RESEARCH ARTICLE

Comparative Evaluation of Herbal Lip Balms Formulated Using Various Natural Bases

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ABSTRACT

The demand for natural cosmetics, including lip balms, has increased in recent years. Studies on the physicochemical characteristics of the designed lip balms are scarce, though. As a result, this comparative study aims to develop lip balms with carrot root extract as a coloring pigment using various natural bases and test the physicochemical characteristics of developed lip balms in order to prepare the best formulation. Four distinct softening agents (White soft paraffin, mango butter, avocado butter, and kokum butter) and two distinct hardening agents (Candelilla wax bees wax) were combined in varying amounts to prepare eight different lip balm formulations. The formulations were subjected to various physicochemical evaluation studies such as melting point, breaking point, spreadability, water resistance and organoleptic evaluation like color and texture. According to this study, carrot root extract may be used as a natural coloring agent in lip balm formulations because of its antioxidant properties. The results showed that the four formulations with mango butter:bees wax (1.5:1), white soft paraffin:Candelilla wax(2:1), Mango butter:Candelilla wax(2:1) and Kokum butter: Candelilla wax(2.5:1) were the best when compared to standard. The research study's findings suggested that in the future, candelilla wax and mango butter can be effective alternatives for others as hardening and softening agents, respectively.

Keywords: Lip balm, Carrot root extract, Hardening agent, Softening agent, Formulation, Physicochemical evaluation.

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INTRODUCTION

The use of cosmetics has been followed for many years and its practice is continued today because of increasing awareness of personal beauty and body care. Consumer interest in cosmetics is on the rise, which has increased the demand for precision and scientific support during the development and production of cosmetic products. At present, men and women of every age rely on herbal cosmetics rather than synthetic one because of assurity having no side effects. As far as India, we have used herbal products for centuries and the main source of information is Ayurveda. Consumers nowadays are searching for natural-based cosmetic products to avoid any side effects and allergic reactions for the safety of their health.[1,2]

Lip balm is a product that is used to protect lips rather than modify/decorate them. They develop an oleaginous film that is adherent and moisture-resistant. Lip balm a cosmetic product that both men and women use to keep their lips healthy. Lip balms are widely used to protect the lips and maintain their moisture. It also enhances the appearance of the lips and protects from sores. The purpose of the formulation of herbal lip balms is to protect the lips and keep them healthy without any chemical parameters involved.[3,4] Even though natural colorants are non-toxic and eco-friendly, they still have some drawbacks when compared to synthetic ones, such as less stability. However, people prefer natural pigments over synthetic colorants which are safe or even beneficial as antioxidants.[5,6]

Beeswax, candelilla wax (Hardening agents), kokum butter, mango butter, avocado butter, white soft paraffin (Softening agents), and a natural coloring agent are among the natural ingredients used in the formulation of natural lip balm.[7,8] The plant *Daucus carota*, or carrot roots as it is more commonly known, can serve as a natural coloring source. Numerous active ingredients found in carrot root extract, including α-tocopherol, polyacetylenes, phenolics and carotenoids, act as antioxidants and have positive effects on the body. Therefore, the use of carrot root extract in the formulation of lip balm can be profitable to the lips, especially as a layer protection when

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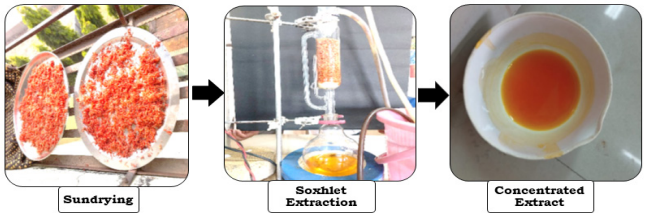


Figure 1: Extraction of carotenoids

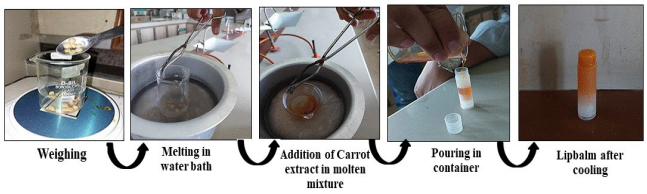


Figure 2: Formulation of Lip balms

applying to lips. The primary reason for its use as a coloring agent is that it has no harmful effects on humans and can be used as a natural substitute for red dyes.[9]

MATERIALS AND METHOD

Materials

Daucus carota roots were obtained from the local market of Jadhavwadi, Chikhali region of Pimpri, Chinchwad. N-hexane was purchased from Finar Chemicals Ahmedabad. Mango butter and avocado butter were purchased from Purenso Global Indore. Candelilla wax was purchased from 'Ibbani Fresh and Pure', Bengaluru through online mode. Bees wax, kokum butter and White soft paraffin (WSP) were purchased from local suppliers.

Formulation Method

Step I

Daucus carota was washed properly and grated. This material was sun-dried for 2 days and stored in an airtight container. The raw material drug was extracted with n-hexane by Soxhlet extraction. The extract obtained was concentrated and cooled. The whole process was represented in Figure 1.

