Production and analysis of Lip Balm using herbal resources

ABSTRACT

Lip care products are an integral part of a day-to-day lifestyle. These impart the colour and protect the lips from the external environment. The major function of lip balm is to protect and moisturize the lips. A variety of lip care products are available in the market. The main concern with this product is that these contain synthetic colourant and flavouring agents that may have adverse effects such as darkening of lips. Besides, these may contain heavy metals that adversely affect various body organs. The current research work deals with preparation lip balm by using maximum possible natural ingredients and evaluation of the formulation. Various natural ingredients used were beetroot extract, Cocoa powder, Almond oil and Vitamin E. The physicochemical properties such as colour, odour, consistency, spreadability, melting point, pH and stability were studied. It was found that the formulation possesses red colour due to the addition of beetroot pigments, it had a typical flavour of cocoa powder, uniform in consistency and good spreadability. The melting point and pH of formulation were found to be 58-60°C ± 0.62 and 6.9 ± 0.25 respectively. The stability study indicated that formulation is stable at room temperature and refrigeration temperature. It can be concluded that lip balm formulation was successfully prepared by using these natural additives and better alternatives to synthetic excipients.

Keywords: Lip balm, Natural ingredients, Beetroot, Cocoa powder, Almond oil.

1 INTRODUCTION

Cosmetic formulations had become part and parcel of lifestyle in today's scenario. The variety and usage of cosmetic are increasing day by day. Numerous national and international manufacturers are engaged in cosmetic manufacturing. The cosmetic market is growing rapidly. The application of herbal cosmetics in the personal care product is more trending. This may be associated with health hazards and several side effects of synthetic chemicals and their derived products. These are also responsible for the adverse effect on the ecosystem and pollution. Consumers are more concerned about choosing cosmetic products. To get better health herbal products are great in demand. Current trends in cosmetics and cosmeceuticals are inclining towards natural or herbal formulation. Cosmetic containing herbal actives having more applications in skin and hair care products [1-3]. Herbal cosmetics composed of bioactive which are valuable to skin and improves the biological function of the skin by providing useful nutrients [4]. Medicinal plants from traditional cultures are gaining more popularity as a natural alternative to synthetic chemicals [5].

The beauty of the lips can be enhanced by the colouring of the lips, it also improves overall face glamour. Various lip care and makeup products mainly include lipstick, lip balm, lip jelly. The major role of lip care products is to impart attractiveness, retain moisture, protect against harmful ultraviolet rays, etc. [6]. Lip skin is thin and different from other body parts. It does not have hair follicle, sebaceous and sweat glands. It is devoid of an inherent mechanism to retain moisture and protection from the external environment [7]. Hence lips need more care, protection and moisture retention. Low-quality products can cause drying and pigmentation or discolouration of lips. Especially certain ingredients like phenol or menthol are harmful to lips [8]. As compared to the adverse effect of certain synthetic ingredients like artificial colourants and flavours; herbal ingredients are skin-friendly and free from side effects [9].

Lip balm is a wax-like substance applied topically to the lips to moisturize. Lip balms are designed to protect the lips from the external environment like cold in winter and prevent drying, chapping of lips. The protection of lips helps to prevent irritation and infection. Occlusive lip balms prevent saliva from wetting the skin repeatedly. It also reduces the pain associated with chapped lips. Ingredients used in the preparation of lip balm maintain the lip moist and promote healing of chipped lips [10]. As compare to lipsticks, lip balms

are not gender-specific. Most of these are waxy texture. The minimum expectation from consumer of lip balm is to form thin occlusive film over the lips. So the formulation preparation is less complex task. [11, 12]. It is advisable to apply lip balm around the edges of lips before applying lipstick as balm fix lipstick in place. It is less expensive than lipstick.

Plenty of personal care products are available in the market. Though some experts may prefer to prepare and sell homemade herbal cosmetics. The current research work aims to prepare and evaluate herbal lip balm by using easily available ingredients for the protection of lips. It will also add attractiveness and glossy appearance to lips. It will explore the new use of natural products with easy manufacturing steps.

2 MATERIAL AND METHODS

Beetroot was procured from the local market, Almond oil, cocoa powder, petroleum jelly was purchased from Loba Chem. Vitamin E capsules were purchased from a local pharmacy, Pune, India. All the other ingredients used were of analytical grade.

