

Physicochemical Analysis of Herbal Lipsticks Developed using Natural Colour Pigment

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ABSTRACT

Background: There are many lipstick formulations available in the market developed with synthetic colorants but this particular research was made use of natural pigment as the colorant.

Aim: The present study was focused to develop and evaluate herbal lipstick containing natural pigment.

Methodology: Natural pigment was extracted from *Tamarindus indica* red with methanol as solvent using trituration method. Lipstick formulations were developed using moulding method and coded from F₁ to F₅. Thus developed lipsticks were evaluated for organoleptic parameters, surface anomalies, size and shape analysis, breaking point, melting point, irritation test, pH analysis, solubility profile, color imparting test and perfume stability test.

Results: Thus developed lipsticks were shown good results for all the evaluations whereas color was found to be dark maroon to light maroon. Among all the developed formulations F₂ shows good color imparting property. pH of all the formulations were found to be neutral at 6.9 to 7 pH. All the lipsticks were partially soluble in organic solvents and insoluble in aqueous media. Lipsticks are nonirritant and similar size in diameter and length with shape of smooth rounded tip. They had moderate melting point of 60°C and breaking point was ranging from 70 grams to 120 grams. Formulation F₅ shows maximum breaking strength. They hold good perfume stability property.
Conclusion: Lipsticks were successfully developed from natural pigment with good color and melting point. Since all the evaluations shown good results this natural pigment can be utilized for developing lipsticks in large scale.

Keywords: Herbal lipstick; Lipstick; Natural pigment; *Tamarindus indica* red; Lipstick evaluations

INTRODUCTION

Lips are one of the most attractive features of the face. The skin of our lips is very thin and delicate. It needs to be taken extra care. Drying of our lips can make cracked and flaky. Use of certain products on your lips can help to regain moisture. They not only prevent your lips from drying and cracking but also give certain shining on the lips which makes them look attractive than ever before. A lip care product will retain lips moisture and keep them hydrated and refreshing and irresistible. They enhance the quality of the lips. So it is very important to use the right type of products on lips that will not harm them [1]. There are different types of lip care products available in the market that can make a look of stunning. Pure lip care products are made with natural, vegan and plant based ingredients various lip care products were shown in Figure 1.

Figure 1. Lip care products.



Types of lip care products:

- Tinted lip balm
- Lip gloss
- Semi matte lipstick
- Cream lipstick
- Lip oil
- Lip liner
- Lip scrub

Introduction to lipstick: Lipstick is the cosmetic product containing the pigments, oils, waxes and emollients that apply colour, texture and protection to the lips. Lipstick is used to impart an attractive colour and glossy moisture appearance to the lips. Any of the preparations used for the beauty treatments for lip makeup known as sticks or by the common name lipsticks. A lipstick brightens the women's smile and it provides hydration to lips and lipsticks having many advantages. It will protect from the dryness and cracking. Herbal lipstick is cosmetic product containing many of ingredients from plant origin only. These lipstick preparations do not cause any damage to the lips and have no side effects. Many types and colours of lipstick are available in day to day life [2-4].

Composition of lipsticks

Waxes: Waxes are thermoplastic materials which are solids at room temperature but melt without decomposition. It provides structure to lipstick. Which is also plays an important role as it forms protective layer on the lips [5,6].

Examples: Beeswax, Chinese wax, lanolin, shellac wax, ozokerite and candelilla wax.

Oils: The oil mixture is required to blend properly with waxes to provide a suitable film when applied on lip. Also acts as dispensing agent for insoluble pigments.

Example: Castor oil, paraffin oil, isopropyl myristate, butyl stearate, olive oil, coconut oil etc.

Colouring agents: Colour of the lipstick is most important from commercial and appearance point of view. Colour which is been used in the lipstick preparation will be appear on lips upon application and is been responsible for the attractive appearance of lips. Carmine was widely used as colorant in lipstick formulations.

Lipstick colours are available in two types:

- Soluble dyes: Example: Fluorescein, Eosin.
- Insoluble dyes: Example: Barium, Alluminium.

Preservatives: Preservatives are used in lipstick formulations to prevent the contamination and microbial growth. Preservatives are also helps to increase the shelf life of the formulations.

Examples: Methyl paraben, Propyl paraben.

Antioxidants: Antioxidants are the agents which prevent the oxidation process during the storage. These are also added to the lipstick to prevent rancidity.

Example: BHT, BHA.

Fragrance: Fragrance is used for imparting pleasant odour to the lipstick and to mask the smell of other ingredients.

