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DEVELOPMENT AND ASSESSMENT OF A LIPSTICK UTILISING HYLOCEREUSPOLYRHIZUS (RED DRAGON FRUIT) BETACYANIN AND ANTHOCYANIN PIGMENT

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ABSTRACT

The most popular cosmetic product is lipstick. According to research findings, the administration of different antioxidants may be able to prevent the harmful effects of lead and the production of oxidative stress. Red dragon fruit, or Hylocereuspolyrhizus, is commonly accessible in Myanmar and contains betacyanin and anthocyanin pigment, an antioxidant amaranth colorant. It is appropriate as a natural lipstick colorant. The goal of this research, in the capacity of a pharmacist, was to reduce the harmful effects of lipsticks by creating a natural lipstick that included various natural components and betacyanin pigment derived from H. polyrhizus. Lipstick was created by heating and combining ingredients in a homogenizer running at 12,000 rpm. Subsequently, the following parameters were assessed for quality: pH, melting point, surface irregularities, aging stability, scent stability, and antioxidant activity. As part of the safety examination, microbiological analysis, skin irritation testing, and lead content measurement were performed. Lipstick formulas using H. polyrhizusbetacyanin pigment are of a satisfactory caliber. The IC50 values for designed lipstick and standard ascorbic acid were 22.23 µg/ml and 4.51 µg/ml, respectively. In qualitative analysis, Staphylococcus aureus, E. coli, and Pseudomonas aeruginosa were not found in 0.5 g of formed lipsticks, and in quantitative analysis for microbiological control, there was no apparent colony in the lipstick. Additionally, the designed lipstick exhibited very little skin irritation and a lead content of only 2.9 ppm, which is within the permitted range. Consequently, lipstick containing H. polyrhizusbetacyanin pigment can be used as cosmeceutical.

I. INTRODUCTION

Cosmetics word is derived from the Greek word “Kosmtikos” which means the power, Organization and skill in beautifying.

The word cosmetics is defined As per Drug and cosmetic Act (Indian Act) Cosmetic means any article Intended to be rubbed, poured, sprinkled, spread all or introduced into, or otherwiseapplicated to human body or other any apart they’re of for cleaning. Beautifying ,promoting, Attractiveness, Appearnes and include Intended for use of a component of cosmetics.[1]

Herbal lipstick define Lipstick is a cosmetic product containing pigments, oils, waxes, and emollients that applies colour and texture to the lips. It is most widely used cosmetic item by the women to give an attractive colour and appearance to the lips. There are many varieties of lipstick. Lippy is a common British word for lipstick.[2]

Ideal characteristics of herbal lipstick

- It is non-toxic and non-irritating.
- It is smooth and easy to apply.
- It has the necessary plasticity, distinct colour, texture, and packaging, among other qualities.
- It has a stable shelf life and doesn’t bloom or sweat while being stored as lipstick.
- It shouldn’t be contaminated. It needs to be long-lasting and free of coarse particles.
- It must not melt or solidify within an acceptable range of temperature fluctuations in the climate.[3][4]

Benefits of herbal lipstick

- Safe to use.
- Natural in nature.
- Affordable and non-expensive.

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- Variety of products.
- No side effects.
- Not tested on animals.
- Free from hazardous chemicals.

BOTONICAL CLASSIFICATION

- Kingdom: Plantae
- Division : Magnoliophyta
- Class : Liliopsida
- Subclass : Lillidae
- Order : Lillidae
- Family : Lillidae
- Genus : Hylocereus
- Species : Hylocereus[5]

Parts of selected plant

Fruit: (Dragon fruit)

1. Peel of the dragon fruit
2. Pulp of the dragon fruit

Biological source

The dragon fruit comes from the cactus genus Hylocereus. It's also known as "pitaya" if it comes from the closely related Stenographers genus.

There are three types of sweet pitaya, each with a different color skin and flesh:

Selenicereus undatus

Also known as Pitaya blanca or white-fleshed pitaya, this type has pink skin and white flesh. It's the most common type of dragon fruit.

Selenicereus costaricensis

Also known as Pitaya roja or red-fleshed pitaya, this type has red skin and red flesh.

