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Research Article

FORMULATION AND EVALUATION OF LIPSTICKS CONTAINING *NEPHELIUM LAPPACEUM* SEED FAT AND OTHER NATURAL INGREDIENTS

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ABSTRACT

Objective: The objective of the study was to formulate and evaluate lipsticks containing seed fat of *Nephelium lappaceum* L. and offer a new prototype of lipstick formulation containing 100% natural ingredients.

Methods: Extraction of the seed fat from *N. lappaceum* was performed using petroleum ether (40–60°C) as the solvent. The coloring matter was obtained by extraction from the shade-dried rhizomes of turmeric (*Curcuma longa*), fruits of sweet paprika (*Capsicum annuum*), and roots of carrot (*Daucus carota*) using suitable non-polar solvents. Different formulations were prepared using varying concentrations of *N. lappaceum* seed fat and beeswax and carrot extract as the main ingredients. The composition that showed optimum consistency and characteristics (Table 1) of a lipstick was finally chosen to prepare lipsticks with different shades. The formulated lipsticks were evaluated using recommended procedures.

Results: Our results revealed that the prepared formulation was good enough to meet the general characteristics for ideal lipsticks. The seed fat of *N. lappaceum* contributed sufficient hardness and luster to the preparations, thus serving as an ingredient in the preparation of lipsticks.

Conclusion: The seed fat of *N. lappaceum* is reported to be edible and compatible with other cosmetic ingredients. In the present study, we have used the seed fat in the lipstick base for the 1st time and attempted to offer a new prototype of lipstick formulation containing 100% natural ingredients. This may serve as a guideline to use natural products in lipstick formulations so as to avoid toxic effects of harmful chemicals otherwise used in synthetic lipsticks.

Keywords: Lipsticks, *Nephelium lappaceum* L., *Capsicum annuum, Curcuma longa*, *Daucus carota*.

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INTRODUCTION

The use of cosmetics has constituted a part of routine body makeup and care since the dawn of human civilization. The cosmetic products are used in many forms with an ultimate aim to improve beautification and pleasure to the sense [1]. Lipsticks are probably the most popular and feminine among the females since it adds life to their early morning face. Lipstick has made an incredible journey from the time of ancient Mesopotamia and Sumerian region in 5000 BC where the females used to color their lips using fragment of bricks and other natural products [2,3]. Over the centuries, lipsticks attained spectacular growth in the cosmetics market were pretty even tempered and acquired many improvements and offered several options to the consumers to choose from a wide range of shades. However, lipsticks often contain harmful chemicals, which may cause cumulative toxic effect to the body on regular use. The presence of heavy metals such as lead, cadmium, and nickel in some lipsticks has been reported by previous researchers [4-7]. The pigments often used in lipsticks are synthetic chemicals, which sometimes become a source of heavy metals. Their presence in the lipsticks may be very small, but it raises concerns about the safety since women apply lipsticks several times a day and continue for the whole lifetime. The exposure to heavy metals adds on long run and can potentially affect their health. Further, incidences of photoallergic dermatitis due to the use of lipsticks have been reported [8]. Therefore, in recent years, a gradual shift from the chemical-based cosmetics to natural product-based cosmetics has gained much importance among the users [9].

The present study was aimed at formulating and evaluating lipsticks containing only natural ingredients. There was no inclusion of any synthetic materials in the formulated lipsticks. Seed fat of *Nephelium lappaceum* L. (Family - Sapindaceae) (Fig. 1) was used in the preparation of the lipstick base for the 1st time. The evergreen tree *N. lappaceum* popularly known as "Rambutan," in Malaysia, is commonly grown for its fruits which are believed to be the potential source of minerals and other nutrients [10]. The fruits are either consumed fresh, canned, or processed, and appreciated for its delicious taste and flavor. The fruits are deseeded during processing in the canning industry and considered as a waste by-product. The seeds contain a good amount of fatty material and have been found to be a source of natural edible fat. The fat is reported to be compatible with other cosmetic ingredients [11].

METHODS

Plant materials

The fresh ripened fruits of *N. lappaceum* were collected from local markets in Ipoh, Perak, Malaysia. The fruits were deseeded and seeds were collected. The collected seeds were washed with water, shade dried, and pulverized to coarse powder. The rhizomes of turmeric (*Curcuma longa*), fruits of sweet paprika (*Capsicum annuum*), and roots of carrot (*Daucus carota*) were procured from the local market.

Extraction of the seed fat

Extraction of the seed fat was performed using petroleum ether (40-60°C) as the solvent. Briefly, the powdered seed (500 g) was extracted with 1.5 L petroleum ether (40–60°C) at 40°C for 1 h. Following extraction, the liquid extract was filtered; the solvent was recovered by vacuum distillation and reused for the seed powder for further extraction. The extraction process was repeated 3 times. The seed fat was pooled from three extractions and stored in a well-closed container until further use.

Extraction of coloring matter
The coloring matter was obtained by extraction from the shade-dried rhizomes of turmeric (*C. longa*), fruits of sweet paprika (*C. annuum*), and roots of carrot (*D. carota*). Extraction of the coloring pigments from the plant materials was performed using non-polar solvents. The plant materials along with the solvent were separately refluxed for 4 h. Following extraction, the liquid extracts were filtered and concentrated under reduced pressure. The extracts thus obtained were either used alone or in combination of different proportions so as to obtain multiple shades of colors.

