

## "Natural ingredients in lip care: a study on herbal lip balms and their relevance to drug formulation trends"

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### Abstract:

This study investigates the formulation and evaluation of three herbal lip balms to assess their effectiveness and relevance in contemporary drug formulation trends. The research aims to determine how different natural ingredients impact lip care products and to explore their broader implications for both cosmetic and pharmaceutical applications. The objective is to develop and evaluate three herbal lip balm formulations, each with a unique combination of natural ingredients, to assess their efficacy in lip care and their alignment with current drug formulation trends. Three lip balm formulations were prepared: Formulation 1: Beeswax, almond oil, vitamin E, lemon juice, beet root juice, glycerine, and honey. Formulation 2: Beeswax, almond oil, acacia, and beet root juice. Formulation 3: Beeswax, almond oil, vitamin E, and lemon juice. The formulations were assessed for texture, colour, moisturizing effectiveness, and stability. Sensory evaluations and user feedback were also collected. Formulation 3 demonstrated superior stability and provided effective hydration and protection, outperforming the other formulations. Formulation 2 also offered good hydration and protection, with improved texture due to acacia. Formulation 1, while multifunctional due to additional ingredients like honey and beet root juice, showed less stability and effectiveness compared to Formulation 3. The findings underscore the potential of natural ingredients in enhancing lip care products, aligning with the trend towards integrating herbal components into both cosmetics and pharmaceuticals. This study suggests that formulations utilizing natural ingredients can meet consumer demands for safe, effective, and environmentally friendly products. The insights gained from this research provide valuable guidance for future development and refinement of natural-based formulations in drug and cosmetic industries.

**Keywords:** Lip care, lip balm, cosmetics, natural, and herbs.

### Introduction:

**History:** Lip balm was first sold in the 1880s by Charles Browne Fleet. However, the idea of using earwax for cracked lips dates back earlier. Lydia Maria Child recommended earwax as a treatment for chapped lips in her popular book, *The American*, more than 40 years before Fleet's product was introduced [1].

Lip balm is a waxy product applied to the lips to keep them hydrated. It was developed to protect the lips from environmental factors such as cold weather and to prevent them from becoming dry and cracked. By offering this protection, lip balm helps reduce irritation and the risk of infection. Its occlusive properties prevent saliva from constantly wetting the lips, which also helps relieve the discomfort of chapped lips. The ingredients in lip balm are designed to retain moisture and aid in the healing of dry, cracked lips. Unlike lipstick, lip balm is not intended for any specific gender and usually has a waxy consistency.

Public concern has increased regarding hazardous synthetic excipients in cosmetics, driving a shift toward organic alternatives. Since lips lack oil glands, it is vital to provide them with continuous moisture and protection. Conventional lip balms often contain harmful ingredients like petrolatum, synthetic waxes, alumina, parabens, hydrogenated oils, and artificial fragrances and colours. The fact that users frequently ingest lip balm raises significant health concerns and makes it a notable issue for regulators.

Cosmeceuticals, which offer medicinal benefits through topical application, provide protection against degenerative skin conditions with fewer side effects. This study emphasizes the use of such ingredients. Lip balms are primarily formulated to protect the lips, forming a moisture-resistant layer of oily substances, and typically avoid the use of dyes [2].

### Anatomy of lips:

The lips are important for grasping, sucking, and speaking. They are made up of skin, a thin layer of connective tissue, the orbicularis muscle, and surrounding muscles, including areolar tissue and mucous membrane. The edges of the lips are covered with a dry, red mucous membrane that blends into the skin and has many tiny

blood vessels and touch receptors. Inside, the mucous membrane extends from the lips to the gums and forms two folds called the superioris and inferioris.

The areolar tissue, or sub mucous layer, contains the coronary vessels that wrap around the opening of the mouth near the edge of the lips. These vessels include the superior and inferior coronary arteries, which come from the facial artery. The superior coronary artery is larger and connects with its counterpart on the other side, supplying a small artery to the septum arteriaseptinasi. Pressing on this artery can sometimes stop nosebleeds. The superior labial vein starts in the upper lip, follows the coronary artery, and drains into the facial vein just below the nose. For the lower lip, the inferior coronary vein usually drains into the facial vein slightly below the superior labial vein, with the main branch often going to the submental vein and then to the facial vein or sometimes to the anterior jugular vein. The mental nerve supplies the lower lip, branching out from the mental foramen in the bone to reach the lip's mucous membrane, skin, and fascia. Lymphatic vessels from the lips either go to a gland above the hyoid bone or to the sub maxillary glands. The labial glands, found in the tissue around the mouth, produce a mucous fluid. If the ducts of these glands become blocked, mucous retention cysts can form [3].

