



# Formulation And Evaluation Of Medicated Beta Vulgaris Lip Balm For Soothing Chapped Lips And Reducing Pigmentation

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**Abstract** : The present study focuses on the formulation and evaluation of a novel medicated herbal lip balm infusing Beta vulgaris (beetroot) juice, the balm is aimed at soothing chapped lips and reducing pigmentation. Lip balm serves as an effective semi-solid dosage form for topical localized treatment of lip-related conditions, providing a protective, shield-like barrier, hydrating property, and targeted delivery of active ingredients with excellent patient compliance. The formulas developed in this study are innovative and new, have not been previously reported in the same combination and concentration. Our two unique formulas (F1 and F2) were prepared using natural ingredients such as beeswax, almond oil, shea butter, rose oil, and alpha-tocopherol (Vitamin E). Beta vulgaris provides a natural red tint along with antioxidant and anti-pigmentation properties. Alpha-tocopherol supports healing and protects lips from oxidative damage, enhancing the therapeutic potential. The lip balms were evaluated for organoleptic properties, pH, spreadability, greasiness, melting point, and skin irritation. Among the two, F2 demonstrated superior characteristics—improved consistency, reduced greasiness, balanced spreadability, and enhanced stability. Both formulations were found safe for application, but F2 emerged as more effective for daily use. This research supports the development of, natural, and treatment-oriented lip balm formulations using herbal ingredients.

**Key Words:** Beta vulgaris, Beetroot extract, Alpha-tocopherol, Chapped lips, dry lips.

## I. INTRODUCTION

Charles Browne Fleet was the first to introduce lip balm into the market in the 1880s. In her wildly popular book *The American*, Lydia Maria Child advised earwax as solution for cracked lips. Lip balms play an essential role in maintaining healthy and supple lips. [1]

Herbal lip balm is a naturally derived type of a lip balm made from natural herbs and organic products. Additionally, nourishing and soothing the lips, the herbs used in its formulation provide extra benefits. Commonly, a combination of oils and waxes, including olive oil, coconut oil, beeswax, and shea butter, are blended with herbs in herbal lip balm. Together, these components provide a nourishing and shields the lips. [2]

The lips often turn chapped, dry and develop cracks under harsh environmental conditions. As the lips do not have any oil glands in the anatomical structure, these require intensive care, and protection throughout the daytimes. There is a wide range of population which have issues of dryness of lips in winters and some of these problems are continued to summer seasons also. The chemical based lip balms contain petrolatum, artificial waxes, parabens, alumina and non – natural fragrances and colours which are noxious. The lip balms unknowingly can be eaten by the people, hence there should be a detailed study on the ingredients which are used to formulate the lip balms to avoid any acute or chronic effects due to these ingredients. [3]

With increasing awareness of the adverse effects of synthetic ingredients, there is a growing demand for natural and herbal alternatives in personal care products. Beetroot (*Beta vulgaris*) is a natural source of pigments, antioxidants, and vitamins such as vitamin C, moreover the use of beetroot in lip balm not only imparts a natural tint but also enriches both the therapeutic and cosmetic attractiveness. [4,5] This study mainly focuses on the preparation and formulation of a medicated natural lip balm using beetroot extract, beeswax, rose oil, almond oil, and other natural ingredients. Our formulation aims to provide moisturizing, healing, and mild tinting properties. Additionally, the final product is evaluated for its physical characteristics such as texture, spreadability, colour and PH to ensure its efficacy and safety for use.

### ADVANTAGES OF LIP BALMS [6-8]

- **Moisturization:** By maintaining lip hydration, they help to reduce chapping and dryness. They form a barrier that locks in moisture.
- **Healing Properties:** specific components in lip balms help, repair chapped or cracked lips, by promoting natural healing.
- **Glossy Effect:** Lip balms can enhance the aesthetics of your lips by giving them a glossy and shiny finish.
- **Sun Protection :** some lip balms also have SPF properties, To protect lips from damaging UV rays
- **Gender-Neutral:** provide benefits to both men and women alike.

## TYPES OF LIP BALM:[6]

There are 7 types of lip balms to choose from

**1] Tinted Lip Balm:** This kind of lip balm is used to colour and moisturize the lips. Tinted lip balms are the alternative for lipstick if the user prefers a natural;. Moreover they provide our lips with a radiant colour.

