

FORMULATION AND EVALUATION OF HERBAL LIPSTICK USING NATURAL PIGMENTS AND FATS TO REDUCE THE RISK OF TOXICITIES CAUSED BY SYNTHETIC PIGMENTS

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ABSTRACT

Natural pigments, colours, fats, and waxes are receiving increased attention for their usage in many cosmetic ailments like lipsticks as synthetic ingredients like colouring agents, fats, and waxes cause allergic reactions and have been discovered to be carcinogenic in nature. Our study's aim and purpose are to design and assess herbal lipstick utilising natural pigments and fats, as well as to determine how adding natural fats such as desi cow ghee and cold-pressed coconut oil will affect the end product's stability. In the current work, we prepared lipstick using beetroot juice as a natural pigment. Different formulations with and without natural fats (desi bovine ghee and cold-pressed coconut oil) were created and tested against commercial formulations according to a number of evaluation criteria. The formulation of the lipstick (F7) that solely contained wax passed all of the evaluation tests, including the one for the lipstick's ability to stain skin, according to the results. All assessment tests were passed by the formulations with natural fats, although these formulations (F1–F6) failed to stain skin. When applying lipstick to the skin, it is crucial that it colour the skin. The formulation containing wax (F7) can be used as lipstick, whereas formulations with blends of oils, fats (cow ghee and coconut oil), and waxes (F5, F6) can be utilised as lip balm sticks instead of lipsticks, according to the conclusions drawn from the aforementioned inferences.

KEYWORDS: Herbal lipstick, cold pressed coconut oil, Desi cow ghee, peroxide value.

INTRODUCTION

Among all cosmetics, lipstick is the one that is used the most frequently. For the purpose of giving the lips colour, texture, and protection, it comprises pigments, oils, waxes, and emollients. There are numerous lipstick brands and colour options. Lip colouring is an age-old technique for enhancing lip beauty and adding a glamorous touch to face makeup. For this, the selection of colour hues, textures, and lustres has altered and gotten greater. This is evident from

the lip balm, lipstick, and lip jelly sold in countless shades to meet consumer demand.^[1] Lip balms can sometimes double as lipsticks to enhance colour and hydration.^[2] Women's first choice is to apply lipstick.

Women select their lipstick colour based on their outfit, the situation, their mood, and their sense of style. Light lipstick may completely transform your appearance for any occasion. Lipstick's negative effects can be quite harmful to the body, despite the fact that the majority of cosmetics are harmful. This is because when lipstick is put to the lips, it directly enters the body during food consumption. As a result, toxic compounds can easily enter the digestive system. The combination of manganese, cadmium, chromium, and aluminium in the body causes significant harm. The likelihood of all these substances entering the body increases when eating while wearing lipstick.^[3]

Additionally, the lips take on a blackish hue. Consuming this type of synthetic colour by the user is extremely risky. It might lead to very serious forms of cancer. In the current study, we can make a herbal lipstick from beetroot extract that may have very few or no side effects due to this type of negative effect.

The various qualities of the herbs employed in cosmetic preparations include anti-inflammatory, antiseptic, and antibacterial effects. These herbal goods assert that they don't have any of the frequent adverse effects associated with products containing synthetic ingredients. Ayurvedic literature, in particular Charaka Samitha, lists a number of therapeutic plants.^[4-6] Numerous antioxidants employed in cosmetics are among the well-liked functional natural compounds that have been scientifically shown to provide additional advantages for maintaining skin texture, look, and tone. The ideal qualities of lipsticks are that they should not irritate or be toxic, be physically and chemically stable, be free of grit, and preserve lip colour for a longer amount of time after application.^[7]

DESIGN/METHODS/MODELLING

MATERIALS

Materials used in the present work include beetroot juice collected from fresh beetroots, cold pressed coconut oil which is extracted freshly from the coconut, Indigenous cow ghee (desi cow ghee), bees wax, castor oil, span 80, Vitamin E, orange oil.

METHODS

Various ingredients used in the lipstick, their biological sources, use of each ingredient was given in table 1.