### Lip Disorders:

**Sun Damage:** Sun exposure can dry out the lips, especially the lower one. Red or white spots on the lips may signal damage that can increase the risk of cancer later. To prevent this, use lip balm with sunscreen or protect your face with a wide-brimmed hat.

**Discoloration:** Freckles and brown spots around the lips are common and usually not concerning. Dark spots may indicate Peutz-Jeghers syndrome, an inherited condition that causes polyps in the digestive system. Kawasaki disease, which affects young children, can also lead to dry, cracked lips and redness in the mouth lining.

**Swelling:** Lips can swell due to allergic reactions from foods, drinks, medications, lipsticks, or airborne irritants. When the trigger is identified and removed, swelling usually goes away. However, sometimes the cause is unknown. Conditions like hereditary angioedema can cause recurring swelling, while non-genetic factors such as sunburn, cold weather, dryness, or trauma can also lead to swollen lips.

**Inflammation:** Inflamed lips, or cheilitis, can cause pain, burning, redness, cracking, and scaling, particularly at the corners of the mouth. This condition can be caused by a lack of vitamin B2 in the diet.

**Sores:** Hard or raised sores on the lips might be skin cancer. Other sores could indicate infections like herpes simplex or syphilis, while some, such as keratoacanthoma, have no known cause [4].

### Types of Lip Balm:

Table.1. Types of Lip Balm

Sr.no	Types Of Lip Balm
1	Tinted Lip Balm
2	Medicated Lip Balm
3	Flavoured Lip Balm
4	Organic Lip Balm
5	SPF Lip Balm
6	Plumping Lip Balm
7	CBD or Hemp Oil Lip Balm
8	Lip Balm with a UV Filter
9	Nourishing Lip Balm
10	Moisturizing Lip Balm

When selecting a lip balm, you have a range of options to suit various needs:

1. **Tinted Lip Balm:** Perfect for those who desire hydration along with a hint of colour, tinted lip balms offer an easy way to add a splash of shade without the bulk of traditional lipstick. To use, simply apply the balm directly to your lips for both moisturizing and a touch of colour.
2. **Medicated Lip Balm:** These balms are specially formulated to address medical issues like chapped lips. Typically recommended by dermatologists, medicated lip balms may be less soothing than other types, as they focus on treating specific lip conditions.
3. **Flavoured Lip Balm:** For a fun twist, flavoured lip balms come in an array of tastes such as vanilla, mint, and mango. They provide the same moisturizing benefits as standard balms but with the added pleasure of delightful flavours that please both the taste buds and the sense of smell.
4. **Organic Lip Balm:** If you prefer natural ingredients, organic lip balms are a great choice. Made with substances like avocado oil, jojoba oil, beeswax, and cocoa butter, these balms avoid harmful chemicals and still offer effective moisture and protection.
5. **SPF Lip Balm:** Essential for sun protection, SPF lip balms guard your lips against the harmful effects of UV rays. They act like a sunscreen for your lips, helping to prevent sunburn and long-term damage while you're out in the sun.
6. **Plumping Lip Balm:** For those looking to enhance their lip volume without invasive procedures, plumping lip balms are ideal. These balms not only provide moisture but also contain ingredients that make your lips appear fuller and more rounded.
7. **CBD or Hemp Oil Lip Balm:** Infused with cannabidiol (CBD) or hemp oil, these balms offer a dual benefit. Hemp oil provides deep moisturizing, while CBD oil delivers anti-inflammatory effects, helping to soothe and heal dry, chapped lips with antioxidant properties [5].
8. **Lip Balm with a UV Filter:** This balm is suitable for year-round use but is particularly advantageous in summer or in regions with intense solar exposure, such as ski resorts in the mountains.
9. **Nourishing Lip Balm:** The best time to use this type of balm is during the winter, when it provides essential nourishment for your lips.
10. **Moisturizing Lip Balm:** Because this balm absorbs quickly in cold weather, it can cause your lips to split if used in winter. However, it is effective for treating dry lips and can be used throughout the year to maintain hydration [6].

