

FORMULATION AND EVALUATION OF HERBAL LIPSTICK USING *BETA VULGARIS* AND *LAWSONIA INERMIS* AS NATURAL COLORANTS

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Cite this article in APA

Obat, R., & Bosire, C. (2022). Formulation and evaluation of herbal lipstick using *Beta vulgaris* and *Lawsonia inermis* as natural colorants. *Journal of physical and applied sciences*, 1(1), 28-37.
<https://doi.org/10.51317/jpas.v2i1.233>



A publication of Edition Consortium Publishing (online)

Article history

Received: 24.07.2022

Accepted: 26.08.2022

Published: 31.08.2022

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Abstract

This study sought to formulate and evaluate herbal lipstick using *Beta vulgaris* and *Lawsonia inermis* as natural colorants. Lipsticks contribute to 60 per cent of the world's commonly used cosmetics to enhance appearance, emblem a woman's strength, power, and ambition and give the first impression. However, 75 per cent of available lipsticks are made up of synthetic excipients, including colorants that pose health hazards and safety concerns; hence need to use natural excipients that are safe and readily available. A moulding process successfully formulated the herbal lipstick. The formulated lipstick had uniform dark red colour, with a good force of application and spread ability. It had a melting point of 60 degrees Celcius and a breaking point of 55. The project was an experimental based study and analytical in nature. The area of study was in the Pharmacognosy lab from the initial steps of extraction. Formulation and evaluation of the lipstick samples were done in the Pharmaceutics laboratory. The study concluded that Herbal excipients are safe and readily available and hence should be exploited in the formulation of cosmetic products. This study recommends further evaluation of lipstick for safety and efficacy. In addition, the stability of the formulated lipstick under different storage conditions should be performed.

Key terms: Herbal lipstick, *Beta vulgaris* *Lawsonia inermis* colorant.

1.0 INTRODUCTION

Cosmetics have been described as products “supposed to be rubbed, poured, sprinkled, or sprayed on or implemented to the human frame or any element thereof for cleansing, beautifying, selling attractiveness, or changing the appearance” (Justice, 2021). Lipsticks are a category of cosmetics, which are waxy and tinted with different pigments used to colour lips. Both beauty and therapeutic benefits can be achieved by using lipstick since current lip care not only focuses on the aesthetic significance of lipsticks but also on the medicinal aspect of offering protection against bacterial lip infections. The market holds a great percentage of lipstick because of increased consumption. Lipsticks exist as synthetic and herbal.

Synthetic lipsticks contain harmful products harmful to the consumer. The pigments used contain heavy metals, and for instance, lead is used in lipsticks to maintain the colour intensity of the dyes or pigments used. These products end up causing lip irritation, lip allergies, chapped lips, lip oedema, lip leukoderma and, in severe instances, cancer. Due to synthetic lipsticks' harmful and neurotoxic nature, the recent use of herbs in the production of lipsticks is on the rise. Natural (herbal) cosmetics are now a modern trend encompassing both beauty and health (Mahanthesh et al., 2020). Natural products have been discovered to portray fewer side effects, supply the body with nutrients and enhance the health of individuals. The main elements in this study will be the plant *Beta vulgaris*, known as beetroot, and *Lawsonia inermis*, known as henna. For centuries they have been used both as food in the everyday diet and as a colorant with beetroot known as E162 (Zielinska-Przyjemska et al., 2009). Also, they have proven benefits such as controlling hypertension, dementia, atherosclerosis and diabetes. They also have good anti-inflammatory effects.

Lipstick is 60 per cent of the cosmetic product. It enhances appearance, gives a sense of well-being and gives the first impression). There are 75 per cent of lipsticks which are available as synthetic. These synthetic lipsticks pose a great health concern, including side effects such as lip edema, cancer, lip discolouration and acne (Angeli & Marinova, 2013); hence, need for alternatives, i.e. natural lipstick made of natural products such as herbal extracts such as *Aloe vera*, *Beta vulgaris*, *Lawsonia inermis* that are safer with no side effects, have good colouring properties, anti-inflammatory, antioxidant and preservative properties.