Isolation of colour pigments from beetroot

Isolation was carried out by the method described by Udonkang et al. (2018) by adopting ethanol as a solvent [13]. Beetroots were cleaned and peeled. 100 g. of Peeled mass was cut into small pieces and subjected to a mechanical stirrer to convert it into pulp. This pulp was mixed with 100 ml of ethanol and stirred on a magnetic stirrer for half an hour. The content was filtered out by whatman No. 1 filter paper and ethanol is allowed to evaporate off.

2.1 Preparation of lip balm

Lip balm was prepared by the method reported by Fernandes et al. (2013) with certain modifications [14]. The composition of lip balm was shown in Table 1. Petroleum jelly was taken in a porcelain dish and heated in a heating mantle at 55-60^{0}C till molten mass is formed; to this cocoa butter and almond oil was added. The mixture was thoroughly stirred and the temperature was lowered slowly with stirring. To this semisolid mass beetroot pigment and vitamin E were added; further, the mixture was stirred to get a uniform mixture. This mass was then poured in the collapsible tube.

Table 1. Composition of lip balm formulation

Ingredients	Quantity	Uses
Petroleum jelly	15.09 gm	Base
Cocoa powder	0.1 gm	Flavouring agent
Almond oil	1 ml	Moisturizer and emulsifying agent
Vitamin E	100 mg	Antioxidant and stabilizer
Beetroot pigment	4 ml	Colouring agent

2.2 Evaluation parameters

2.2.1 Organoleptic properties

The formulation was studied for physical appearance, colour and odour. These characteristics were evaluated by physical observation. Texture and homogeneity were tested by pressing a small quantity of the formulation between the thumb and index finger. The presence of coarse particles and consistency were used to evaluate the texture and homogeneity of the formulations. Skin feel (including stiffness, greasiness, and grittiness) was also evaluated.

2.2.2 pH

One gram of formulation was dispersed in 25 ml of distilled water. The pH of the formulation was determined by a pH meter (Mettler Toledo) previously calibrated with a standard buffer solution (pH 4, 7 and 10). Measurement was carried out in triplicate [15].

2.2.3 Melting point

The melting point was determined by the melting point apparatus (Veego, India). Briefly, one end of the capillary was sealed; the formulation was inserted from another end in the capillary up to a certain height. The capillary was subjected to melting point apparatus and the temperature at which the mass was melted was noted.

2.2.4 Test for spreadability

Spreadability was determined using glass slides. The formulation was sandwiched in between two slides and load was applied; the formulation was spread over the slides. Visual observation was carried out with respect to the uniformity in the formation of the layer [16].

For this test, the following criteria were established:

G - Good: uniform

I – Intermediate uniform; leaves few discontinuations

B - Bad: not uniform

2.2.5 Skin sensitivity

It was carried out by applying the product in the form of a patch on the skin for 30 minutes and observes the reaction as

N- No reaction

R- Redness of the skin

I- Irritancy or itching

2.2.6 Stability test

The lip balm formulation was evaluated for stability for 30 days under the various temperature conditions mainly room temperature (25 ± 2°C), the higher temperature in an oven (40± 2°C) and refrigerator (5 ± 2°C). The characteristic such as organoleptic properties and spreadability was assessed on the 7th, 15th and 30th day [17].

3 RESULTS AND DISCUSSION

Lips have very thin skin and very susceptible to drying out, ultimately chipping of lips takes place. Applying lotions and creams on chipped lips are impractical as these are water-soluble have very little retention on lips. Ointments suffer from stickiness; hence lip balm is the best alternative to apply on lips. Lip balm retains the moisture and prevents chipping. Synthetic dyes, flavours and other ingredients may harm lips as these may cause drying of lips, allergic reaction and darkening. The current research work aims to prepare lip balm containing the maximum possible herbal ingredients. To impart the attractiveness to lips as well as to enhance the aesthetic appeal of the cosmetic formulation selection of colouring agents is of utmost importance. In this formulation, the colouring agent was used as beetroot pigments. The beetroot is an easily available resource of red and yellow colour pigments. These pigments are known as betalains.

These consist of betaxanthines which responsible for the yellow colour and betacyanins produce the red colour. The major constituent of betacyanins is betanin that accounts for 75-95%, which imparts red colour to beetroot. Retention of colour pigments is important for the visual appeal of the formulation. The current study is also focused to impart a red colour to the formulation; hence beetroot is selected as a major source of colour pigment [18]. In addition to that betanin also possess antioxidant potential and found to constrain lipid peroxidation [19-21]. The extracted pigment is shown in Fig. 1.