**2] Medicated Lip Balm:** Of all the lip balms, medicated lip balms are calming and non irritating . Dermatologists typically prescribe this lip balm as part of a treatment for chapped lips and other lip-related issues.

**3] Flavoured Lip Balm:** A type of lip balm that has added flavourings which is called flavoured lip balm. Lip balms with common flavours are like vanilla, mint, mango, and numerous other fruity flavours are known as flavour-infused lip balms.

**4] Organic Lip Balm:**An organic lip balm is made using natural or organically sourced components. The organic lip balm typically includes avocado oils, jojoba oils, beeswax, vitamin E, hemp, and cocoa butter.

**5] SPF Lip Balm:** This type of lip balm is made with substances that shield the lips from the damaging effects of the sun's rays. Like a sunscreen, the SPF lip balm protect the lips from sun burn, UV damage, and lip related skin cancer.

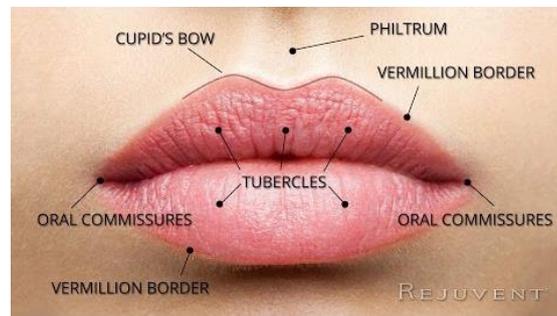
**6] Plumping Lip Balm:** This type of lip balm gives a natural plump and healthy look . It contains unique ingredients that gives the appearance of bigger lips .

## HOW OFTEN SHOULD YOU APPLY LIP BALM?

- You should only put on lip balm a few times throughout the day. According to dermatologist
- Most experts recommend that you Apply it in the following situations:
  - When you wake up in the morning
  - After eating or drinking
- When you go to bed at night

## LIP ANATOMY

Lips are made up of the mucous membrane, areolar tissue, orbicularis muscle, superficial fascia, and skin. Dry, red mucous membrane that is continuous with the skin and has many touch corpuscles and vascular papillae covering the lip edges.



**Fig.1 - Structure of Lips**

- **Vermillion border**

Latin terms labium superius oris and labium inferius oris refer to the structural names for the upper lip and lower lip .[9] The lower lip includes the area between the lateral commissures and the labiomental crease of the chin, although most considerations of the lips are revolved around the vermilion zone. The upper lip extends from the nasolabial folds to the inferior border of the nose.

- **Tubercles**

The tubercle or procheilon is the underlying fleshy fullness of the philtrum, which forms the downward arch of the cupid's bow.

- **Oral commissures**

The commissure is the point where the upper and lower lip unite . Several muscles used in lip movement attach at this location.

- **Philtrum**

A symmetrical pair of paramedian vertical philtral ridges that surround the philtrum, a central depression, are features of the upper lip. Dermal collagen and thick elastic tissue combine to generate a special collection that forms the philtrum and philtral ridges. the philtrum provides extra skin that can be pulled into oral movements that need upper lip stretching. [10]

## II. MATERIALS REQUIRED

Table No: 1 Materials for lip balm

| Sr.No | Materials        |
|-------|------------------|
| 1     | Beet root juice  |
| 2     | Bees wax         |
| 3     | Almond Oil       |
| 4     | Shea Butter      |
| 5     | Alpha-tocopherol |
| 6     | Rose Oil         |

### Active ingredients in medicated lip balm



Fig 2 Beetroot (beta vulgaris)

Botanical name: Beta vulgaris

Kingdom: Plantae

Family: Amaranthaceae

Species: Beta vulgaris

Beetroot is rich in betalains, pigments that give it a natural red tint . simultaneously eliminating the need for synthetic dyes. This natural color enhances the aesthetic appeal of the lip balm, providing a subtle to deep red hue, Based upon the concentration used. Beetroot contains antioxidants such as betalains, vitamin C, and manganese. These antioxidants help protect the lips from damage caused by free radicals and environmental stressors, reducing the signs of aging and maintaining healthy, youthful-looking lips.[11]

Alpha-tocopherol [12]



**Fig. 3 alpha-tocopherol**

Synonym: Tocopherol/ Vitamin E

Biological source: It is a group of compounds found in a wide variety of foods.