2.0 LITERATURE REVIEW

Cosmetics have been used for centuries; it predates its documentation. It all traces back to Egyptians who honoured their beautification and utilised makeup for grooming and neatness (Chaudhri & Jain, 2009). Cosmetics, as initially mentioned, are products “supposed to be rubbed, poured, sprinkled, or sprayed on or implemented to the human frame or any element thereof for cleansing, beautifying, selling attractiveness, or changing the appearance” (Justice et al., 2021). The uses range from enhancing attractiveness to seduction, intimidation and concealing signs of ageing (Parish & Crissey, 1988). They exist as skin care creams, lipsticks, toothpaste, deodorants, eye and face makeup, nail polish sprays, and lotions, just to mention a few. Cosmetics have become part of an everyday routine, and their use has significantly increased from decade to decade. Developing trends when it comes to cosmetics are tracing back their roots to herbal ingredients largely for the production of different cosmetics where extracts of various plants are now being incorporated into cosmetics (Chaudhri & Jain, 2009).

In this modern time and age, lipstick has diversified to moisturising, glossy, matte, sheer, satin, frosted, and pearl, just to mention but a few (Schaffer, 2007). The characteristic sign of lipsticks is mainly their colour,

which is a result of the pigmentation drawn from minerals or organics, for instance, from lead, cadmium, chromium, cobalt, and nickel, among others (Resano & García-Ruiz, 2010; Volpe et al., 2012). Lipsticks that contain dyes are obtained from lead (Al-Saleh & Sundararaj, 2009; USFDA, 2013). (Volpe et al., 2012), suggests that the metallic properties in these lipsticks could also be attributable to their process of manufacture by the machines used.

Lipsticks present in the market sometimes contain the heavy metals mentioned above, which are harmful to consumers in the long run. The average woman is said to ingest up to 4.5 pounds of lipstick in a lifetime since wearing lipstick; there are possibilities of licking, drinking or eating the lipstick (Charitra, 2012; Patel, 2016); hence accumulation of heavy metals in the body. Lead accumulation causes disorders of the central nervous system, reproductive system (infertility and miscarriage), hepatic and renal system, and decreased learning and hearing. (Faghihian et al., 2012; Volpe et al., 2012). Furthermore, cadmium is associated with atherosclerosis, hypertension, and cardiovascular diseases (Angeli & Marinova, 2013). In addition, cadmium and lead are carcinogenic in nature (WHO, 2004).

Due to insufficient regulatory oversight, history has repeatedly shown that unscrupulous individuals or mischievous companies exploit the vulnerable public for profit despite the burning of heavy metal use in cosmetics (Califf, 2017). Due to the harmful effects of synthetic lipsticks, there has been a developing interest in herbal ingredients for the formulation of new products, which are less harmful. Therefore, the formulation and evaluation of herbal lipsticks have appreciated other natural ingredients like beeswax, lemon juice, peppermint oil, castor oil, olive oil, almond oil, coconut oil, aloe vera, beetroot etc.

Herbal plants have played a vital role in the manufacture of cosmetics in the market because they are easily available, biocompatible, biodegradable, eco-friendly and safe on application during makeup, skincare routines, hair care and are effective stabilisers and modifiers (Klein & Poverenov, 2020) (Patil & Ferritto, 2013). Herbal lipstick formulations have been shown to exhibit fewer side effects subsequent to a study.

According to a study by Swati and his colleagues that was conducted in 2013, Beta vulgaris and Bixa Orellana, lipstick formulations had no evidence of side effects. The formulation also had excellent spreading, shining and smoothness of the lip (Swati et al., 2013). Another similar study by Sunil on the formulation and evaluation of herbal lipsticks also supported the idea of minimal side effects when it came to natural products as compared to synthetic lipsticks (Sunil et al., 2013). The common ingredients in lipsticks include oils, waxes and lemon juice.

Beeswax is one of the regularly used waxes in the formulation of lipsticks. It is a natural component obtained from bees and has numerous uses in the cosmetic industry. It has natural constituents that exhibit properties such as helping retain moisture in the skin, making it helpful for chapped lips and dry lips. In addition, according to a study done by (Fratini et al., 2016), beeswax was seen to portray antibacterial activity and was seen to be helpful in subsiding inflammatory pain. Another study suggested that Beeswax is rich in Vitamin A and aids in protecting the skin against UV radiation, improves wound healing, stimulates skin cell turnover and reduces wrinkles (Gendrolis & Ziukiene, 2013).

Oils from plants like *Olea europaea* and *Ricinus communis* are also of natural origin and are known to influence the sensory characteristics of the formulation products. Their biological properties are seen to be

essential in lipsticks as they promote moisturized lips and elasticity and provide a protective barrier to free radicals. They also exhibit medicinal properties such as immunomodulatory, antioxidant, and anti-inflammatory medicinal effects in line with the scientific evidence (Upadhyay et al., 2010; Suryakumar & Gupta, 2011; Ignea et al., 2013).