#### **Advantages of lip balm:**

1. **Preserving Lip Health:** Using lip balm helps maintain both the natural health and beauty of your lips. Lip balms that include sunblock offer protection against UV radiation.
2. **Gender-Neutral Use:** These lip balm products are suitable for everyone, regardless of gender. Both men and women can benefit from their use.
3. **Preventing Lip Issues:** Lip balms are designed to prevent common problems like dryness, chapping, and cold sores.
4. **Application and Effectiveness:** When applied, the lip balm should spread smoothly without causing friction or additional dryness. It should create a protective layer on the lips, safeguarding them from environmental factors such as pollution, dryness, and UV rays. Additionally, it provides a refreshing sensation and helps address symptoms related to cold, flu, and allergies.

#### **Disadvantages of Lip Balm:**

1. **Potential for Harm:** Using lip balms made from subpar ingredients can result in significant damage to the lips, causing them to become dry and irritated.
2. **Risk of Dependence:** A common drawback of lip balm use is the potential to become dependent on it.
3. **Shorter Duration:** Lip balms made at home often dissolve faster than those manufactured in a lab, which means you'll need to reapply them more frequently [4,6].

**Applications of Lip Balm:**

1. Chapped lips are healed by it.
2. Provides nourishment and moisture.
3. Ensures lips stay soft and supple.
4. Shields lips from sun damage[7]

**Drug Selection Criteria:**

**1. Efficacy**

**Hydration and Moisturization:**

**Glycerine:** Evaluate its ability to attract and retain moisture, providing long-lasting hydration.

**Almond Oil:** Assess its emollient properties, which help to soften and smooth the lips.

**Honey:** Consider its natural humectant properties that contribute to moisture retention.

**Protection and Barrier Formation:**

**Beeswax:** Examine its effectiveness in forming a protective barrier to shield the lips from environmental factors and prevent moisture loss.

**Vitamin E:** Assess its role in protecting the skin from oxidative stress and its contribution to overall lip care.

**Additional Benefits:**

**Lemon Juice:** Evaluate its potential for exfoliation and brightening, ensuring it doesn't cause irritation or sensitivity.

**Beet Root Juice:** Consider its role in providing colour and possible antioxidant benefits, while ensuring it doesn't impact the stability or safety of the formulation.

**2. Stability**

**Physical Stability:**

**Beeswax and Almond Oil:** Test how these ingredients contribute to maintaining the balm's texture and consistency over time.

**Colour and Texture Stability:** Assess how well beet root juice and lemon juice maintain their properties without affecting the overall product stability.

**Chemical Stability:**

**Vitamin E:** Evaluate its effectiveness in preventing oxidation of other ingredients, ensuring the formulation remains stable and effective.

### 3. Safety

#### Ingredient Safety:

**Allergy Testing:** Ensure that all ingredients, including beeswax, almond oil, and honey, are tested for potential allergens and irritants.

**Lemon Juice:** Verify that lemon juice doesn't cause sensitivity or irritation, particularly when used in a topical product.

### 4. Sensory Attributes

#### Texture:

**Beeswax and Glycerine:** Assess how these ingredients contribute to the balm's smoothness and ease of application.

**Almond Oil:** Evaluate its role in enhancing the product's Spreadability and user comfort.

#### Scent and Flavour:

**Honey and Lemon Juice:** Consider their impact on the scent and flavour profile of the lip balm, ensuring they are pleasant and non-overpowering.

### 5. Combination Effectiveness:

**Interactions:** Assess how well the ingredients work together to enhance the overall performance of the balm. Ensure that the combination of beeswax, almond oil, vitamin E, and other ingredients complements each other to maximize effectiveness.

By applying these criteria, you can effectively select and refine a lip balm formulation that provides optimal lip care, meets safety and stability standards, and aligns with consumer preferences and market trends. This study explores three distinct herbal lip balm formulations, each crafted to utilize natural components for effective lip care.

#### Formulation 1:

Table no.2. F1

Sr.no	Ingredients	Uses
1	Beeswax	Retains moisture
2	Almond Oil	Provides deep hydration and soothing effects
3	Vitamin E	Antioxidant
4	Lemon Juice	Mild exfoliation
5	Beet Root Juice	Natural tint
6	Glycerine	Humectant
7	Honey	Natural antibacterial and moisturizing qualities

#### Formulation 1: Beeswax, Almond Oil, Vitamin E, Lemon Juice, Beet Root Juice, Glycerine, and Honey

The first formulation integrates a diverse selection of natural ingredients to offer comprehensive lip care. **Beeswax** serves as the primary base, creating a protective layer that retains moisture and shields lips from environmental factors. **Almond oil** provides deep hydration and soothing effects, improving lip smoothness. **Vitamin E** is included for its antioxidant properties, which support lip health and repair. **Lemon juice** adds a refreshing scent and mild exfoliation, while **beet root juice** contributes a natural tint and extra nutrients.

