

Natural Colourants Used in Herbal Lipstick –A Review

Mrs. Selvi A¹, Amothanambigai S², Dharshini Sri S³, Harini M⁴, Nandhini B⁵, Sujitha K⁶

¹Associate Professor, Department of Pharmaceutics, Adhiparasakthi College of Pharmacy, Melmaruvathur-603319, Tamilnadan

^{2,3,4,5,6}UG scholars, affiliated to The Tamilnadan Dr. M.G.R. Medical University, Chennai-600032, Tamilnadan, India

Abstract—Lipsticks are one of the most widely used cosmetic products designed to enhance lip appearance while offering protection and hydration. Conventional lipsticks often contain synthetic dyes, heavy metals, and petroleum-based chemicals that may pose health concerns, especially due to unintentional ingestion during regular use. To overcome these limitations, natural and herbal lipsticks have gained significant attention due to their safety, biocompatibility, and availability of plant-based colourants. This review provides a comprehensive overview of lipstick history, anatomy of lips, types of lipsticks, ideal characteristics, advantages, disadvantages, and side effects. It also highlights various natural pigments such as beetroot, carrot, tomato, hibiscus, rose, turmeric, annatto, and purple sweet potato, along with their extraction methods. The general formulation steps, manufacturing procedures, and evaluation parameters including melting point, breaking point, pH, solubility, texture, and stability are discussed. Overall, natural lipsticks formulated with herbal colourants offer a safer alternative to synthetic products while maintain desirable aesthetic and functional properties.

Index Terms—Herbal lipstick, Natural pigments, Cosmetic formulation, Lip anatomy, Colour extraction, Evaluation parameters, Lip care, Natural cosmetics.

I. WORDS:

Herbal lipstick, Natural pigments, Cosmetic formulation, Lip anatomy, Colour extraction, Evaluation parameters, Lip care, Natural cosmetics.

II. INTRODUCTION

A cosmetic is any product that is intended to be applied to human skin by rubbing, sprinkling, spraying,

pouring, or any other method for the purposes of beautifying, enhancing, or altering appearance, as defined by the drugs and cosmetic Act, 1940 and 1945 regulations [10]. Lipstick is one of the most commonly used cosmetic products, applied to enhance the beauty of the lips. It is formulated with pigments, waxes, various oils, and emollients that provide colour, texture, and protection [13]. It helps prevent cracking and rupturing of the lips, which can lead to bacterial infections [20]. It keeps the lips hydrated and enhances the radiance of our smile. A good lipstick should have adequate non-drying plasticity and a smooth, non-gritty texture [29]. Synthetic lipsticks often contain a harmful combination of petroleum-based chemicals, many of which are considered carcinogenic. In contrast, herbal cosmetics are gaining popularity worldwide and are regarded as valuable gifts of nature. Herbal lipsticks are formulated using pigments derived from commonly available plants and vegetables. Popular natural colorants include henna, beetroot, alkanet root, indigo, amla, hibiscus, tomato, and carrot, allowing easy creation of customized shades. Since lipstick is often ingested in small amounts during use, it is crucial for health regulators to closely examine the safety of its ingredients [8].



III. HISTORY

Men first began using colors for adornment around 3000 BC, primarily to attract the animals they hunted. The concept of “cosmeceuticals” was initially introduced by Raymond Reed in 1961, the founder of the U.S society of cosmetic chemists. The term is derived from the Greek word “kosm tikos,” meaning “decorating skill”. Later, in 1984, Albert Kligman used the term to describe products that possess both cosmetic and medicinal benefits. Humans have been using lip color for more than 500 years. Early forms of lipstick were discovered in ancient Mesopotamia, where crushed fragments of brick were used for lip coloring. The practice of adorning the lips dates back to prehistoric times. Lipstick was first introduced as a cosmetic product in France in 1869, made from animal fat and beeswax. By 1915, lipsticks became available in cylindrical metal tubes. Today, they are considered an essential beauty product for many people, with a wide variety of shades and textures. This is evident from the hundreds of color variations offered in the market to meet growing consumer demand [22].

IV. ANATOMY OF LIPS

The upper lip sits between the base of the nose and the mouth opening. On either side, it is bordered by the nasolabial grooves, which run from the nose downwards and become more visible when smiling. A central vertical depression known as the philtrum extends from the nasal septum to the vermilion border, the distinct line separating the coloured lip from the surrounding facial skin. The lower lip lies above the labiomental groove, the crease that distinguishes the lip from the chin. Both lips meet at the corners of the mouth, known as the oral commissures, forming a continuous structure [31].