Step II

Lip balm was formulated using different ratios of Bees wax(BW) and Candelilla wax(CW), which act as hardening agents in combination with white soft paraffin (WSP), mango butter (MB), avocado butter (AB) and kokum butter (KB) separately which act as softening agents. The combined mixture of beeswax and different kinds of butter was melted separately with the addition of carrot root extract along with castor oil and vitamin E and the molten mixture was added in the wells of precooled stainless-steel molds.[10]

After cooling, Four formulations were obtained named F1, F2, F3, F4 and again, the same process was repeated with candelilla wax and different kinds of butter separately, which resulted in four other formulations named as F5, F6, F7, F8, respectively. The whole process was represented in Figure 2 The ratios of different waxes and butter was shown in Table 1.

Evaluation Method

Organoleptic characteristics

The color and texture were determined by visual observation. Color was observed by placing the lip balms on white background and observing under fluorescent white light. The texture was observed during the spreadability as well as the applied area.[11]

Color of applied area

The lip balm stick was evenly spread on the sheet of paper and uniformity was observed.[11]

Breaking point

Determination of the breaking point is useful for knowing the strength of the solid formulation obtained. The lip balm stick was placed horizontally and loaded with weight and further addition of weights was done until the stick broke and parts in two different parts.[12]

Melting point

Determination of melting point is important for stability. Melting point can vary according to the proportion of the ingredient used. The melting point was determined using the capillary tube method, where the required amount of formulation was filled in the capillary tube and kept in the capillary apparatus. The formulation starts melting slowly with a rise in temperature and the melting point is determined.[12]

Water resistance

Water was sprinkled on the applied area of the lip balm and observed for 4 hours for resistance. The significance of this test is to determine the long-lasting effect of the lip balm on the lips with resistance to water, food, and other drinks.[12]

Spreadability test

A fixed amount of lip balm was applied on the top surface of the glass slide, and a spreading tool was used to evenly distribute it. The thickness of the layer and the time taken to spread it were measured, maintaining consistent pressure and technique. The spreadability was evaluated based on the uniformity of

Table 1: Different proportions of waxes and butter

S. No	*Using Beeswax As a Hardening agent*		*S. No.*	*Using Candelilla wax As a Hardening agent*	
F1	WSP:BW	2:1	F5	WSP: CW	2:1
F2	MB:BW	1.5:1	F6	MB: CW	2:1
F3	AB0:BW	2:1	F7	AB: CW	2:1
F4	KB:BW	2.5:1	F8	KB: CW	2.5:1

Table 2: Spreadability status of lip balm samples

Status	*Criteria*
Good	homogeneous, leaves no fragments behind, flawless application
Intermediate	homogeneous, leaves few fragments, appropriate application.
Bad	Not homogeneous, leaves no fragments, improper application

the layer and ease of spreading, with results documented for comparison against established criteria as per Table 2. The test was repeated to ensure accuracy and reliability.[13]

RESULTS AND DISCUSSION

Various evaluation parameters were studied to predict the physical, chemical and physiochemical changes that may occur from product manufacturing to the end of its shelf life. The color range of lip balm was found to be yellow to dark orange depending on the concentration of extract. The orange color of the lip balm was due to the presence of carotenoid pigment. It was represented in Figure 3.

Texture

The texture of lip balm was found to be smooth when applied. The smoothness was due to the addition of castor oil.

Size and Dimension

measured with the help of a ruler scale. The dimensions were found to be similar for all the lip balms due to the preparation of lip balms in same molds. The average length and width of the lip balm stick were found to be from 33 mm ± 2 and 1mm, respectively.[9] It was represented in Figure 4.

Color of Applied Area

Color of applied area was shown as per Figure 5.

Breaking Point

Breaking point of lip balms, which contained beeswax was found to be less in comparison to the candelilla wax. The average range of breaking point of the stick where beeswax is used was found to be 150 to 300 gm and in case of candelilla wax, it was found to be 200 to 300 gm.

Melting Point

The melting point is determined by the capillary method. The sticks formulated using beeswax started to melt at 50ºC and completely melted between 57 to 60ºC, were the sticks formulated using candelilla wax started to melt between 61 to 63ºC and completely melted between 72 to 75ºC.