Selenicereus megalanthus

Also known as Pitaya amarilla or yellow pitaya, this type has yellow skin and white flesh.

Dragon fruit is native to Mexico, Central America, and South America. It may have been introduced to Southeast Asian countries through Vietnam during the 1800s as a result of trade with the French. It's an important part of the diet in Cambodia, Thailand, Taiwan, Vietnam, and the Philippines.

Phytoconstituents

Table 1.1:

	Phytochemical compound	Varities (S)	Method	Reference
Pulp and peel	Betacynin ,phenolics,flavonoids	H.polyrhizus	Colour test followed by UV Vis	Ramli et al. (2014b)
Pulp	Carbohydrates, proteins and amino acids, alkaloids, terpenoids, steroids, glycosides, flavonoids, tannins, and phenolic compounds, saponins, oils	H.undatus	NA	Kanchana et al. (2018)
Fruit	Glycosides, alkaloids, saponins, phenolic compounds, tannins, flavonoids, proteins, steroids	H. undatus	Colour test	Mahdi et al. (2018)
Peel	13 phenolic compounds: quinic acid, cinnamic acid, quinic acid isomer, 3,4-	H. polyrhizus	UHPLC-ESI-QTRAP-MSMS	Zain et al. (2019)

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	dihydroxyvinylbenzene, isorhamnetin 3-O-rutinoside, myricetin rhamnohexoside, 3,30-di-O-methyl ellagic acid, isorhamnetin aglycone monomer, apigenin, jasmonic acid, oxpoctadecanoic acid, 2 (3,4-dihydroxyphenyl)-7-hydroxy-5-benzene propanoic acid and protocatechuic hexoside conjugate			
Pulp and Peel	Seven betacyanin compounds in pulp and 10 betacyanins in peel with betanin, phyllocactin, and hylocerenin as major compounds found in fruit peel of H. ocamponis. Pigments 1-10 of betacyanin profiles in H. ocamponis fruit peel of revealed, including: betanidin 5-0-B-sophoroside, betanin, 2-Apiosyl-betanin, phyllocactin, 4'-Malonyl-betanin, hylocerenin, 2-Apiosyl-phyllocactin, 5"-O-E-Feruloyl-2'-apiosyl-betanin, 5"-O-E-Sinapoyl-2-apiosyl-betanin, and 5"-O-E-Feruloyl-2'-apiosyl-phyllocactin.	H. ocamponis, H. undatus, H. purpusii, H. costaricensis x H. polyrhizus, and H. undatus x H. polyrhizus	HPLC	Wybraniec et al. (2007)
Pulp	Four different types of carotenoids: two xanthophylls (lutein, B-cryptoxanthin), and two carotenes (lycopene, ß-carotene); vitamin A	H. undatus	colour test followed by UV vis	Moo-Huchin et al. (2017
Pulp and Peel	Phenolics, flavonoids, betacyanins.	H. polyrhizus	colour test followed by UV vis	Wu et al. (2006)
Pulp and Stem	Phenolics	H. undatus	colour test followed by UV vis	Som et al. (2019)
Pulp and Pulp	Phenolics	H. undatus and H. polyrhizus	colour test followed by UV vis	Nurliyana et al. (2010)

Adverse effect

Headache

Stomach upset

Allergic reaction

Vision changes such as blurred vision

Fig 1.1:

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Objective

This study's main goal is to create and assess a lipstick that uses H. polyrhizusbetacyanin pigment. The study's precise goals were as follows:

1. To remove H. polyrhizus'sbetacyanin pigment
2. To recognise and measure the pigment betacyanin
3. To create the lipstick using H. polyrhizus'sbetacyanin pigment.
4. To assess the safety and quality of lipstick containing betacyanin pigment.