Lemon juice serves as an antioxidant among the ingredients because of the presence of vitamin C and flavonoids. According to recent studies, their commercial use has been shown to extend the shelf life of the products in cosmetics (Lupo, 2001). Vitamin E is also known as Tocopherol. It is naturally an antioxidant that extends the stability of cosmetic products. The essential oil of interest in the formulation was peppermint oil. Essential oils are normally obtained from water or solvent extraction or through distillation (Dreger & Wielgus, 2013). They show significant antibacterial activity and inhibit the growth of fungi (Bakkali et al., 2008). The fragrance is an essential part of cosmetics. A significant number of essential oils possess an aroma, which can also be useful as essence and are beneficial in aromatherapy. There are different flavours, from floral to woody to fruity. These aromas are classified according to their degree of volatility. The essence of interest in this case scenario was vanilla essence, which has a subtle fragrance.

Beta vulgaris is obtained from the Chenopodiaceae family; rich in phenols such as caffeic epicatechin, ferulic, catechin, p-hydroxybenzoic, p-coumaric, vanillic, protocatechuic, and syringic acids, and other active compounds such as flavonoids, carotenoids, folates, and betalains (betacyanins and betaxanthins). (Vulić et al., 2014; Kujala et al., 2000; Kujala et al., 2001; Ceclu & Oana-Viorela., 2020). The plant is also known to exhibit very prominent properties such as anti-inflammatory, antioxidant, antimicrobial, hepatoprotective, hypoglycemic and hypolipidemic with antitumor properties (Melgar & Hayes., 2017; Faridah et al., 2015).

Lawsonia inermis, as mentioned earlier, is locally known as henna or pico by other communities. Since ancient times henna has been used in culture as skin decoration or hair dyes. The powdered leaves historically have been used as hair dye and for temporary skin staining. Its cultivation poses interest not only on the leaves but also in the roots, flowers, seeds and bark for interests ventured into traditional medicine for the treatment of various illnesses (Chaudhary et al., 2010; Borade et al., 2011; Semwal et al., 2014; Bhagwat et al., 2017). Every part of the plant exhibits medicinal value (Chaudhary et al., 2010). It has portrayed medicinal value in headaches, diabetes, rheumatoid arthritis, fever, heart diseases, diarrhoea and ulcers (Chaudhary et al., 2010; Semwal et al., 2014; Jayaweera, 1981; Reddy et al., 1988).

Subsequent to exposure to the internet, especially during the corona period, some Tiktokers and YouTubers, on occasional TikTok challenges, have also shown that henna can be used as a lip colorant, which drew interest towards the idea relevant to this research. For decades, herbal lipsticks have been formulated from different plants with different colouring properties. According to (Kothari et al., 2018), herbal lipsticks can be formulated from edibles with colouring properties like turmeric powder, cinnamon powder and cocoa powder. According to another study by (Bhagwat et al., 2017), lycopene from *Solanum Lycopersicon* was used as a coloring agent to formulate herbal lipstick. (Juma'at et al., 2021) has a paper focusing on the evaluation of herbal lipstick and its benefits in use, from its production to the skin irritation test to the state of stability of the lipstick.

3.0 METHODOLOGY

Selected methods were adopted within the course of the study, and herb selection was in regard to (Dwivedi et al., 2009) for formulation in the latter stages. A taxonomist did collect and authenticated the herbs in the Pharmacognosy laboratory. The project was an experimental based study, analytical in nature, and the study period was from September 2021 to June 2022. The area of study was in the Pharmacognosy lab from the initial steps of extraction. Formulation and evaluation of the lipstick samples were done in the Pharmaceutics laboratory. Spatulas, filter papers, metallic plate, mixer, fridge, lipstick holders, beakers, cold water bath, centrifuge, weighing scale, heat plate and oven.

