlighted that herbal ingredients can effectively replace synthetic chemicals and petroleum-based products used in commercial lip balms. Unlike synthetic formulations, the prepared herbal lip balm was found to be non-toxic, skin-friendly, biodegradable, and associated with minimal side effects. Thus, it can be concluded that the formulated herbal lip balm is:

- Safe for topical application
- Stable during storage
- Effective in moisturizing and protecting lips
- Economical and eco-friendly
- Suitable for regular lip care use

Overall, the present work supports the growing importance of herbal cosmetics and demonstrates that natural formulations can provide effective therapeutic and cosmetic benefits with better safety and consumer acceptability.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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