II. METHODOLOGY

1. **Initial Steps in the Formulation of Lipsticks**

- **Extraction of Betacyanin Pigment from H. polyrhizus:** Patheingyi Township produced mature H. polyrhizus, which was then verified. Following the authenticating procedure, the gathered fruits were cleaned and peeled using a ceramic knife to prevent the fruit's acidic compound from rubbing against the steel or metal knife. Afterwards, the fruit pulp was manually crushed and divided into tiny bits. After three days of cold maceration with 50% ethanol, the betacyanin pigment was extracted. After that, the extract was produced by muslin double filtering. The extract was concentrated using a freeze-drier, and the concentrated solution was then kept for later use in a refrigerator (4˚C).

Fig 2.1:

- **Extraction of Anthocyanin pigment from H.polyrhizus**

Grab some fruit that has been cleaned. Used a knife to remove the peel in order to prevent the fruit's acidic chemicals from interacting. Remove the dragon fruit's peel and properly dry it. The dragan fruit's dried peels correctly crush it. Fruit peel powder from dragan is combined with a 50% ethanol solvent at a ratio of 1:10 and macerated for a whole day in the dark. To create a liquid extract, the products are filtered and evaporated using a rotating vacuum evaporator.

Fig 2.2:

- **Betacyanin Extract Identification and Quantification**

The extracts betacyanin level was ascertained using a UV-Visible Spectrophotometer. Three measurements of the betancyanin content were made in deionised water. The absorption value was obtained by diluting the extract 100 times with deionised water. Following a 20-minute equilibration period, the following equation was used to quantify betacyanin.[6]

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BC=A×DF×MW×1000/ε ×L

BC = Betacyanin concentration in mg/L

A = Absorption value at the absorption maximum (λmax= 536nm)

DF = Dilution factor

MW = Molecular weight of betacyanin (550 g/mol)

Ɛ (Molar extinction coefficient of betacyanin (60,000 L·mol−1·cm−1 in H2O)

L = Path length of the cuvette

- **Identification and Incompatibility Pre-Formulation** By scanning each ingredient using an FT-IR spectrophotometer and comparing the resulting spectra to the reference spectrum of each ingredient, each chemical utilised in the formulation of the lipstick was identified. The acquired spectra were stored for a study of incompatibility. Prior to the primary formulation of the lipstick, an incompatibility study was conducted using an FT-IR spectrophotometer to scan the pre-formulated lipsticks. The incompatibility was then verified by comparing the final spectrum with the original spectrum of each ingredient.

2. **Creating Lipsticks with Pigments Betacyanin** The recipe used to manufacture lipsticks (Red Lipstick) was taken from Cosmetic Chemistry. Formulation table provided a thorough description of each ingredient and its quantity. The composition of the lipsticks was executed in compliance with Good Laboratory Practice (GLP). A computerised balance was used to weigh each ingredient precisely. The 100 mL beaker was filled with colour extract containing betacyanin pigment, and olive oil was then added. After that, the mixture was heated to 70˚C over a water bath with a small amount of Tween 20 added as an emulsifier. Placed in a 100 mL beaker, white bee wax, candellia wax, cetearyl alcohol, lanolin alcohol, and cocoa butter were heated to 70˚C on a temperature-controlled hot plate. Afterwards, they were added in accordance with their melting points. All the materials were combined at 70˚C and heated at 12,000 rpm for the following ten to fifteen minutes, after which the lipstick was moulded. Following a quick 20 minutes of freezing the mould, the finished lipsticks were moved from the mould to the lipstick case.

Active pharmaceutical ingredients used in herbal lipstick

Betacyanin Pigment from H. polyrhizus

Botanical name : SelenicereusDragon fruit, Selenicereus

Pitaya (Hylocereusundatus Haw., Family Cactaceae) is the biological source.The dragon fruit, or pitaya, is thought to have originated in Mexico, Central America, and South America. Today, this fruit is widely cultivated and has gained popularity in Thailand, Malaysia, Indonesia, China, Vietnam, Taiwan, Bangladesh, and Australi[5]

Anthocyanin pigment of H.polyrizus

In addition to betacyanins, red pitaya has been found to contain anthocyanins. Research indicated that the pulp and peel of red and white pitayas had been found to contain several anthocyanins.[7]

Uses

- It has antioxidant properties and is used as a natural sunblock.
- It is used as natural colouring agents.