Table 1: Various ingredients used in formulation and their categories.

S. No.	Ingredient	Biological source(family)	Uses
1.	Beetroot juice extract	Beta vulgarism (Amaranthaceous)	Colouring agent
2.	Beeswax	Apis mellifera (Apidae)	Thickening agent
3.	Cold compressed coconut oil	Cocos nucifera (palm family)	Nourishing agent
4.	Desi cow ghee	Bos indicus.	Antioxidant, moisturizer, softening agent
5.	Castor oil	Ricinus communis, Euphorbiaceae	Smoothing & moisturizer
6.	Orange oil	Citrus sinensis	Fragrance
8.	Vitamin E	--	Antioxidants

By using the above mentioned ingredients lipstick formulation have been developed. Formulation of lipstick was given in table 2.

Table 2: Formulation of Lipstick.

S. No.	Name	F1	F2	F3	F4	F5	F6	F7
1.	Beeswax	3g	3g	3g	3g	3g	3g	3g
2.	Cold compressed coconut oil	1g	2g	-	-	1g	2g	-
3.	Desi cow ghee	-	-	1g	2g	2g	1g	-
4.	Castor oil	3g	3g	3g	3g	3g	3g	3g
5.	Beetroot juice extract	2g	2g	2g	2g	2g	2g	3g
6.	Span 80	0.2g	0.2g	0.2g	0.2g	0.2g	0.2g	0.2g
7.	Vitamin E	qs	qs	qs	qs	qs	qs	qs

Preparation of herbal lipstick:

Step 1: Extraction of beetroot juice: Beetroots weighing 250g were taken and thoroughly washed with tap water. Beetroots that have been thoroughly washed are cut and skinned. A piece of muslin fabric was used to filter the extract, and the red beetroot filtrate was recovered and saved for later use.

Step 2: Extraction of coconut oil: Using a sharp object, coconut water was retrieved by drilling holes in the coconut eyes to allow the water to drain. Process of coconut oil extraction was given in figure 1.

Removed the coconut meat from the broken coconut shell. Blended the coconut flesh after adding it to the blender. To make coconut milk, re blend the ingredients with a little water. Squeezed all the liquid out of the blended coconut milk using a nut milk bag. The coconut milk was poured into a large jar and left to stand so that the creamy portion and the watery liquid portion separated. The cream eventually split and rose to the top. Drained the liquid away. (carefully remove the cream from the top). Chilled the cream overnight in the refrigerator.

In order to remove extra water from the cream and separate the curd from the oil, fermentation was used. The coconut cream should be poured into a glass air tight jar, covered, and kept in a warm place for 8hrs. After that placed the glass jar with coconut cream in refrigerator for 8hrs. Removed the supernatant cream very carefully and transferred to an air tight glass jar and again fermented for 8hrs by placing the jar in tightly wrapped cloth bag. Curd and oil will eventually separate if you wrap it in a towel and keep it at 35 to 40 degrees Celsius, which will aid in fermenting the coconut cream and cause the oil to separate. The coconut curd will be at the bottom and the oil will be on top. Preserved the oil after filtering it through a nut milk bag.

**Figure 1: Extraction Of Cold Pressed Coconut Oil.**

Step 3: Preparation: weighed each herbal component separately in a porcelain dish. The china dish was then set on the heating mantle. Beeswax is added along with the coconut oil/cow ghee while the components continue to melt. As an antioxidant and smoothing agent, span 80 and vitamin E were also used. The mixture was then supplemented with beetroot juice, which was carefully incorporated before being emulsified. As a flavouring ingredient, orange oil was included. Then, using a glass rod in one direction, combine everything. Placed the mixture in freezer-safe moulds that had been well-lubricated. Using a sharp knife, scrape the coating to reveal the sticks. Passed the lipstick through the flame for quick fashion and it gives gloss to the surface of the lipstick. Performed various evaluation tests for prepared lipsticks then place the lipstick in lipstick container and stored. Prepared lipsticks were shown in figure 2.



Figure 2: Preparation of Herbal Lipstick.