V. LAYER OF LIPS

Vermilion:

It is the reddish portion of the lip. It is lined with a specialized stratified squamous epithelium that continues seamlessly with the oral mucosa of the gingivolabial groove. The term vermilion is often used interchangeably with lips, which can sometimes cause confusion.

Vermilion border:

The vermilion border is the visible red portion of the lips where the skin transitions into the mucous membrane. Its red appearance comes from the abundant blood vessels near the surface and the thin skin covering this area.

Cupid’s bow:

The curved outline created by the vermilion border of the upper lip. When viewed from the front, this outline resembles an archer’s bow, sweeping upward and inward from the mouth corners towards the paired peaks situated at the bases of the philtral ridges (crista philtrae). Between these peaks lies a gently downward-curving segment the philtrum itself is the vertical midline groove of the upper lip, bordered on each side by these raised ridges.

Hard palate:

The hard palate forms the bony front two-thirds of the mouth’s roof and serves as a divider between the nasal and oral cavities. The transition point between the hard and soft palates can be identified by touch (palpation).
Soft palate (velum palatinum):

The soft palate forms the posterior one-third of the palate. It is a fibromuscular, flexible fold of tissues that hangs from the hard palate and serves as a divider between the nasal and oral cavities [1,2].

VI. TYPES OF LIPSTICK

Depending upon the thickness of cosmetic products, there can be many types such as lipsticks and liquid lipstick. By the number secondary functions lipsticks can be divided into:

1) Matte lipstick:

It provides a flat, non-shiny finish and tends to be long-lasting [33].

2) Cream lipstick:

Cream lipsticks are ideal for women with thin lips. Cream- based lipstick gives a smoothing effect on the lips but is not glossy. For the desired effect, you must apply lip gloss afterwards. In order to protect lips, cream lipsticks require more wax, which can result in dry lips [23].

3) Gloss lipstick:

This is very popular type of lipstick for women who have small and thin lips because gloss lipsticks give your lips a little shine and make them look a little

bigger. If you like, you can use regular lipstick underneath the lip gloss, which gives you the perfect mix of color and shine [21].

4) Stain \ Semi – Matte lipstick:

- Balanced finish – not too shiny, not too flat
- Smooth application with good moisture
- Popular for everyday use [18].

5) Sheer lipstick:

These sheer lipstick guarantee that lips are glossy & shiny while also moisturizing & nourishing them [5]

6) Lip stain:

It provides a long-lasting tint to the lips, giving a natural and stable appearance [33].

7) Pearl and frosted lipstick:

Lips that have been covered in frosting gleam and shimmer. Frosted and pearl lipsticks reflect light and give your lips an extremely glossy appearance [33].

8) Metallic lipstick:

Metallic lipstick is a lip color formula that contains reflective pigments to create a shiny, metal – like finish. It delivers bold, high – impact color with a shimmering effect that catches light. Often used for dramatic or glamorous looks, metallic lipsticks come in various shades from subtle nudes to vibrant, edgy tones [4].

9) Hydrating lipstick:

These are infused with moisturizing ingredients to keep lips hydrated, often with a satin finish [33].

10) Long wearing lipstick / Transfer – resistant:

Long-wearing lipstick may be used by women who lack the time to apply lipstick often. The composition of their lipsticks keeps lips looking flawless for four to eight hours. They're tough, & you'll soon be eating something fatty or greasy. To counteract the dryness of the lips, several of them include moisturizer [23].

11) Liquid lipstick:

- It comes in liquid form with an applicator wand.
- Dries down to matte or semi-matte finish.
- It has very long lasting and smudge- proof [18]

12) Lip crayon:

A pencil-like lipstick that is easy to apply and often provides a matte or satin finish [33].

13) Two – Toned Lipstick:

It features two complimentary shades in one bullet, creating a gradient or ombre effect [7].

14) Colour Changing Lipstick:

It reacts with the pH of your lips to create a custom color based on your skin's chemistry [33].

15) Velvet Lipstick:

Soft and smooth textured lipstick with in between cream and matte lipsticks, giving a finish that is neither too shiny nor too dry [33]

VII. IDEAL CHARACTERISTICS OF GOOD LIPSTICKS

The Ideal characteristics of the good lipsticks as follows:

- It should be safe and Non-irritating or Non-toxic to the lips.
- It should have a soft and smooth with shiny texture and provide a glossy finish without sweating.
- The product should possess a good shelf life.
- Its surface should remain free from any crystal formation and gritty particles.
- It needs to provide an even and consistent colour on application.
- It must withstand normal environmental condition without degradation.
- It should show good transfer resistance, so that colour stays on lips with minimal smudging onto objects.
- It should be versatile-easy to layer, blend or mix with other shades for different looks.
- The formulation needs to exhibit thixotropic behavior.
- The lipstick should have a pleasant smell, taste and overall flavor.
- It should be free from large particles.
- It should be no drooping or distortion of the lipstick on heat test of constant temperature of oven 130°F (54°C) [711,19].