Example: Rose essence, strawberry essence.

Advantages of lipsticks

It provides beauty to lips which directly enhance face appearance. It protects and moisturizes the lip. It defines the lip and brightens smile provided you to choose the right shade. It hydrates the lip. It enhances facial appearance and gives gorgeous looks to face. The medicated lipstick protect lip from dryness and even useful for antifungal treatment. It also protect from sores and swelling [7].

Introduction to *Tamarindus indica* red 8

Botanical name: *Tamarindus indica* red

Source: It is obtained from fresh pulp of *Tamarindus indica* linn.

Family: Leguminosae

Geographical source: Tamarind is originated in Madagascar and now it has been extensively cultivated in India, Bangladesh, Thailand, Central American countries.

Phytoconstituents: Tartaric acid, Malic acid, Oxalic acid, Vitamins (C, E, K, Folate) Carbohydrates, Water and Fibers (pectin).

Therapeutic applications: It is used as anti-fungal, astringent, anti-inflammatory, anti-septic, anti-bacterial agent. In day today life even tamarind was used as part of cooking ingredient which imparts sour taste to food. *Tamarindus indica* red fruit was shown in Figure 2.

Figure 2. *Tamarindus indica* red fruit.



Other benefits: Fruit pulp used as gentle laxative. It improves appetite. Decoction of dried fruit is taken orally for fevers. It is known to restore sensation in paralysis. Tamarind bark is used as tonic, lotions and to relieve sores, ulcers rashes [8].

MATERIALS AND METHODS

Chemicals and reagents

The excipients carnauba wax, white bees wax, cetyl alcohol and liquid paraffin were purchased from SDFCL Mumbai. Cocoa butter, lanolin, castor oil and isopropyl myristate were procured from Loba chemie Mumbai. Natural pigment was extracted from *Tamarindus indica* red fruit pulp. Strawberry essence was procured from Manju chemicals (p) LTD, Chennai and Vitamin e obtained from Abbot India. All the chemicals used are of analytical grade.

Methods

Extraction of colour pigment from *Tamarindus indica* red: Red tamarind fruits were collected from local farm and the fresh ripen fruits were washed with tap water twice to remove the dust present on the peel of the fruits. Then the peel was scaped and pulp was collected in beaker. Accurately weighed 100 grams of pulp was placed in mortar and 300 ml of methanol was added to it. The pulp was triturated until it becomes smooth. The whole mixture in the mortar was then filtered using muslin cloth. The filtrate was concentrated by keeping it in a hot air oven for 3 hours at 40°C. Then

the concentrated mass was used as the natural colouring pigment in development of lipstick formulations [9].

Development of lipstick formulations by moulding method: The lipstick formulations were developed using moulding method. The formulation chart was designed by varying the wax concentrations and formulations were depicted in Table 1. For this initially the waxes like white bees wax, carnauba wax were accurately weighed and taken in a china dish. To the wax mixture accurately weighed lanolin, cetyl alcohol and cocoa butter were added and mixed thoroughly. After a while the mixture of accurately weighed castor oil, liquid paraffin and isopropyl myristate were added. The above mixture was kept on hot water bath at 45°C for 5 minute. After 5 minutes the wax and emollients were melted and it forms oily solution. To this solution required quantity of essence, antioxidant and natural colouring pigment was added and stirred well. Then whole solution was poured into lipstick moulds and mould was kept in refrigerator for 10 minutes. After 10 minutes lipsticks were collected and used for further evaluation parameters [10-13].

Table 1. Composition of lipstick formulations.

Si no.	Ingredients (gms/ml)	Formulation code				
		F ₁	F ₂	F ₃	F ₄	F ₅
1	Carnauba wax	5	5.5	6	6.5	7
2	White bees wax	5	5.5	6	6.5	7
3	Cocoa butter	7	6.5	6	5.5	5
4	Lanolin	4.5	4	3.5	3	2.5
5	Castor oil	15	15	15	15	15
6	Isopropyl myristate	3	3	3	3	3
7	Cetyl alcohol	2.5	2.5	2.5	2.5	2.5
8	Liquid paraffin	3	3	3	3	3
9	Natural pigment	2	2	2	2	2
10	Strawberry essence	1	1	1	1	1
11	Vitamin E	0.5	0.5	0.5	0.5	0.5

Evaluation of lipsticks

Organoleptic evaluations: The prepared lipstick formulations were evaluated for organoleptic parameters like its colour, odour, texture using sensory organs and the observations were reported as same [14-16].