Evaluation of Lipsticks

The prepared formulations were subjected to various evaluation test to know the quality and stability of the prepared product.^[8-14] The tests include

Colour and texture: Formulated lipstick was checked for the colour, glossiness, and texture by physical observation.

Breaking load point test: The purpose of this test is to evaluate the created lip balm stick's hardness and strength. This approach involves attaching weights with increasing loads to the lip balm stick while it is horizontal and one inch from the base. The breaking point of a lipstick is the weight at which it begins to break. The test ought to be conducted under particular circumstances at a temperature of roughly 25 °C.

Skin irritation test: It was carried out by applying the formulation on the skin and left it for 15 minutes, and found that no skin irritation was found on the skin.

pH parameter: A pH paper was used to measure the lip stick's pH.

Melting point assessment: Melting point analysis is carried out to ascertain the formed product's storage conditions. The capillary tube method is used to evaluate the melting point of herbal lipstick. Lipstick is inserted into the capillary tube, which is then connected to a thermometer. Melting point is the temperature at which lipstick starts to melt.

Test of rancidity: Oils like castor oil and many other substances can oxidise and produce a sticky product with an unpleasant taste and smell. Hydrogen peroxide can be used for the test, and the peroxide number can be calculated using the peroxide value determination method.

Peroxide value determination

A selection of solvent mixtures is given below.

Solvent Mixture I Glacial acetic acid: chloroform (3:2)

Solvent Mixture II Glacial acetic acid: cyclohexane (3:2)

Solvent Mixture III Glacial acetic acid: isooctane (3:2)

The sample needs to be kept cold, shielded from the air, and not opened before the determination is complete.

After that, more testing needs to be done. It is not necessary to melt solid fats prior to the decision.

About 3 g of the precisely weighed sample were transferred into a 250 mL Erlenmeyer flask and promptly sealed with a glass stopper. It is important to note that no sample is collected from the surface.

50 mL of the suitable solvent mixture (I, II, or III) should be added. Then, add 1 mL of freshly made saturated potassium iodide solution, and let the mixture react for 60 seconds \pm 1 second while stirring it vigorously and manually at least twice.

Shake after adding 100 mL of water. Using a 1 mL starch solution indicator, titrate with the suitable sodium thiosulfate solution (0.01 or 0.1 mol/L) until the purple to slightly yellow or colourless endpoint is reached. When the titration is almost done, but the faint straw tint is still visible, add the indicator. Shaken until the blue colour fades throughout the titration process.

Conducted a blank titration in the identical circumstances. For this reason, 0.5 mL or less of sodium thiosulfate solution should be ingested. It is essential to reevaluate the reagents' quality if this volume is surpassed.

Solubility test: To determine the lip stick's solubility, it was dissolved in a range of solvents. (Ethanol, water, petroleum ether, chloroform)

Aging stability: Prepared herbal lipsticks were stored at refrigerator temperature (4°C), room temperature (20- 30°C) and high temperature (40-50°C) for 1hour. Various parameters such as bleeding, crystallization and ease of application were observed.

Microbial contamination test: Nutrient agar medium was melted, then added to petri plates and let to solidify. The produced formulations were then injected in this solution. Following solidification, they are incubated for 24 hours at 37 degrees Celsius in an inverse posture. The petri dishes were examined for microbial development after a 24-hour period.

Odour testing: The created formulations were tested to determine whether or not they contained any offensive odours.

Comparison with commercial formulation: For each of the aforementioned evaluation criteria, prepared herbal lipsticks were contrasted with typical marketed formulations.

RESULTS AND DISCUSSION

The prepared formulations of lipsticks were subjected to various evaluation tests to determine the various parameters which involve color, textures, odour, melting point, breaking point, physical stability, microbial stability, skin irritancy etc. the results of the all evaluation tests of prepared formulations in comparison with the marketed formulation were given in table 3 and the solubilities of the formulations were given in table 4.

Table 3: Evaluation parameters of Herbal lipstick formulations in comparison to marketed formulation.

