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Review Article

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REVIEW ON PREPARATION AND EVALUATION OF NATURAL LIP BALM FROM BEETROOT

Kowlu Ramu, Chapana Joginaidu, Duppala Yogendra, Yellabilli Jagadish, Gedela Prasad, C. Madhu

Gokul College of Pharmacy, Piridi, Bobbili, Vizianagaram, Affiliated to Jntu-Gurajada Vizianagaram.

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*Corresponding author

Kowlu Ramu

Assistant Professor, Department of Pharmaceutics
Gokul College of Pharmacy, Piridi, Bobbili, Vizianagaram,
Affiliated to Jntu-Gurajada Vizianagaram.

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Abstract

The increasing demand for safe, natural, and eco-friendly cosmetic products has led to the development of herbal-based lip balms as alternatives to synthetic formulations containing petroleum derivatives, artificial colors, and chemical preservatives. Natural lip balms use plant-derived waxes, oils, butters, flavors, and pigments to hydrate, protect, and enhance lip appearance. Beetroot (*Beta vulgaris* L.), rich in betalain pigments and antioxidants, has emerged as a promising natural colorant for lip care formulations. This combined review summarizes the anatomy of lips, lip disorders, natural lip balm ingredients, formulation methods, evaluation parameters, and stability considerations. A special focus is placed on beetroot-based lip balm formulations due to their functional and aesthetic benefits. The review highlights that natural lip balms are safe, effective, and environmentally sustainable but require improved stability due to the temperature sensitivity of natural pigments.

Keywords: Natural lip balm; Herbal cosmetics; Beetroot (*Beta vulgaris* L.); Betalain pigments; Formulation methods; Evaluation parameters; Stability studies; Eco-friendly cosmetics.

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Introduction

The lips have a unique anatomical structure, lacking sweat glands, sebaceous glands, and hair follicles. This makes them more susceptible to dryness, cracking, UV damage, and environmental stress [10,11]. Lip balms serve as moisturizers and protective barriers to reduce transepidermal water loss (TEWL) and maintain lip hydration [11].

Synthetic lip balms often contain parabens, petrolatum, artificial dyes, and fragrances that may cause irritation, allergies, or long-term damage [6]. Consequently, the use of herbal-based natural lip balms is increasing due to their biocompatibility, safety, and multifunctional benefits [7, 12]. Natural ingredients provide moisturization, healing, coloring, and antioxidant activity while reducing side effects [13].

Beetroot extract, rich in betalains (betacyanins & betaxanthins), is widely recognized for its vibrant natural color and potent antioxidant properties, making it an ideal ingredient in natural lip cosmetic formulations [2, 9].

Anatomy of Lips

Lip skin differs significantly from normal skin [10, 11]:

- Contains only 3–4 layers in the stratum corneum vs. 15–16 in normal skin.
- No hair follicles or sweat/sebaceous glands.
- Lacks melanin, making blood vessels more visible and giving lips a pink color.
- Highly sensitive to dehydration, UV exposure, and environmental factors.
- Because lips lack a natural protective barrier, topical formulations such as lip balms are essential for protection and moisturization [11].

Common Lip Disorders

Common lip disorders include [10,11]

- **Swelling**-allergies, irritants, hereditary angioedema.
- **Sun damage**-dryness, rough patches, increased cancer risk.
- **Cheilitis**-cracked corners, vitamin B2 deficiency.
- **Discoloration**-hyperpigmentation, freckles, systemic conditions.
- **Sores**-infections (e.g., herpes), trauma, precancerous lesions.

Natural lip balms can soothe dryness, support healing, and provide a protective shield [12,13].

Ingredients Used in Natural Lip Balm Formulation

Natural lip balms typically contain:

Waxes (Base)

- Provide hardness, structure.
- Protective barrier [6,7].

Eg: Beeswax, Carnauba wax, Candelilla wax, Shea butter or cocoa butter (fatty waxes).

Properties

- High melting point.
- Excellent film-forming agent.
- Prevents moisture loss.

Function of Base

- Forms the solid structure of lip balm.
- Provides occlusivity (prevents moisture loss).
- Determines melting point, hardness, and stability [7,13].

Oils

- Provide emollience and softness.
- Unsaturated oils improve spreadability and skin absorption [6,12].