VIII. ADVANTAGES OF THE LIPSTICKS

- Lipsticks help shield the lips from dryness and cracking.
- To enhance the shape of your lips and brighten smile when the right shade is chosen.
- They also help to protect the lips from sores and swellings.
- They give hydration due to ingredients like Vitamin E.
- Lipsticks are safe if made from natural ingredients [10,12,16].

IX. DISADVANTAGES OF THE LIPSTICKS

- They can trigger various skin allergies.
- Regular use of makeup can create a psychological dependence.
- May lead to accidental ingestion of chemicals.
- If lipstick contains heavy metals and lead, it causes various health issues [27,29].

X. SIDE EFFECTS OF LIPSTICK

- Heavy metals like chromium and cadmium in lipstick can damage the kidneys.
- Lead can affect nervous system, brain and causes hormonal imbalance and infertility.
- Preservatives like paraben in lipstick can increase carcinogenic risks.
- Using lipstick often can make you swallow more toxins [3].

XI. FORMULATION OF LIPSTICKS:[9]

The lipstick base is made by mixing the oils and waxes in varying proportions in order to obtain a desirable viscosity and melting point.

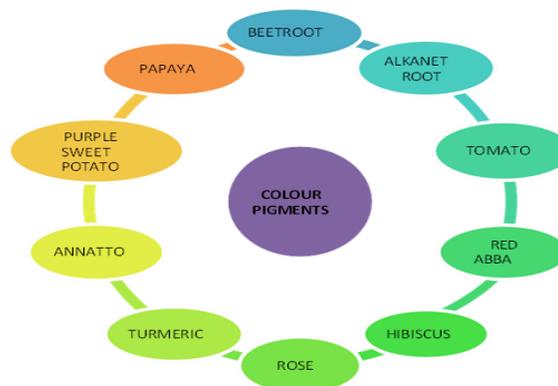
XII. COMPOSITION

The raw materials involved the formulation of the lipsticks could be as follows:

INGREDIENTS	EXAMPLE
The solid components /waxes: (a) The hydrocarbon waxes (b) The mineral waxes (c) Hard waxes (d) Micro crystalline waxes	White bees wax, Ozokerite wax, ceresine wax, carnauba wax, candelilla wax, hard paraffin
The liquid components	Mineral oils, vegetable oils, castor oils, butyl stearate, glycol, water, silicon-fluids, IPM (isopropyl maleate)
The softening components	Anhydrous lanoline, lanoline cocoa butter, lecithin, petrolatum
The colouring agents	Carmines, dyestuff stain, pigmented stain, lakes etc.
Pearlescent pigments	Guanine crystals, bismuth oxychloride
Opacifying agents	Titanium dioxide

Perfumeries	Rose oil, cinnamon oil, lavender oil etc.
Miscellaneous agents: (a) Preservatives (b) Antioxidants (c) Flavouring agents	Parabens BHA, BHT, Tocopherol etc. Cinnamoniol, spearmint oil etc.

XIII. DIFFERENT NATURAL PIGMENTS USED IN LIPSTICK:



XIV. EXTRACTION PROCEDURE OF VARIOUS COLOUR PIGMENTS

Extraction procedure of colour pigment from Beetroot:

The beetroot was peeled and cut into uniformly thin slices. The slices were spread on butter paper, covered with a fine mesh, and left to shade-dry for one day. Any remaining moisture was removed by drying the slices in an oven. The dried beetroot was then ground into a fine powder and passed through a fine sieve. The powder was checked for any coarse particles and re-sieved if necessary. Finally, the required quantity of the powdered material was weighed and packed [20]

Extraction of colour pigment from Alkanet root:

The extraction of red pigment from alkanet root is done by maceration extraction technique. Since the alkanet root is insoluble in water the extraction is done by using oil as an extraction medium. The various oils used for the extraction technique is coconut oil, castor oil, olive oil, almond oil. The alkanet root is infused in oil and is kept macerated for one week to obtain a dark red color pigment. The obtained red pigment which is infused in oil is then filtered using a lint cloth and funnel since the viscosity of oil differs filter paper is not used. The infused alkanet root oil which produced

a red pigment can be used in formulation of herbal lipstick as it is soluble in oil [8]

Extraction of colour pigment from Tomato:

Approximately 100g of tomato paste was placed in a beaker, and 30ml of benzene pre-warmed to 40°C was added. The mixture was stirred, and the benzene layer was decanted. This extraction process was repeated five times. The combined benzene extracts were then distilled to obtain the lycopene extract. For identification, a few crystals of the extracted lycopene were added to concentrated sulfuric acid, and the resulting colour change was observed. The appearance of an indigo-blue colour confirms the presence of lycopene.