S. No	Evaluation parameter	F1	F2	F3	F4	F5	F6	F7	Marketed product
1	Texture	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
2.	Odours	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic	Aromatic
3.	Skin irritation	No	No	No	No	No	no	No	No
4.	pH	6.2	6.2	6.3	6.2	6.3	6.3	6.5	6.4
5.	Breaking point	36.4g	36.4g	37.5g	32.27g	58.0g	55.9g	60.9g	61.9
6.	Stability	Stable	Stable	Stable	Stable	Stable	stable	Stable	stable
7.	Rancidity	9.3	9	9	9	9	9.07		
8.	Melting point	65°C	63°C	65°C	64°C	66°C	68°C	64°C	70°C
9.	Microbial test	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth

Table 4: Solubility of lipstick formulations in various solvents.

S. No.	Solvent	F1	F2	F3	F4	F5	F6	F7	Marketed Product
1.	Water	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble
2.	Chloroform	Soluble	soluble	soluble	Soluble	Soluble	Soluble	Soluble	Soluble
3.	Ethanol	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble
4.	Petroleum ether	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble

Color – the color of the formulations was observed to be dark pink color and it was found to be uniform throughout the preparation which is a basic characteristic of lipstick.

Texture – The texture of the products was found to be smooth and glossy which is important for a lipstick.

Odour – all the formulations possessed a characteristic odour.

pH – the prepared formulations and marketed one exhibited pH range between 6.3 – 6.5. The pH range is slightly acidic pH and the products with slight acidic pH will be compatible with skin. And all the formulations did not produce any skin irritation when applied on skin.

Breaking Point test- Provides information about the mechanical strength of the preparation. Formulations made with cold pressed coconut oil (F1, F2) exhibited breaking point of 36.4gm.

Formulations made up of desi cow ghee (F3,F4) exhibited 32-37gm of breaking point. Formulations made up of combination of desi cow ghee and cold pressed coconut oil (F5, F6) possessed 55-58gm of breaking point value.

Formulation with only beeswax (F7) and marketed product shown 60.9gm and 61.9gm of breaking point values respectively. Formulations with Combination of desi cow ghee and coconut oil (F5,F6) have shown better mechanical strength when compared to formulations with individual fats.

Coloring spreading test – when the formulations (F1- F6) applied on paper, they produced stain on paper but when they applied on skin the preparations not stained properly and produced colorless stripes. Formulation without oils and fats (F7) produced stain on skin – it infer that the presence of oils and natural oils prevented the staining ability of the pigment.

Rancidity test: All the formulations were tested for rancidity property. As the preparations are done by incorporating natural oils and fats, its necessary to check the preparations for oxidative degradation. This property can be checked by determining Peroxide value. The peroxide values of the all the preparations were found between 9-9.3 which is less than 10. This indicates the formulations are devoid of rancidity.

Melting point test: The formulations shown melting range of 63-68°C. This indicates all the formulations maintain their shape and integrity at storage conditions.

Solubility test: Solubility of all the formulations was determined in water, chloroform, methanol, petroleum ether. All the formulations were soluble in chloroform and insoluble in remaining solvents that were used for testing.

Microbial testing: To maintain the stability of the preparation it should be free from any microbial contamination. All the formulations were tested for microbial growth by using nutrient agar medium and the results revealed that all formulations were free of microbial contamination.

CONCLUSIONS

Herbal lipstick using beetroot juice and natural fats was formulated and evaluated and the prepared formulations were compared with a marketed formulation and the effect of incorporation of natural fats like cold pressed coconut oil and desi cow ghee on strength, stability and integrity of lipstick formulation was determined.

From the results obtained it is inferred that the lipstick formulation containing only wax (F7) complied all the evaluations tests including skin staining ability of the lipstick. The formulations containing natural fats complied with all the evaluation tests but these formulations (F1-F6) failed to stain the skin. It is very important that a lipstick must color the skin when it is applied on the skin.

From the above inferences it is concluded that the formulation containing wax (F7) can be used as lipstick, but formulations with combinations of oils, fats (both cow ghee and coconut oil), wax (F5,F6) can be used as lip balm sticks instead of lipsticks.

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