Flavor
Pure lemon oil was used as a flavoring agent in the lipsticks.

Formulation of lipsticks
Different formulations were prepared using varying concentrations of *N. lappaceum* seed fat and beeswax and carrot extract as the main ingredients. The composition that showed optimum consistency and characteristics (Table 1) of a lipstick was finally chosen to prepare lipsticks with different shades. Natural colors as mentioned above were either used alone or in combination in varying proportions so as to obtain multiple shades of colors.

Preparation of the lipsticks was carried out as suggested by Jain and Sharma [12]. Briefly, the seed fat of *N. lappaceum* and beeswax was mixed and melted at 75°C. Calculated quantities of carrot extract, colors, and flavor were added to the molten mass and immediately transferred to previously lubricated lipstick molds (Fig. 2). The preparation was kept at room temperature for 30 min and then stored in a refrigerator for 1 h.

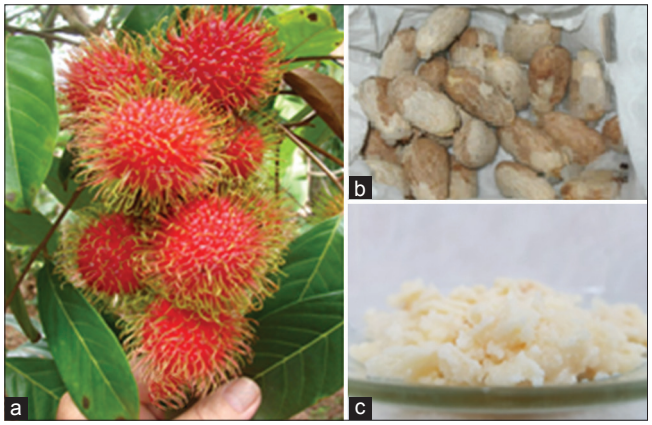

Fig. 1: (a) *Nephelium lappaceum* L. fruits; (b) seeds; (c) seed fat

Fig. 2: Formulated lipsticks

Evaluation of the lipsticks
The formulated lipsticks were evaluated for color, breaking point, melting point, surface anomalies, ease of application, aging stability, solubility, and skin irritation test using recommended procedures [13,14]. The results of the study are presented in Table 2.

Physical appearance
The lipsticks were evaluated for color and uniformity of color distribution.

Melting point
Approximate temperature of melting was noted.

Breaking point
Breaking point was determined to access the strength of the lipsticks. The lipsticks were separately held horizontally in a socket about half inch away from the edge of support. Gradual increasing weights (10 g every time successively) at specific interval of 30 s were loaded until the lipsticks broke. The final weight at which the lipstick broke was considered as the breaking point.

Surface anomalies
Surface anomalies were observed from the surface defects if any, such as the absence of crystal formation on the surfaces or contamination by molds, fungi, etc.

Aging stability
The lipsticks were stored at 40°C for 1 h. Different parameters such as bleeding and ease of application were noted.

Solubility test
The formulated lipsticks were dissolved in different solvents to observe their solubility.

Skin irritation test
The lipsticks were applied to the skin surface and allowed to remain for 30 min.

Perfume stability
The formulated herbal lipsticks were tested after 30 days, to record fragrance.

RESULTS AND DISCUSSION

The percentage yield of the seed fat was 22.4% w/w with respect to the dried seeds. All formulated lipsticks showed good texture and consistency for application.

Table 1: Formulation of natural lipsticks

Ingredients	Composition
Seed fat of N. lappaceum	50%
Beeswax	49%
Carrot extract	1%
Extracts of color (for different shades)	q.s
Lemon oil	q.s

N. lappaceum: Nephelium lappaceum

Table 2: Evaluation of lipsticks

Parameters	Characteristics
Color	Uniform
Melting point (°C)	50–60
Breaking point (g)	80–90
Surface anomalies	No defects
Ease of application	Good
Aging stability	Good
Solubility test	Chloroform
Skin irritation test	No irritation
Perfume stability	Good

The formulated lipsticks were evaluated for color, breaking point, melting point, surface anomalies, ease of application, aging stability, solubility, and skin irritation test using recommended procedures. The results of the study are presented in Table 2.

Our results revealed that the prepared formulation was good enough to meet the general characteristics for ideal lipsticks. The seed fat of *N. lappaceum* contributed sufficient hardness and luster to the preparations, thus serving as an ingredient in the preparation of lipsticks. The use of natural ingredients in the formulations further supports safety aspects of the lipsticks which are free from toxic effects.

CONCLUSION

The seed fat of *N. lappaceum* is reported to be edible and compatible with other cosmetic ingredients. In the present study, we have used the seed fat in the lipstick base for the 1st time and attempted to offer a new prototype of lipstick formulation containing 100% natural ingredients. This may serve as a guideline to use natural products in lipstick formulations so as to avoid toxic effects of harmful chemicals otherwise used in synthetic lipsticks. The prepared lipstick formulation showed excellent properties such as shining, spreading, and smoothness of lips after application. Further studies through a detailed clinical trial may be suggested to ensure safety of these formulations.

AUTHOR'S CONTRIBUTIONS

The corresponding author (Dr. Gouri Kumar Dash) is the principal investigator of the present research work who designed the work, collected the materials for the study, and prepared the manuscript. The second and third authors performed the experiment, reviewed the manuscript, and monitored overall performance of the project.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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