Extraction of colour pigment from red cabbage:

Pigment extraction was carried out by homogenizing the fruit pulp with solvent in a 1:1 (w/v) ratio. A 100g portion of the watery sample was macerated with 100ml of solvent (ethanol or 50:50 aqueous ethanol) for 15 minutes in a water bath. The mixture was then centrifuged at 18,000 rpm for 20 minutes at 4°C and immediately filtered through a nylon mesh. The filtrate was concentrated using a rotary evaporator under vacuum at 35°C until the volume was reduced to 3-4ml, ensuring complete removal of alcohol. The final extract was stored in a dark container [14].

Extraction of colour pigment from Hibiscus:

The shade-dried, coarsely powdered hibiscus flower petals were extracted with ethanol at 60°C using a centrifugation method. Upon completion, the hot extract was filtered to remove any impurities. A reddish-colored extract was obtained, which was then stored in an air-tight container [30].

Extraction of colour pigment from Rose:

The shade-dried, coarsely powdered flower petals of *Rosa rubiginosa* (100g each) were macerated separately for 7 days. After extraction, the mixtures were filtered through Whatman No.10 filter paper to remove any impurities. The filtrates were then concentrated by vacuum distillation to reduce the volume and further evaporated on a water bath. A dark reddish extract was obtained. The concentrated extract was placed in a desiccator to eliminate excess moisture, and the dried extract was stored in an airtight glass container for further analysis [17].

Extraction of colour pigment from Turmeric:

First, the turmeric was washed and cut into small slices (approximately 1 mm). The slices were then dried at 50°C to remove moisture and subsequently ground into a fine powder. The turmeric powder was dissolved in 95% ethanol and heated in a water bath at 50°C for 1 hour. The mixture was then filtered, and the filtrate was concentrated using a rotary evaporator at 90°C to remove excess ethanol. The resulting curcumin extract was collected and stored for further use [15].

Extraction of colour pigment from annatto seed:

The shade dried coarsely powdered seeds of *Bixa Orellana* (150 gm) were extract with Methanol (60-80°C) for 18 hrs. After completion of extraction, the defatted extract was filtered while hot through Whatman filter paper (No.10) to remove any impurities if present. The extract was concentrated by vacuum distillation to reduce the volume to 1/10; the concentrated extract was transferred to 100ml beaker and the remaining solvent was evaporated on a water bath. Dark reddish coloured extract was obtained. The concentrated extract was then kept in desiccators to remove the excessive moisture. The dried extract was packed in air tight glass container for further studies.

Extraction of colour pigment from Purple sweet potato:

Purple sweet potato (*Ipomoea batatas* (L.) Lam) was washed, cut into 3-5mm cubes, and dried in a microwave at 400W for 30 minutes. The dried pieces were then ground into powder and stored in a black bottle at room temperature. For the extraction study, 15g of the powder was placed in a two-neck round-bottom flask and extracted using water-ethanol mixtures with a liquid-to-solid ratio of 4:1 to 7:1 (ml/g). The extraction was carried out at 40-70°C for 40-70 minutes. After extraction, the mixture was centrifuged at 4000 rpm for 15 minutes using high-speed centrifuge. The supernatant was collected, filtered, and stored in a plastic bottle for further analysis [32].

Extraction of colour pigment from papaya:

100gms of papaya paste were weighed and mixed with 125ml of acetone, then allowed to stand for 3-4 minutes to facilitate water removal. The mixture was filtered through Whatman filter paper, and the filtrate was collected. The residue was further dehydrated by

additional filtration using filter paper. Next, 125ml of petroleum ether and a small amount of magnesium sulphate were added to the filtrate, and the mixture was stirred thoroughly for 3-4 minutes. It was then filtered again using Whatman filter paper. The resulting filtrate containing lycopene was collected and left to evaporate. The dried extract was finally reconstituted using a petroleum ether and acetone mixture in a 9:1 ratio [20].

XV. GENERAL MANUFACTURING PROCEDURE:

They involve three steps:

First the raw materials like solvents, oils and waxy material are melted in separate stainless-steel container.