Excipients used in the herbal lipstick

- **BEES WAX:**

Introduction

A commodity called beeswax is created from the honeycomb of bees and other bees. High cholesterol, discomfort, fungus-related skin infections, and other ailments are treated with beeswax. It is applied topically to the skin to hydrate, condition, soothe, and calm it. It restores damage, encourages skin renewal, reduces the appearance of ageing signs, eases irritation and itching, and forms a moisturising, long-lasting barrier against environmental contaminants.[8]

Biological source

Derived from the honeycomb of Apismellifera and other Apis species that are members of the Apidae family of bees

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Uses

- used to prepare face creams and lipsticks in the cosmetics industry. Making ointments.
- It can also be used to make lip balms. It serves as a thickening agent and lubricant for antique furniture joints.
- Bees wax can benefit the lips; it is utilised in lip balm, lip gloss, and hand creams. Bee wax aids in keeping skin hydrated
- Bee wax is a common ingredient in cosmetics
- **PARAFFIN WAX**

Paraffin is a petroleum-based soft white solid wax.It is used in a variety of industries, including food and candle manufacturing.It is used in various body care products as well as cosmetic cosmetics products including lipstick and mascara. Liquid paraffin is a cleaning and moisturising substance. As a result, it is one among the ingredients of wipes that come after wax.[9]

Biological source

You can get paraffin wax from the following sources: Petroleum, Oil Shale, and Coal

Uses

- Candles are made with paraffin wax. It is also used to food products as an additive.
- It is present in crayons and is utilised as a glossing, stiffening, and hardening agent in lipstick.
- It is used in many cosmetic and personal care products, such as lipsticks, lotions, and creams.
- It reduces friction on the skin.
- It is an emollient.
- It aids in the restoration of the skin's softness, flexibility, and smoothness.
- **CASTOR OIL**

It is high in ricinoleic acid, a Monounsaturated fatty acid that is well-known to be a humectant. By keeping water from evaporating from your skin's outer layer, humectants aid in the preservation of skin moisture. Owing to these properties, castor oil can be used as an ingredient or applied alone to the lips and skin to encourage hydration.[10]

Biological source

Ricinus oil, often known as castor oil, is a non-volatile fatty oil extracted from the seeds of the Ricinuscoummunis castor bean.

Uses

There are many different applications for castor oil, including pharmaceutical, industrial, and medical ones. As a component of biodiesel fuel and an industrial lubricant, as well as an additive in foods, medicines, and skin care goods.

- **ORANGE ESSENCE**

It prevents lip cracking and lightens the tone of your skin. Limonene, a naturally occurring anti-inflammatory found in orange essential oil, aids in the healing of dry, cracked lips. Orange lips are likewise revitalising.[11]

Uses

- If you use it frequently, it will help you get rid of the dark, red patches around your mouth quickly.
- Its shade works well on dry lips and is versatile.
- Used to healthy lip and prevent the cell damage.
- It's reduced the inflammation.
- It has to fight the urge to smear.
- It used to prevent colds.

- **VANILLA ESSENCE**

Natural oil, which nourishes and lubricates your lips by sealing in moisture, and vitamin E are both abundant in vanilla flavour oil.Vanilla oil, which isn't really an essential oil, can be used.[12]

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Uses

- Because of its anti-inflammatory qualities, vanilla can help calm and soothe irritated skin. Antimicrobial.
- Vanilla has been used to reduce skin infections and in wound healing

- **LEMON JUICE**

Lemon is a well-known bleaching agent that works wonders for dark lips. Just squeeze some lemon juice onto your lips and gently massage them. The citric acid in the juice helps to lighten the dark shade of your lips, which makes them look pink. Lemon juice also plays a significant role in skin care routines. It can prevent blackheads and blemishes and reduce the size of skin pores, leaving your skin looking clear, smooth, and youthful. Lemon juice also has astringent properties.[13]

Biological source

It is obtained from the lemon which is species of evergreen flowering plant belonging to the family Rutaceae.

Uses

- Skin lightening Cleanse hair and skin. Prevent acne
- It acts as antibacterial, anti-inflammatory
- It also acts as anti-oxidant. It helps to reduce cholesterol.