Eg:- Coconut oil, Almond oil, Olive oil, Jojoba oil, Castor oil, Avocado oil, Vitamin E oil (antioxidant).

Function of Oils

- Provide lubrication and shine.
- Enhance softness and spreading.
- Prevent dryness and cracking.
- Act as carrier medium for pigments and flavors [11,12].

Natural Coloring Agents

- Beetroot is the preferred natural dye due to strong pigment stability and antioxidant activity [2,9].

Eg:- Beetroot (Betalains), Turmeric, Saffron, Pomegranate, Marigold, Cherry and berry extracts.

Function of Natural Colorants:

- Provide natural tint.
- Add antioxidant properties (e.g., beetroot, berries).
- Improve consumer appeal [8,9].

Flavouring Agents

- Enhance palatability and consumer appeal.
- Also improve taste masking [6].

Eg: Honey, Vanilla, Strawberry, Orange, Rose oil, Mint oil.

Function of Flavouring Agents

- Improve taste and aroma.
- Enhance sensory experience.
- Enhance product acceptability.
- Some also act as mild preservatives (e.g., honey) [12].

Beetroot (Beta Vulgaris L.)

Beetroot as a Natural Cosmetic Ingredient.

Beetroot contains

- Betalain pigments (betacyanins-red; betaxanthins-yellow).
- Phenolic antioxidants.
- Minerals and vitamins.
- Anti-inflammatory phytochemicals [2,3,9].

Benefits in lip balm

- Provides rich pink-red tint.
- Protects against oxidative damage.
- Enhances lip health and hydration.
- Completely safe and edible.

Limitations

- Sensitive to heat, light, and oxidation.
- May cause mild fading under high temperatures [1,3].

Method of Preparation of Natural Lip Balm

Preparation of Beetroot Extract (Coloring Agent)

Cleaning: Wash fresh beetroot thoroughly to remove dirt and impurities.

Peeling and Cutting: Peel the beetroot and cut it into small pieces.

Grinding: Grind the pieces into a fine paste without adding water.

Filtration: Filter the paste using muslin cloth to obtain beetroot juice.

Concentration: Heat the juice on a low flame to evaporate water and obtain a thick concentrated pigment (betalain extract). Cool it and store for use [1,2].

Preparation of Natural Lip Balm

Step 1: Melting the Base: Take beeswax (or candelilla/carnauba wax) in a beaker. Melt it using a double-boiler method (hot water bath).

- Temperature: 65–70°C.
- Stir until it becomes completely liquid.

Step 2: Adding Oils: Add coconut oil / almond oil / castor oil to the melted wax.

Add Vitamin E oil as a natural antioxidant. Continue stirring to mix thoroughly.

Step 3: Incorporating Beetroot Extract: Add the prepared beetroot pigment slowly into the warm wax-oil mixture. Stir continuously to ensure uniform dispersion of color.

Maintain low heat to avoid pigment degradation (betalains are heat-sensitive).

Step 4: Add flavouring agents such as: Honey, Vanilla extract, Rose / orange / mint oil and Mix well.

Step 5: Homogenization /Mix the entire formulation until:

- The texture becomes smooth.
- The color is uniform.
- No lumps are present.

Step 6: Molding/ Pour the warm mixture into: Lip balm containers, Lip balm sticks, Small cosmetic pots.

Step 7: Cooling: Allow it to cool at room temperature. The mixture solidifies into a semi-solid, smooth lip balm [4,5].

Storage:

- Store lip balm at room temperature.
- Avoid high heat and direct sunlight (betalain pigment may fade).
- This method yields a smooth, spreadable, semi-solid lip balm suitable for tropical climates [1,3].

Evaluation Parameters

Organoleptic Evaluation

Color: Uniform deep pink/light red.

Appearance: Smooth, glossy.

Odor: Mild, coconut-like.

Texture: Non-gritty, easily spreadable.

These characteristics confirm proper homogenization and ingredient compatibility [4,12].

Physicochemical Evaluation

pH: 6.0–7.5 → safe for lip application and non-irritating.

Melting point: 60–70°C → ensures stability in warm climates while melting at body temperature.

Spreadability & Hardness: Ideal balance between beeswax and oil phase allows smooth application without brittleness.

Antioxidant Activity: Attributed to beetroot betalains and phenolics.