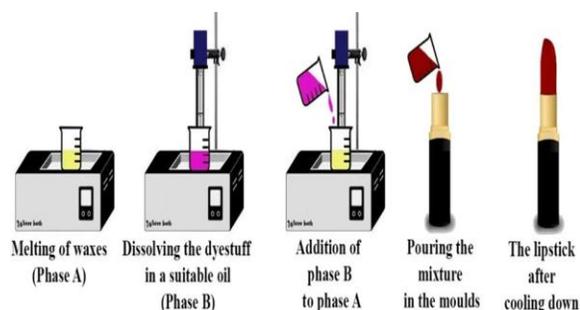
The solvents and oils are mixed with color pigments. Then the mixture is passed through roller mill grinding the pigments to avoid grainy feel in lipsticks. After the pigment mass is grounded and mixed it and added to hot wax until uniform color and consistency is obtained.

Once the lipstick mass is mixed and free of air, it is ready to be poured in tubes.

The melted mass is dispensed into a mold, which consists of bottom portion of metal and a shaping tube. Lipstick is poured upside down so that bottom of tube is at top of mold. Any excess material is scrapped out. The lipstick is cooled and separated from mold and bottom of tube is sealed.

The lipstick is passed through flaming test to seal the pinholes and to give finish to the product.

The lipstick is retracted and tube is capped. The lipstick is ready for labeling and packaging [20,27]



XVI. EVALUATION PARAMETERS

It is very essential to maintain a uniform standard for herbal, keeping this view in mind the formulated herbal lipsticks were evaluated on the parameters such as melting point, breaking point, force of application, surface anomalies etc.

1) Colour And Texture:

Formulated lipsticks were checked for colour, glossy and smooth texture.

2) pH:

The pH of formulated herbal lipstick was determined using digital pH meter [28].

3) Solubility Test:

The formulated herbal lipstick was dissolved in various solvents to observe the solubility [24].

4) Melting Point:

Determination of melting point is important as it is an indicator of the limit of safe storage. The melting point of formulated lipstick was determined by capillary tube method. The capillary tube was filled and kept in the capillary apparatus and firstly observed the product was slowly-slowly melted. After sometimes it was observed that the product was completely melted. The above procedure was done in 3 times and the melting point ratio was observed in different-different formulation.

5) Breaking Point:

Breaking point is done to determine the strength of lipstick. The lipstick is held horizontally in a socket 1/2 inch away from the edge of support. The weight is gradually increased by a specific value (10gm) at specific interval of 30secs and weight at which breaks is considered as the breaking point[26].

6) Softening Point:

The softening point test was performed by inserting the lipstick sample into an aluminium ring, and extra mass above and below was removed. The ring containing the sample was placed in the refrigerator at 6°C for 10 minutes. After removal, the ring was fastened into a stand and dipped into a beaker filled with water. The whole assembly was heated with continuous stirring and the softening point was recorded as the temperature at which the lipstick mass loosened and fell into the beaker [6].

7) Force Of Application:

It is the test for comparative measurement of the force to be applied for application. A piece of coarse brown paper kept on a shadow graph balance and lipstick was

applied at 45° angle to cover 1sq inch area until fully covered. The pressure reading is an indication of force of application.

8) Aging Stability:

The products were stored in 40°C for 1 hr. various parameters such as bleeding, crystallization on surface and ease of application were observed [8].

9) Surface Anomalies:

This is studied to determine the surface defects such as the formation of crystals on the surface, contamination by moulds, fungi, and others. There are no defects of surface anomalies for marketed lipstick formulation [25].

10) Thixotropy Character:

It is indication of thixotropic quality and is done by using penetrometer. A standard needle of specific diameter is allowed to penetrate for 5secs under a 50gm load at 25°C. The depth of penetration is a measurement of the thixotropic structure of lipstick [26].

11) Skin Irritation:

The formulated natural lipstick will be applied on the skin for 10 minutes which is to see either it is suitable for use by the consumer. For standard value and marketed lipstick formulation value due to this test did not have the skin irritation [25].

XVII. CONCLUSION

Lipstick is a popular cosmetic, but many commercial products contain chemicals that may be harmful when used regularly. Herbal lipsticks made from natural ingredients and plant-based colours offer a safer and healthier alternative. Natural pigments like beetroot, hibiscus, carrot, and purple sweet potato can give good colour while also being gentle on the lips. With proper formulation and testing, herbal lipsticks can provide good texture, stability, and appearance. Overall, natural lipsticks are a better choice for people who want safe, effective, and eco-friendly cosmetic products.

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