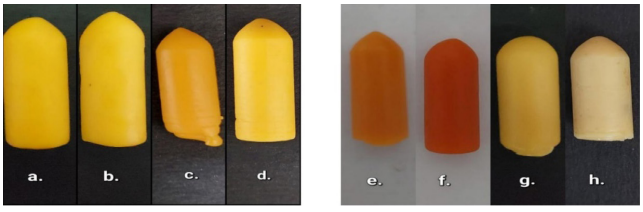


Figure 3: Color of various lip balms with carrot extract labeled as a, b, c, d containing the composition of beeswax with different butters and e,f,g,h containing the composition of candelilla wax with different butters

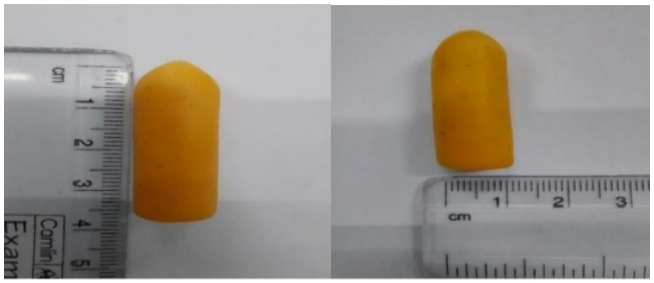


Figure 4: Size and dimension of lip balms

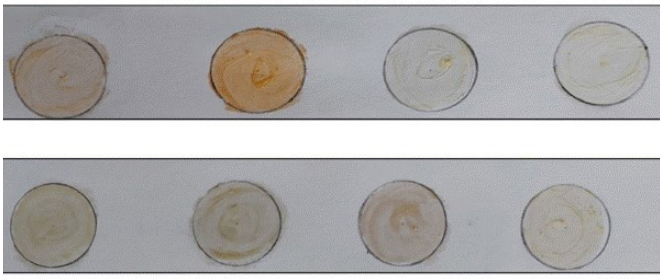


Figure 5: The color of applied area

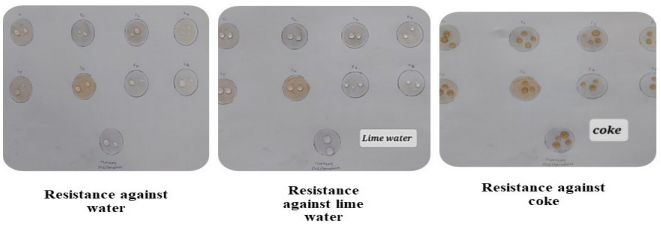
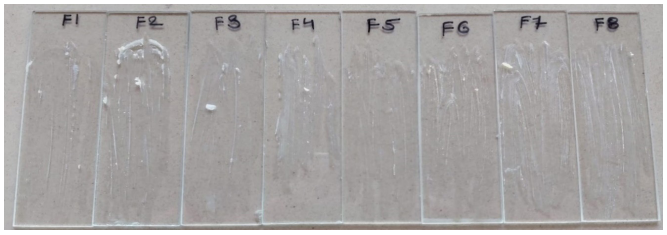


Figure 6: Water resistance



*All parameters were evaluated in triplicate. Spreadability: G-Good; I-Intermediate; B-Bad

Figure 7: Spreadability test

Water resistance

All the lip balm sticks were found to be water resistant. It also showed resistance against lemon, water and coke represented in Figure 6

Table 3: Physico-chemical parameters of herbal lipbalms formulated using different bases

S. No.	*Parameter*	*F1 Wsp:bw*	*F2 Mb:bw*	*F3 Ab:bw*	*F4 Kb:bw*	*F5 Wsp:cw*	*F6 Mb:cw*	*F7 Ab:cw*	*F8 Kb:cw*	*Marketed Formulation*
1.	Color	Yellow	Dark yellow	Light orange	Caramel	orange	Dark orange	caramel	caramel	white
2.	Texture	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft
3.	Size and dimension	L=35 mm W=1 mm	L=35 mm W=1 mm	L=33 mm W=1 mm	L=35 mm W=1 mm	L=34 mm W=1 mm	L=35 mm W=1 mm	L=35 mm W=1 mm	L=35 mm W=1 mm	L=35 mm W=1 mm
4.	Color of applied area	Caramel	Dark caramel	Light orange	Light yellow	orange	Dark orange	Light yellow	caramel	White
5.	Breaking point (Load in g)	158	201.2	106	316	200.8	201.4	311.8	204	106
6.	Melting point (^{o}C)	52–57	52–60	53–59	49–57	62–76	61–72	64–75	63–75	51–59
7.	Water resistance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8.	Speadability	I	G	I	I	G	G	I	I	G

Spreadability

Figure 7 illustrates the sensory (naked eyes) observation of the deformation or breakdown of the lip balm sample, which was compared with the standards mentioned in Table 2.

In the end, all the results of 8 formulated herbal lip balms were compared with the standard(marketed formulation) mentioned in Table 3

CONCLUSION

The study proves that better quality of lip balms can be formulated by the use of various Softening and hardening agents(bases) at optimum concentration and carrot root extract. Due to growing awareness of the adverse side effects associated with unnatural or chemically produced lip balm ingredients, there is a significant demand for lip balms formulated with all-natural substances that offer moisturizing benefits. Research has concluded that carrot root extract can be used as a natural colorant in herbal lip balm formulations. The results showed that four formulations F2, F5, F6, F8 with mango butter:bees wax (1.5:1), white soft paraffin:Candellila wax(2:1), Mango butter:Candellila wax(2:1) and Kokum butter: Candellila wax(2.5:1) respectively were the best when compared to standard.

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Disclosure Statement

The authors declare that in this work there is no potential conflict of interest.

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