These results demonstrate that the formulation meets cosmetic quality standards [6,11,15].

Stability Study

Conditions tested:

- Room temperature.
- Refrigeration (5°C).
- Elevated temperature (40°C).

Findings

- Good stability at room temperature.
- Pigment fading observed at 40°C due to heat-sensitive betalains.
- Betalain degradation under light, heat, and oxygen is a known limitation in natural formulations [1,3,15].

Therapeutic & Cosmetic Benefits

- Moisturizes and nourishes lips.
- Treats dryness, cracks, and chapping.
- Provides natural tint and shine.

- Protects from UV damage when combined with SPF.
- Antioxidant properties reduce oxidative stress.
- Safe for prolonged use.
- Suitable for men and women [11-13].

Advantages and Limitations of Natural Lip Balms

Advantages

- Safe and non-toxic.
- Environment-friendly.
- Rich in antioxidants.
- Prevent dryness and cracking.
- Provide natural shine and aesthetic appeal [12,13].

Limitations

- Thermal instability of natural pigments.
- Shorter shelf life compared to synthetic balms.
- Natural oils can be greasy if formulation is unbalanced.
- Some natural dyes have limited color intensity [1,3,8].

Conclusion

Natural lip balms prepared with plant-based waxes, oils, and pigments offer safe, effective, and sustainable alternatives to synthetic lip care products. Beetroot extract is an excellent natural colorant with antioxidant properties that enhance lip health and provide vibrant pigmentation. Despite limitations such as heat sensitivity and shorter shelf life, beetroot-based lip balms show promising potential for commercial natural cosmetic formulations.

Further research should focus on

- Enhancing pigment stability.
- Incorporating natural preservatives.
- Developing SPF-containing natural balms.
- Optimizing long-term storage characteristics.

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Informed Consent and Ethical Statement

Not applicable

Author Contributions

All authors are contributed equally.

References

1. Cliff MA, King MC. Influence of processing on beetroot pigments (betalains). *J Food Sci.* 1996;61(1):44–47.
2. Azeredo HMC. Betalains: properties, sources, applications, and stability—a review. *Int J Food Sci Technol.* 2009;44(12):2365–2376.
3. Herbach KM, Stintzing FC, Carle R. Betalain stability and degradation: structural and chromatic influences. *J Agric Food Chem.* 2006;54(1):390–398.
4. Chawla P, Janveja C. Formulation and evaluation of herbal lip balm using beetroot extract. *Int J Pharm Sci Res.* 2021;12(5):2792–2799.
5. Sharma S, Sandhu H. Preparation and evaluation of natural lip balm using plant extracts. *J Cosmet Laser Ther.* 2020;22(8):421–426.
6. Barel AO, Paye M, Maibach HI. *Handbook of cosmetic science and technology.* 4th ed. Boca Raton (FL): CRC Press; 2014.
7. Lodha R, Jain A. Herbal lip formulations: a review on ingredients and evaluation parameters. *Asian J Pharm Res.* 2017;7(3):123–130.
8. Pandey S, Mishra S. Natural colorants in cosmetics: sources and applications. *Int J Pharm Sci Rev Res.* 2018;50(1):98–103.
9. Stintzing FC, Carle R. Betalains—emerging prospective natural colorants for food and cosmetics. *Food Rev Int.* 2007;23(2):209–233.
10. Draelos ZD. *Cosmetic dermatology: products and procedures.* 2nd ed. Oxford: Wiley-Blackwell; 2010.
11. Rawlings AV, Harding CR. Moisturization and barrier repair. *Dermatol Ther.* 2004;17(1):43–48.
12. Singh V, Chaudhary A. Formulation and evaluation of herbal lip care products: a review. *Int J Res Cosmet Sci.* 2019;9(1):1–9.
13. Gowda DV, Mohammed T. Herbal lip care formulations: an overview. *World J Pharm Res.* 2018;7(12):234–248.
14. Kokate CK, Purohit AP, Gokhale SB. *Pharmacognosy.* 50th ed. Pune: Nirali Prakashan; 2015.
15. International Council for Harmonisation. *ICH Q1A(R2): stability testing of new drug substances and products.* Geneva: ICH; 2003.
16. Kaul S, Khandelwal P. Development of natural beetroot-based cosmetic tint and its stability analysis. *J Herb Med.* 2022;32:100526.