Chemical constituents: It refers to a group of eight different compounds:  $\alpha$ -,  $\beta$ -,  $\gamma$ -, and  $\delta$ tocopherols and the corresponding four tocotrienols.

Uses: It is used as a preservative and treating fine lines and wrinkles. It makes lips softer and promotes lips regeneration.

### **III .METHODOLOGY:**

Fresh beetroot was collected from the local market and thoroughly washed with clean water to remove any dirt or impurities. The cleaned beetroot was then peeled and sliced into small even pieces to achieve a smooth and uniform consistency . The sliced beetroot was transferred into a clean blender jar, and a appropriate quantity of distilled water was added to facilitate smooth blending. The mixture was blended continuously for 4–5 minutes to obtain a fine pulp. The resulting juice was then filtered using a clean muslin cloth to separate the liquid extract from the solid residues. The filtered beetroot juice was collected.

**Concentrated pigment-** For the concentrated colour or pigment heated the juice in a beaker using Water bath, kept it for cooling[13]

#### IV . FORMULATION AND COMPOSITION OF LIP BALM

Table No 2: Formula for medicated beet root lip balm.

| S.NO | Ingredients      | F1                            | F2                            | Use   |
|------|------------------|-------------------------------|-------------------------------|---|
| 1    | Beet root juice  | 30ml                          | 30ml                          | Natural colorant/ Improves lip pigmentation/ Adds natural tint and antioxidant effect                           |
| 2    | Bees wax         | 1.75gm                        | 4gm                           | Structuring agent<br>Provides firmness and texture/ Forms protective layer                                      |
| 3    | Almond Oil       | 15ml                          | 15ml                          | Emollient / Nourishing agent,<br>Moisturizes and soothes dry, chapped lips                                      |
| 4    | Shea Butter      | 1.75gm                        | 8gm                           | Healing base/<br>Deeply hydrates/ Helps in skin repair and lip softening  |
| 5    | Alpha-tocopherol | ½ Capsule (200 IU) or ~0.25ml | ½ Capsule (200 IU) or ~0.25ml | Healing enhancer/<br>Prevents oxidative damage/ Enhances skin regeneration                                      |
| 6    | Rose Oil         | 0.25ml                        | 0.25ml                        | Fragrance / Soothing agent /<br>Mild antimicrobial/ Calm irritated skin/<br>Adds aroma and therapeutic benefits |
|      | Total            | 50 approx.. gm                | 50gm approx..                 |   |

#### V. PREPARATION

Weigh accurately all the required ingredients



In a clean evaporating dish, take Bees wax, shea butter, almond oil, Vit E and Rose oil then melt it on a water bath, not exceeding the temperature range of 50°-64° C (Oil Phase)



Warm beet root juice in a beaker to 50°- 64° C (Water Phase)



Add water phase to oil phase, mix vigorously till homogeneous mixture



Stand at room temperature (Air dried)



Fill in the moulds and put onto ice bath for 10 minutes



Allow to solidify completely, store in airtight containers away from heat and sunlight.



Label with formulation details and date.



Observe for texture, spread-ability, and uniformity.

## VI. PACKAGING AND STORAGE [15]

**a. Packaging:** Label the lip balm containers with proper product information, including ingredients, usage instructions, and expiry As well as manufacturing date .

**b. Storage:** Store the packaged lip balm in a cool, dry place away from direct sunlight to maintain its quality and efficacy.

## VII. EVALUATION TESTS FOR LIP BALM

**1. Organoleptic Property:** The formulation was studied for physical appearance, colour and odour.

**2. PH:** The pH meter was used to measure the pH value for both the formulas . The pH meter was Calibrated using a buffer solution before continuing the pH measurement of the lip balm.

The pH value for the lip balm sample was Measured and recorded. [16]

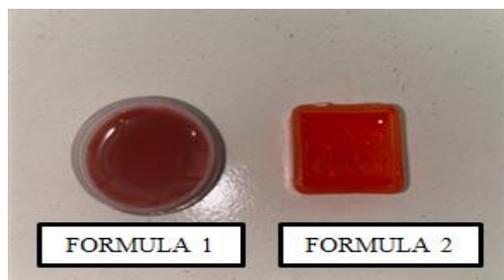
1. **Greasiness:** Greasiness test was performed to know the amount of oil in the formulation of lip

2. Balm, 4 g of lip balm was placed on the filter paper, and the sample was left at room temperature for 24 hours.

**4. Melting Point:** The sample of lip balm is taken in a glass capillary whose one end was sealed by flame. The capillary containing Drug placed in liquid paraffin inside the melting point apparatus. Melting was determined and melting point was noted .