Surface anomalies: Surface anomalies test was carried out for all the formulations in order to identify any kind of crystal formation, contamination or rough surface development on the lipstick formulations and the observations were reported [17].

Skin irritation test: This evaluation was carried out to ensure the irritation property of formulation. The lipsticks were applied on skin of volunteers and it is been left for 10 minutes and the observation was reported [18-21].

pH of the formulation: The pH of formulated herbal lipsticks was determined using pH meter. The average of 3 readings was taken and the pH was reported [22-24].

Size and shape analysis: Size and shape of developed lipstick formulations was carried out using vernier caliper. The shape was reported and length and width of lipsticks were determined by placing lipstick horizontally and vertically within jaws of vernier caliper and the readings from the digital screen was taken thrice to get average value [25].

Solubility of lipsticks: Solubility of lipstick formulations were carried out using different solvents of varying polarity for this ethanol, water, chloroform, methanol, petroleum ether were used and solubility profile was reported as completely soluble, partially soluble and soluble [26].

Colour imparting test: Colour imparting test was carried out to ensure the dispersion of colour from the lipstick formulation. For this evaluation 1 lipstick from each formulation was taken and rubbed gently on the paper. The extent of colour dispersion was reported as poor, good or excellent. The observations were reported as same [27].

Melting point: Melting point of lipstick was a major parameter for this little quantity of lipstick formulation was placed in test tube and a thermometer was immersed in it. Then it was clamped tightly to burette stand. The whole assembly was immersed in a beaker containing water which is placed on a heating mantle. The temperature was increased gradually and at particular temperature at which the lipstick gets melted is been reported as its melting point. The average of 3 readings were taken and mean value is been reported [28,29].

Breaking point: Breaking point evaluation was carried out to determine the strength of lipstick. The lipstick was held horizontally in a socket inch away from the edge of support. The weight was placed using thread in position to vertical direction towards the gravity. Then the weight is been gradually increased by a specific value (10 gm) at specific interval of 30 second and weight at which breaks was considered as the breaking point. The average values of three readings were taken to avoid errors [30,31].

Perfume stability: The perfume stability of lipstick formulation was evaluated periodically at interval of 15 days and 30 days and the presence of perfume was reported [32].

RESULTS AND DISCUSSION

Extraction of colour pigment from *Tamarindus indica* red

The colour pigment from *Tamarindus indica* red fruit was obtained by trituration followed by evaporation method. The dark red natural pigment from *Tamridus indica* red was obtained and stored in a refrigerator for further lipstick development process. The extracted pigment was shown in Figure 3.

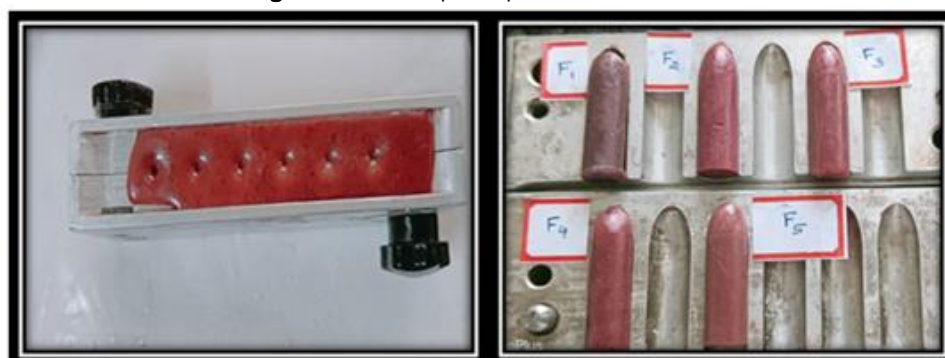
Figure 3. Extraction of natural pigment from *Tamarindus indica* red.



Development of lipstick formulations using natural pigment

Using different concentrations of oils and waxes 5 different formulations chart was developed and accordingly the quantities of each ingredient were taken and lipsticks were developed using moulding method. From each formulation 4 lipsticks were developed and evaluated for various parameters. The developed lipsticks were shown in Figure 4.

Figure 4. Developed lipstick formulations.



Organoleptic evaluation: Developed lipstick formulations were evaluated for its colour, odour and texture and the observed characteristics were depicted in Table 2. All the formulations poses maroon colour of different intensity and pleasant odour along with smooth texture.

Table 2. Organoleptic evaluation of lipstick formulations.