- **TURMERIC POWDER**

Turmeric powder is a brilliant yellow powder that is manufactured from dried turmeric rhizomes. Its warm, slightly peppery flavour, vivid colour, and preservation qualities make it an excellent culinary ingredient, but it can also be used for cosmetic and medical purposes due to the presence of "curcumin."[5]

Biological source

It comes from the rhizomatous herbaceous perennial plant Curcuma longa, which is a member of the Zingiberaceae family of gingers.

Uses

- It heals acne. Lightens hyperpigmentation.
- Reduce dark circles.
- Prevent premature aging.

Role of ingredient

Table 2.1:

Herbal ingredients	Scientific name	Medical use
Betacyanin pigment of dragon fruit	Selenicereus costaricensis	Natural colorantand antioxidant
Anthocyanin pigment	H.polyrhizus	Colouring agent
Bees wax	Cera alba	Moisturizing skin
Paraffin wax	Paraffinum Durum	Glassing ,stiffening andHardning
Castor oil	Ricinus communis	Hydrate and smoothing
Orange essence	Citrus sinensis	Antioxidant and healing properties
Vanilla essence	Vanilla palanifolia	Preservative
Lemon juice	Citrus limon	Antioxidant
Turmeric powder	Solanum lycopersicon	Natural colouring

III. EVALUATION TEST

- **Organoleptic properties**

The colour, smell, and texture of the prepared lipstick were examined. Physical observation was used to assess these characteristics.

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- **Melting Point**

10 mm of a lipstick sample is injected into a glass capillary tube that is open on both ends, and it is then placed into an outside capillary that is filled with water. The latter is serving as a water bath with temperature control.[14]

- **Surface anomalies**

The purpose of these investigations was to formulate herbal lipsticks and identify any crystals that might be present on their surfaces. 3. Sensitive Skin: To assess sensitivity, apply the product as a patch to the affected area for half an hour, then watch for any reactions.N-No responseR-Skin erythema I: Itching or irritation.

- **Spreadability on Sensitive Skin**

Applying the lipstick to the hand and observing any fragmentation, deformation, or breaking during application, then comparing the results to a standard formulation.Spread-ability [15][16]

- **Test for skin irritation**

Applying a product to the skin and waiting 10 minutes is how it's done.

- **Time period**

After applying lipstick to the skin, the length of time the lipstick remains there is noted.

- **Microbial Analysis**

The lipstick sample used in the formulation was found to be microbiologically appropriate for cosmetic use through microbial examination, indicating that the product belonged to category 2. In the quantitative microbiological control analysis, there was no discernible colony on the lipstick containing betacyaninpigment.In 0.5 grammes of Formulated Lipstick samples, yeast and mould were not found.Additionally, 0.5 g of prepared lipstick did not include any Staphylococcus aureus, E. coli, or Pseudomonas aeruginosa, according to a qualitative study.

The lipstick's microbiological investigation using a red dragon fruit colour extract was satisfactory. There were no fungi, yeast, mould, or bacteria found. No signs of potentially pathogenic microbes like E. Coli, Pseudomonas aeruginosa, or Staphylococcus aureus were found. This might be because red dragon fruit extract's etha-nolic activity has antibacterial properties, and lipstick containing red dragon fruit extract doesn't need preservative during the study time. This demonstrated the RDF extract's antibacterial properties. This result was in line with the reexamination conducted by Azwandia in Malaysia, which found that the pigments in red dragon fruit have strong antibacterial properties.[17][18]

Fig 3.1:

IV. CONCLUSION

Study investigated the possibility of lowering the lead level of lipsticks by substituting natural dye with betacyanin pigment and anthocyanin pigment derived from H. polyrhizus. Natural colour lipsticks are safe, of good quality, and contain very little lead. An investigation of antioxidant activity revealed that the lipstick formulation was adequate. According to this study, lipstick that has been developed with betacyanin and Anthocyanin pigment and enhanced with natural oil will lessen the oxidative stress on the lips, preventing dry

lips and delaying the ageing process. Consequently, it can be applied as a cosmetic, and applying natural colour can lower the lead level of lipstick.

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