**5. Skin Irritation test:** It is carried out by applying lip balm on the skin for 10 min.

**6. Test of spreadability :** The test of spreadability consisted of applying the product repeatedly onto a glass slide to visually observe the uniformity in the formation of the protective layer. [16,17]



**Fig. 4 F1 & F2**

This is a Comparison of beetroot-based lip balm formulations: Formula 2 exhibited superior properties with a pleasant odor, lighter red color, and firmer texture compared to Formula 1.

## VIII. RESULTS AND DISCUSSION

### 1. Organoleptic Property:

**Table No 3**

| Organoleptic Properties | Formula 1                                       | Formula 2                                      |
|-------------------------|---|--|
| Result                  | Dark reddish in color, mild smell, soft texture | Light red color, pleasant odor, firmer texture |

### 2. Ph measurement:

F1: pH measured was 5.8.

F2: pH measured was 6.1.

Both are safe for skin, with Formula 2 being slightly closer to neutral.

### 3. Greasiness:

F1: Moderate greasy

F2: Less greasy

F2 may contribute to better user experience

### 4. Melting Point:

**Table No 4**

| Melting Point | Formula 1 | Formula 2 |
|---------------|-----------|-----------|
|               | ~ 53°     | ~ 58°     |

### 5. Skin irritation:

No signs of erythema, itching or irritation were observed.

## 6. Spreadability:

F1: Soft consistency, exhibited excessive spreadability

F2: firmer consistency, balanced spreadability gives smoother application

## IX. CONCLUSION:

The present study aimed to formulate and evaluate a medicated lip balm using natural ingredients, with beetroot extract as a natural colorant and alpha-tocopherol as an antioxidant.

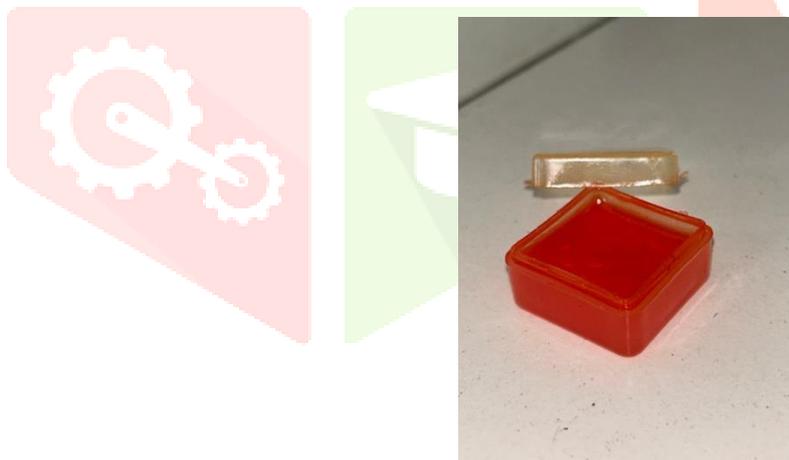
Two formulations (F1 and F2) were developed and assessed for organoleptic properties, melting point, spreadability, pH, greasiness and irritation.

Formula 1, which contained a lower quantities of wax and butter, exhibited softer texture and very high spreadability. This made it difficult to apply smoothly.

Formula 2, on the other hand, included high quantity of beeswax and shea butter. This contributed to a firmer consistency and better structural integrity, with improved thermal stability and color retention.

Both formulations had pH values within the safe range for lip application. Overall, Formula 2 is found to be more effective for soothing chapped lips and reducing pigmentation due to its higher wax content, reduced greasiness, improved thermal stability, and better retention of active herbal components such as beetroot extract and alpha-tocopherol.

This study demonstrates the importance of balancing viscosity and spreadability in lip balm formulation and supports the effective use of natural ingredients in developing stable and skin-friendly cosmetic products



**Fig 5 Final product**

“Final Product – Formula 2: which is reddish in color , beetroot-based lip balm with a mild rose fragrance and soft texture, formulated for natural lip chapped lips and reducing pigmentation .”

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