Sl. no.	Parameter	Formulation code				
		F ₁	F ₂	F ₃	F ₄	F ₅
1	Colour	Dark maroon	Maroon	Light maroon	Light maroon	Light maroon
2	Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
3	Texture	Smooth	Smooth	Smooth	Smooth	Smooth

Surface anomalies: Surface anomalies test was carried out for all the formulations in which formulations from F₁ to F₅ shown absence of crystal formation, contamination and there is even distribution of colouring pigment was observed. The results were depicted in Table 3.

Table 3. Surface anomalies evaluation results.

Sl.no.	Parameter	Formulation code				
		F ₁	F ₂	F ₃	F ₄	F ₅
1.	Crystal formation	No	No	No	No	No
2.	Contamination	No	No	No	No	No
3.	Color distribution	Even	Even	Even	Even	Even

Skin irritation test: Skin irritation test was carried out in volunteers. The skin was observed after 10 minutes of applying lipsticks. It was concluded that there is no any kind of itching, redness, swelling or irritation is been observed in volunteers. All the formulations are free from irritation upon topical applications.

pH of the formulation: pH of all the formulations were evaluated using digital pH meter whereas all the formulations shown near to neutral pH values, it was ranging from 6.8 to 7.0. So the extent of pH difference will not cause any harm on the lips. The results were depicted in Table 4.

Table 4. pH of the formulations.

Sl. no.	Formulation code	pH Mean ± SD
1	F ₁	6.9 ± 0.1
2	F ₂	7.0 ± 0.3
3	F ₃	6.8 ± 0.1
4	F ₄	6.9 ± 0.2
5	F ₅	7.0 ± 0.1

Size and shape analysis: Shape of all the lipstick formulations were observed to be rounded smooth tip structure and the length of the lipsticks were ranging from 39.34 mm to 40.92 mm and diameter of lipsticks were ranging from 10.30 mm to 11.00 mm. The lipstick dimensions were depicted in Figure 5 and the observations of length and width were depicted in Table 5.

Figure 5. Determination of lipstick dimensions.



Table 5. Size and Shape evaluation of lipsticks.

Sl.no.	Parameter	Formulation code				
		F ₁	F ₂	F ₃	F ₄	F ₅
1	Shape	Rounded smooth tip	Rounded smooth tip	Rounded smooth tip	Rounded smooth tip	Rounded smooth tip
2	Length (mm)	39.80 ± 0.1	39.79 ± 0.3	40.92 ± 0.4	39.80 ± 0.2	39.34 ± 0.4
3	Diameter (mm)	10.30 ± 0.1	10.82 ± 0.2	10.94 ± 0.2	10.95 ± 0.4	11.00 ± 0.2

Solubility of lipsticks: The developed lipstick formulations were evaluated for its solubility profile and the results were depicted in Table 6. Since the lipsticks contains high amount of waxes and oils these are insoluble in water and partially soluble in ethanol, petroleum ether and methanol.

Table 6. Solubility profile of lipstick formulations.

Sl.no.	Solvent	formulation code				
		F ₁	F ₂	F ₃	F ₄	F ₅
1	Ethanol	Partially soluble	Partially soluble	Partially soluble	Partially soluble	Partially soluble
2	Water	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble
3	Petroleum ether	Partially soluble	Partially soluble	Partially soluble	Partially soluble	Partially soluble
4	Methanol	Partially soluble	Partially soluble	Partially soluble	Partially soluble	Partially soluble

Colour imparting test: Extent of colour imparting property of lipstick formulations were evaluated using a white paper. Upon gentle pressure formulation F₁ and F₂ shown very good colour imparting property and formulation F₃ shown slightly less and F₄,F₅ formulations shown least colour imparting property. The colour imparting property of all the formulations was shown in Figure 6.

Figure 6. Colour imparting test for lipstick formulations.

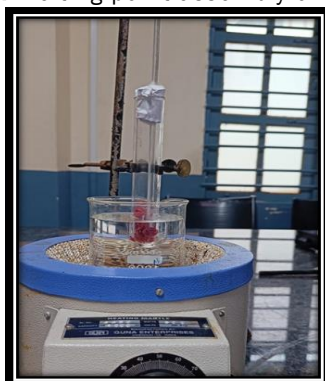


Melting point: Melting point of all the lipstick formulations was found in between 60-61°C. Thus all the formulations poses typical lipstick property. Moderate melting property of lipstick prevents its melting during storage and promotes ease of application on lips. The melting point results were depicted in Table 7. The melting point assembly was represented in Figure 7.

Table 7. Melting point and breaking point of lipsticks.