**Glycerine** functions as a humectant, attracting moisture, and **honey** enhances the formula with its natural antibacterial and moisturizing qualities. This formulation is designed to deliver a multi-functional lip balm that combines protection, hydration, and nourishment.

#### Formulation 2:

Table no.2. F2

Sr.no	Ingredients	Uses
1	Beeswax	Retains moisture
2	Almond Oil	Provides deep hydration and soothing effects
3	Acacia	Emulsifying properties
4	Beet Root Juice	Natural tint

#### Formulation 2: Beeswax, Almond Oil, Acacia, and Beet Root Juice

The second formulation presents a streamlined blend focused on hydration and protection. **Beeswax** and **almond oil** form the foundation, offering crucial moisturizing and protective benefits. **Acacia** (likely Acacia Senegal or Acacia gum) is included for its emulsifying properties, which improve the balm's texture and application. **Beet root juice** continues to provide natural colour and additional nutrients for lip health. This formulation aims to deliver effective hydration and protection through a simplified, functional approach.

#### Formulation 3:

Table no.3.F3

Sr.no	Ingredients	Uses
1	Beeswax	Retains moisture
2	Almond Oil	Provides deep hydration and soothing effects
3	Vitamin E	Antioxidant
4	Lemon Juice	Mild exfoliation

#### Formulation 3: Beeswax, Almond Oil, Vitamin E, and Lemon Juice

The third formulation adopts a minimalist approach, emphasizing essential ingredients for effective lip care. **Beeswax** provides the necessary barrier to prevent moisture loss and protect lips. **Almond oil** offers deep hydration and nourishment. **Vitamin E** is included for its antioxidant benefits, aiding in lip protection and repair. **Lemon juice** imparts a fresh scent and gentle exfoliation. This formulation focuses on delivering a straightforward, yet effective lip balm that addresses fundamental lip care needs.

#### MATERIALS:

Table no.3.List of Ingredients and Quantity

Sr. no	F1		F2		F3	
	Ingredient	Quantity	Ingredient	Quantity	Ingredient	Quantity
1	Beeswax	5gm	Beeswax	5gm	Beeswax	5gm
2	Almond Oil	5ml	Almond Oil	5ml	Almond Oil	5ml
3	Vitamin E	1ml	Acacia	1gm	Vitamin E	1ml
4	Lemon Juice	1ml	Beet Root Juice	1ml	Lemon Juice	1ml
5	Beet Root Juice	1ml				
6	Glycerine	1ml				
7	Honey	5ml				

#### Method:

1. Accurately weigh all the necessary ingredients.
2. Melt the Bees wax first in a clean evaporating dish using a water bath, ensuring the temperature does not exceed 50-64°C.
3. Next, add the remaining ingredients one by one and stir vigorously [8].

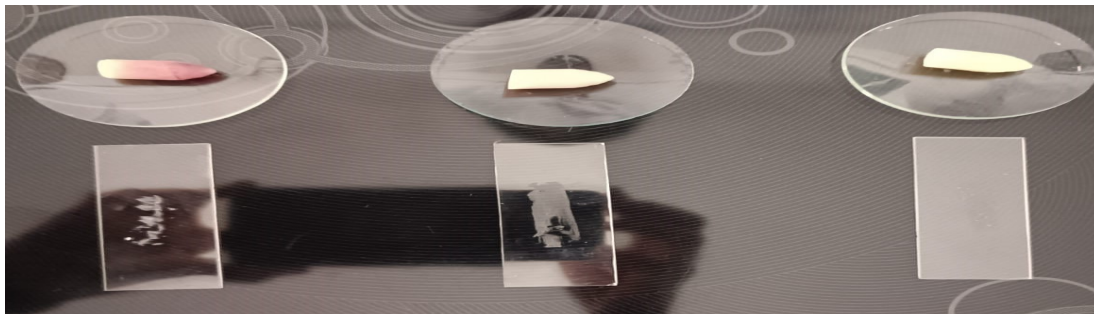
#### Evaluation:

**Organoleptic Properties:** The Lip Balm was checked for its colour, smell, taste, and look.

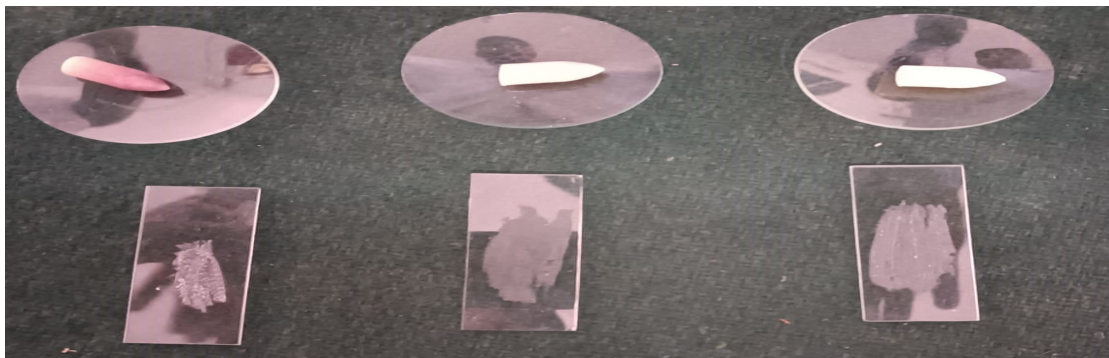


**Fig.1 Formulation F1, F2, F3**

**Spreadability Test:** The test for Spreadability involved repeatedly applying the product (at room temperature) to a glass slide to observe how uniformly the protective layer forms.



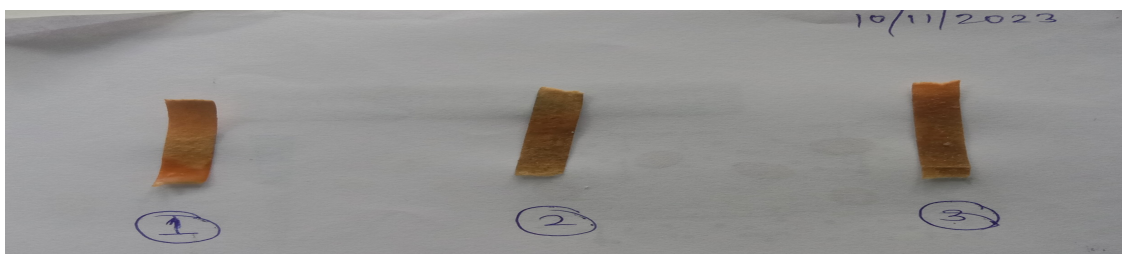
**Fig.1.1 Spreadability test results Before Stability studies**



**Fig. 1.2 Spreadability test results After Stability studies**

**Measurement Of pH:**

To investigate potential side effects, the pH of the lip balm was measured. Since an acidic or alkaline pH could irritate the lips, the goal was to maintain the formulation's pH as close to neutral as possible. To measure the pH, 1 gram of the sample was dissolved in 100 ml of water, and the pH was determined using a pH meter and pH paper.



**Fig. 1.3.pH measurement**

**Melting Point:** The melting point of the lip balm was determined using a melting point apparatus. A sample was placed in a glass capillary with one end sealed. This capillary was then dipped in liquid paraffin inside the apparatus, which had magnetic stirring. The melting point was observed and recorded visually. It was checked by using a pH meter.

**Stability Studies** The prepared lip balm was subjected to accelerated stability studies by storing it at room temperature ( $25.0 \pm 3.0$  °C), in refrigeration ( $4 \pm 2.0$  °C), and in an oven ( $40.0 \pm 2.0$  °C) for 30 days. After this period, the lip balm was evaluated for its organoleptic properties, melting point, Spreadability, and pH [9, 10, 11, 12, 13, 14, 15].