Table1: Ingredients with their Required Quantity and Uses in the Formulation of Herbal Lipstick

S/ No.	Ingredients	Quantity (gm.)	Importance
1.	Olive oil	25	Blending properties
1.	Castor oil	5	Blending properties
1.	Almond oil	2	Blending properties
1.	Coconut oil	10	Glossy and hardness
1.	Beeswax	7.5	Glossy and hardness
1.	Juice of <i>Beta vulgaris</i>	26.60	Colouring agent
1.	Mix of <i>Lawsonia inermis</i>	26.60	Colouring agent
1.	Peppermint essence	q.s.	Perfume
1.	Honey	q.s.	Preservative
1.	Glycerin	q.s	Humectant

1.	Lemon juice	q.s	Antioxidant
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Procedure for Extraction, Formulation, and Evaluation

Extraction of Colorant by Cold Infusion

For *Lawsonia inermis*, we ground 26.60g into powder and placed it into a test tube. Then added 200ml of cold water to it and subjected to centrifugation using a centrifuge for 15 min. then, strained it with a sieve. For *Beta Vulgaris*, we used a blade to chop it into small pieces. Then placed it in a blender, added 100ml of cold water, blended it for 15 min to obtain the juice, and then strained it with a sieve.

In this study, the lipstick was formulated using natural ingredients according to the (Mittal & Saha, 2003; Jain & Sharma, 2005) procedural method. The lipsticks were prepared in the pharmaceuticals laboratory through the moulding method. First, beeswax was added to the preheated oils mixture mixed together at temperatures ranging from 60-70 degrees up to melting. Then added, extracted henna and bee wax and stirred until the mixture was uniform. Next, the essence was added to the mixture, and a preservative was then cooled in the refrigerator after pouring it into individual packaging containers.

Evaluation

Organoleptic Properties

Colour uniformity, texture and odour were visually determined.

Surface Anomalies

This test was intended to observe any surface defects, moulds or fungi or any form of crystallization. It was visually examined.

Spreadability

The formulated lipstick was applied on a glass slide, and on application, deformation and fragmentation were observed, comparing it to the standard formulation.

Force of Application

At an angle of 45 degrees, the lipstick firmness was determined by applying it to a piece of paper; the pressure used on the application was the one to determine the force of the application.

PH Parameters

The pH was determined using a pH meter.

Aging stability

This parameter was observed by leaving it at normal room temperature and exposing it to 40° C for a period of one month.

Skin irritation

This parameter was determined by applying the lipstick on the lips for 10 minutes.

Solubility

A portion of the formulated lipstick was placed in water and ethanol.

Perfume Stability

This parameter was evaluated by leaving the samples at room temperature for one month to confirm the presence or absence of fragrance.

Data presentation

We used pictures and tables.

4.0 RESULTS AND DISCUSSION

Extraction of *Lawsonia inermis* and *Beta vulgaris*



Figure 1: *Beta vulgaris* and *Lawsonia inermis* Cold Infusion Extracts

Formulation of Herbal Lipstick using *Lawsonia inermis* and *Beta vulgaris* Extract



Figure 2: Formulated Herbal Lipstick

Determination of the Colour, Surface Abnormalities, Spreadability, Force of Application, pH, Solubility and Stability of Formulated Herbal Lipstick

Table 2: Evaluated Parameters

EVALUATION PARAMETER	INFERENCE
Colour	Dark Red
Force of application	Good
Spreadability	Good
Surface anomalies	No defect
Melting point	60° C
Breaking point	55

PH parameter	6.0 ± 0.5
Ageing stabilities	Smooth
skin irritation	None

Cosmetics with natural ingredients are believed to be safer than chemical based cosmetics. Beetroot and henna apart from being good coloring agents, they offer advantages in terms of UV protection, anti-inflammatory, anti-cancerous and anti-oxidant effect. Beetroot extracted provide red color for formulation while henna provides brown color hence when blended together and used in formulation they give dark-red color. Betanine is the main red color in beetroot. Lawsone in henna gives it the principle color. The composition of the lipstick including oils, beeswax, honey, glycerin and juice was to enable us formulate better quality of lipstick. The lipstick was formulated as per general method of formulating lipstick. The physiochemical parameters evaluated fell within the normal satisfactory ideal requirement in terms hardness, melting point, spreadability, shine, pH, skin irritation, ageing ability, breaking point and solubility.

5.0 CONCLUSIONS AND RECOMMENDATION

Conclusions: Herbal excipients are safe and readily available and hence should be exploited in the formulation of cosmetic products. In addition, herbal products offer more health benefits because of their good anti-inflammatory properties, and antihypertensive etc. hence should be recommended for use in cosmetic products.

Recommendation: Further evaluation of lipstick for safety and efficacy should be done. In addition, the stability of the formulated lipstick under different storage conditions should be performed.

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