Formulation	F ₁	F ₂	F ₃	F ₄	F ₅
Melting point (°C)	60 ± 2	61 ± 1	60 ± 2	61 ± 1	60 ± 2
Breaking point (gms)	70 ± 0	80 ± 00	100 ± 00	110 ± 00	120 ± 00

Figure 7. Melting point assembly of lipsticks.



Breaking point: Breaking point of lipsticks was ranging from 70 grams to 120 grams. As the wax content in the formulation increases there is frequent increase in breaking strength is been observed. Formulation F₅ shows maximum breaking point and formulation F₁ shown least breaking strength because of lesser amount of wax content. The breaking strength results were depicted in Table 7. Breaking point assembly was depicted in Figure 8.

Figure 8. Breaking point determination of lipsticks.



Perfume stability: Perfume stability of lipsticks was carried out at 15th and 30th day. All formulations shown good perfume retention property at the end of 30th day and the results were depicted in Table 8.

Table 8. Perfume stability of lipstick formulations.

Days	F ₁	F ₂	F ₃	F ₄	F ₅
15 th Day	Good	Good	Good	Good	Good
30 th Day	Good	Good	Good	Good	Good

CONCLUSION

Considering the extensive use and importance of lip care cosmetics in day today life the present work was designed and developed to prepare and evaluate the lipstick formulations using natural colour pigment. The aim of present work was to focus on the naturally occurring colour pigments and incorporating them into some cosmetics to avoid the synthetic colours to some extent. This could be helpful to safeguard our external health from the harmful side effects. After completion of the present project work some conclusions are briefed. Colour pigment was successfully extracted from Red tamarind fruit pulp using trituration and methanolic extraction method. Concentrated natural pigment extract was tested for its colour imparting property prior to development of lipsticks. The lipstick formulation chart was developed considering varying the concentration of waxes and some emollients. The natural pigment concentration was kept constant in all the formulations to validate effect of wax concentration and ratio on colour imparting property. The lipstick formulations were prepared by moulding method and formulations were coded from F₁ to F₅. Thus developed lipstick formulations were evaluated for various parameters. In the organoleptic evaluations it was concluded that developed lipstick formulations were varying from dark maroon colour to light maroon colour. This is because of difference in wax concentrations. Among all formulation F₂ matches with the colour of tamarind extract. All the lipstick formulations were shown smooth texture and very good fragrance. While validating surface anomalies it is been concluded that there is no crystal formation, uneven colour distribution and contamination. pH of all the lipsticks were found to be neutral such that there will not be any kind of discomfort will be observed on topical application. From size and shape analysis it was concluded that developed lipsticks were in shape of rounded smooth tip and diameter of about 10 mm and length of about 40 mm. This could be beneficial in developing them into commercial scale. All the formulations show similar dimensions. From solubility studies it was concluded that lipsticks were partially soluble in organic solvents and completely insoluble in aqueous media. From colour imparting test it was concluded that formulation F₁ and F₂ shown excellent colour imparting property. Among these two F₂ shown similar colour as that of tamarind extract. From melting point analysis it was concluded that all the formulations ranging from 60°C to 61°C hence it is been aid in storage at higher temperature zones and ease in application. Breaking point analysis was confirmed that higher the wax concentration harder will the lipstick formulation. So F₅ shows maximum breaking strength and F₁ shows least values. Perfume stability test confirmed that the formulations retained the fragrance for longer duration. Even though the study was carried out for 30 days there is no change in fragrance was observed. Final conclusion for the present study is that lipsticks can be successfully developed using natural pigment extract and since all the ingredients were from natural sources it is been considered as safer lip care cosmetic.