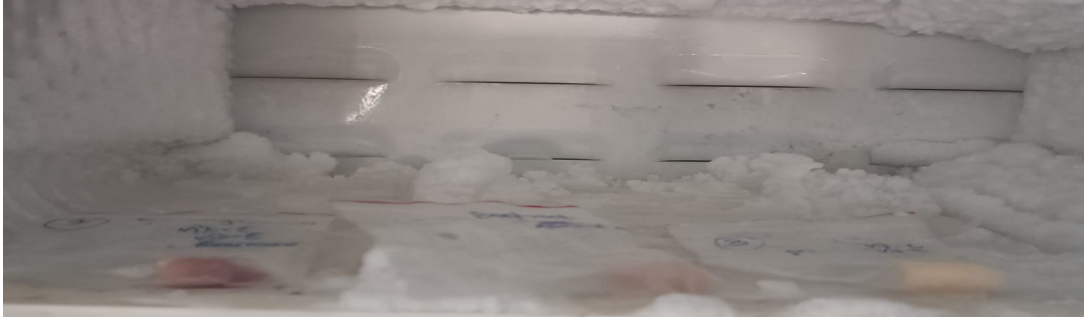


Fig. 1.4. Formulations in Refrigerator

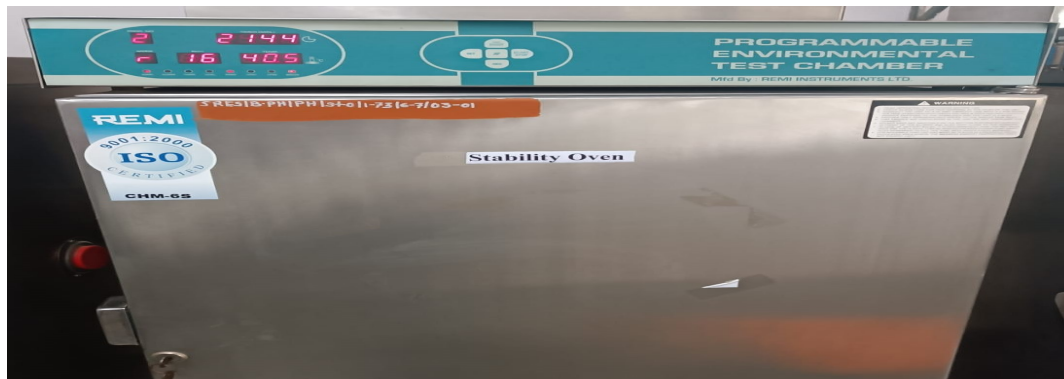


Fig.1.5 Stability Oven

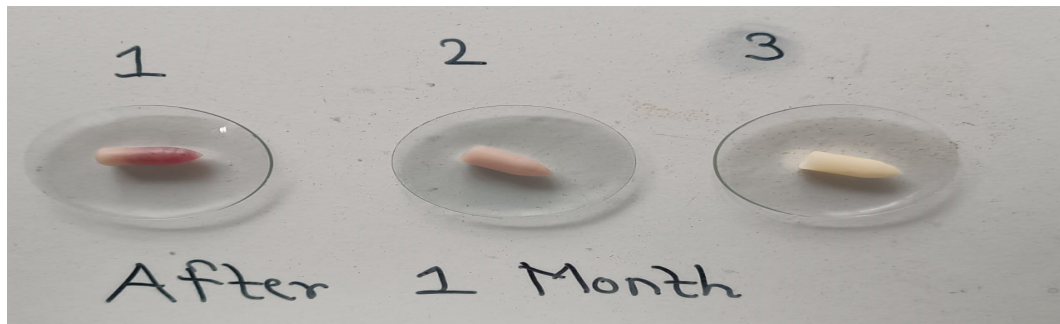


Fig.1.6 Formulations after Stability studies



**Result:**

Sr.no	Evaluation parameter	F1	F2	F3
1	Colour	Pinkish red	Pink	Faint Pink
2	Spreadability	Bad	Good	Good
3	pH	6	6.5	6.5
4	Melting point	45	57	59
5	Texture	Smooth	Smooth	Smooth
6	Stability	Stable	Stable	Stable

**Marketed Examples:**

Sr.no	Brand name	Company	Strength	Cost
1	Liquorice Shea Lip Butter Balm	Just Herbs	8 g	395
2	Super Soft Strawberry Lip Balm	Sage Apothecary	8 g	190
3	Lotus Herbals Lip Balm Raspberry	Lotus Herbals	5g	149
4	Khadi Rishikesh Herbal Pineapple lip balm	Khadi	8 g	214
5	Real Herbs Lemonade Lip Balm	Zoic Pharmaceuticals	30 g	176
6	Moha Herbal Lip Balm	Moha	40 g	170
7	Aayurmadom Herbal Lip Balm	Aayurmadom	8 g	140
8	We Herbal Kumkumadi Lip Balm	We Herbal	8 g	199

**Conclusion:** These formulations highlight the versatility and effectiveness of natural ingredients in lip care products. By incorporating elements such as beeswax, almond oil, and various herbal extracts, these lip balms not only address essential lip care needs but also reflect the broader trend of integrating natural ingredients into both cosmetics and pharmaceuticals. The comparative analysis of these formulations provides insights into their potential applications and effectiveness, demonstrating how natural ingredients can meet modern consumer demands in drug formulation and development.

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