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REFERENCES

1. Hougeir FG, et al. A review of delivery systems in cosmetics. *Derma Ther.* 2012;25:234-237.
2. Rogers RS, et al. Diseases of the lips. *Cutaneous Med Surg.* 1997;16:328-336.
3. Kadu M, et al. Review on natural lip balm. *Int J Res Cos Sci.* 2015;5:1-7.
4. Rasheed N, et al. Formulation and evaluation of herbal lipsticks. *Res J Pharm Technol.* 2020;13:1693-1700.
5. Jain S, et al. Formulation and evaluation of herbal lipstick by using beet root extract. *Res J Pharmacog Phytochem.* 2022;14:23-25.
6. Bhagwat DA, et al. Formulation and evaluation of herbal lipstick using lycopene extracted from *Solanum lycopersicum* L. *Res J Pharm Technol.* 2017;10:1060-1064.
7. Singu S, et al. Formulation and evaluation of herbal lipstick from broccoli flower extract and analytical bioactive characterization and quantification. *Int J Trend in Sci Res Devel.* 2019;4:407-414.
8. Rao YS, et al. Tamarind *Tamarindus indica* L- A Review. *Ind J Arecanut Spices Med Plants.* 1999;1:127-145.
9. Pooja D, et al. Formulation and evaluation of herbal lipsticks. *Int J Pharm Res.* 2020;2:180-184.
10. Yadav DS, et al. Formulation and evaluations of herbal lipstick. *Int J Pharm Sci Rev Res.* 2016;9:1436-1444.
11. Mishra P, et al. Formulation and evaluation of lipstick containing herbal ingredients. *Asian J Med Pharm Res.* 2012;2:58-60.
12. Pandit D, et al. Formulation and evaluation of herbal lipstick from the extract of Papaya. *Int J Pharm Sci Rev Res.* 2020;63:107-110.
13. Azhary DP, et al. Lipstick formulation to use a natural dye from rambutan (*Nephelium lappaceum* L.) rind extract. *Res J Pharm Bio Chem Sci.* 2017;1:59-63.
14. Bornare A, et al. Formulation and evaluation of herbal lipstick. *Int J Creative Res Thoughts.* 2020;8:2390-2400.
15. Swathi K, et al. Formulation and evaluation of herbal lipstick using Lycopene extracted from *Citrullus lanatus*. *Int J Adv Res Sci Comm Tech.* 2022;2:176-183.
16. Gore TA, et al. Formulation and evaluation of herbal lipstick containing antifungal agent. *Ind Am J Pharm Res.* 2018;8:1298-1310.
17. Karanje PS, et al. Formulation and evaluation of herbal lipstick containing *Amaranthus cruentus* Linn. *Int J Res Anal.* 2020;2:246-255.
18. Patil CD, et al. Formulation and evaluation of sugar cane wax based lipstick. *Int J Trend in Sci Res Devel.* 2019;3:827-829.
19. Kasparaviciene G, et al. Evaluation of beeswax influence on physical properties of lipstick using instrumental and sensory methods. *Evi Comp Alter Med.* 2016;4:1-8.
20. Kruthika S, et al. Formulation and evaluation of natural lipstick from coloured pigments of beta vulgaris taproot. *Res Rev: J Pharm Sci.* 2014;3:65-71.
21. Munawiroh SZ, et al. Development of water in olive oil (W/O) Nanoemulsions as lipstick base formulation. *Int J Pharm Med Biol Sci.* 2017;6:37-42.
22. Pnda S, et al. Preparation and evaluation of herbal lipstick. *J Pharm Adv Res.* 2018;1:117-119.
23. Kamairudin N, et al. Optimization of natural lipstick formulation based on pitaya (*Hylocereus polyrhizus*) seed oil using D-optimal mixture experimental design. *Molecules.* 2014;19:16672-16683.
24. Halakatti PK, et al. Development and evaluation of multiherbal toothpaste. *J Pharm Adv Res.* 2022;5:1639-1645.
25. Verma S, et al. Formulation and evaluation of natural lipsticks prepared from *Bixa orellana* seeds and *daucus carota* root extract and their comparative study. *J Pharm Sci.* 2017;7:131-135.
26. Shayesta K, et al. Formulation and evaluation of beta vulgaris herbal lipstick. *Int J Int Res Technol.* 2022;8:1401-1404.
27. Juhi N, et al. Formulation and evaluation of herbal lipstick prepared from *Crocus sativum* and *Brassica oleraceae*. *Int J Sci Res.* 2020;5:378-383.
28. Jayashri SK, et al. Formulation and evaluation of lipstick from *Beta vulgaris*. *Int J Res Pub Rev.* 2021;2:1650-1653.
29. Jain M, et al. Design, development and characterization of herbal lipstick containing natural ingredients. *Am J Life Sci Res.* 2017;5:36-39.
30. Poomanee W, et al. Application of factorial experimental design for optimization and development of color lipstick containing antioxidant rich Sacha inchi oil. *Pak J Pharm Sci.* 2021;34:1437-1444.
31. Sainath M, et al. Formulation and evaluation of herbal lipstick. *Ind J Adv Res Med Pharm Sci.* 2016;3:2058-2060.
32. Chaudhari NP, et al. Formulation and evaluation of herbal lipstick from Beta vulgaris taproot. *Indian J Drugs.* 2019;7:14-19.