Fig. 1. Extracted beet root pigment

Besides, vitamin E is added as antioxidant to prevent oxidation of formulation. Vitamin E also helps to make lips softer and more resistant to damage. Cocoa powder is one of the key excipients in food and pharmaceuticals. In this formulation, cocoa powder is used as a natural flavouring agent. The flavour is a significant parameter for the consumer. The cocoa flavour is natural, characteristic and attractive. Cocoa contains volatile constituents such as esters, pyrazines, aldehydes, organic acids, and diketopiperazines that impart aroma [22]. Cocoa also composed of alkaloids like methylxanthine, proteins and carbohydrates. Reducing sugar and protein that interacts through Millard reaction that yields a characteristic chocolate-like flavour [23, 24]. Almond oil used as a moisturizing and emulsifying agent. It contains fatty acids that retain moisture in the skin and promote healing of chapped lips. The emollient property helps to keep the lip soft and smooth. Besides Almond oil rejuvenates lips by removing dead skin cells and lightens lips. [25]. By considering the various advantages of natural ingredients lip balm formulation was prepared. The prepared formulation is shown in Fig.2.

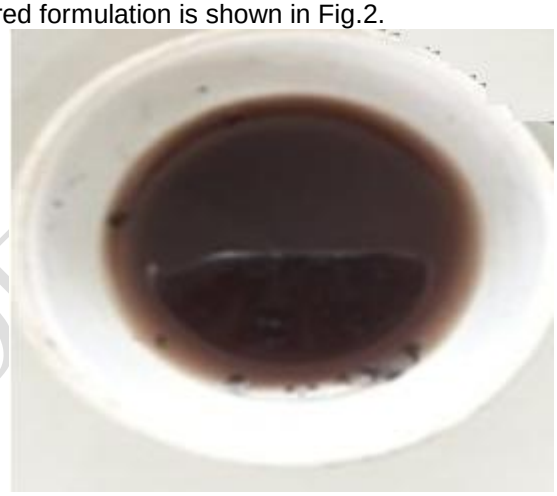

Fig.2. Formulation of Lip Balm

The formulation is evaluated for physical appearance, colour and odour. It was found that the lip balm was dark red in colour and possesses a characteristic smell of cocoa. It was free from gritty particles and lumps. It was homogeneous, non-greasy and smooth in texture. The pH of the formulation was found to be 6.9 ± 0.25, which indicates a neutral pH of a formulation. This result showed that the formulation pH was safer to apply on the lips. The melting point was found in the range of 58-60°C ± 0.62. The melting point range for lip balm was 55-75°C as reported by Mariani et al. (2007) [26]. Thus obtained value of the melting point falls within the general range of melting point. It also matches with the melting range of petroleum jelly.

Lip balm is intended to apply topically; the efficiency of formulation depends on spreadability [27]. Therefore test for spreadability was performed. It was determined using glass slides and graded on various scales starting from good to bad. The prepared formulation showed good spreadability and uniform film formation. A skin sensitivity test is carried out to check the allergic reaction of formulation with skin components. It was

carried out by applying the product in the form of a patch on the skin for 30 minutes and observed the reaction. Results showed that the formulation is compatible with skin and no redness or allergic reaction was found. These results were indicative of the safety of the formulation for topical use.

The stability of the formulation at different temperatures was checked and graded as Normal and Modified. Organoleptic characteristics, consistency and spreadability were kept as parameters for the stability study. It was found that at room temperature and refrigeration conditions these parameters were found normal but slightly modified at oven condition. Consistency was found to be soft at oven temperature. There was no change of colour at room temperature and refrigerator and at oven temperature, it was slightly faded. Kaym and et al. also reported that beetroot pigments were stable at lower and room temperatures but starts degrading at a higher temperature above 35°C [28]. The odour was found stable for all temperature conditions throughout 30 days. Consistency was found uniform for room temperature and refrigeration but softness was observed at a higher temperature. Spreadability was found good for room temperature and refrigeration and uniformity of the film remained for 30 days. However, at oven temperature, it was slightly modified due softening of petroleum jelly. The film was discontinuous and slight deformation was observed at a higher temperature. All these results were shown in Table 2. These results were in agreement with a study carried out by Ajit et al. 2018 [28].

Table 2. Stability data of lip balm formulation

Parameters	Storage condition								
	Room temperature (25± 2°C)			Refrigeration(5±2°C)			Oven (40± 2°C)		
	7th d	15th d	30th d	7th d	15th d	30th d	7th d	15th d	30th d
Colour	N	N	N	N	N	N	M	M	M
Odour	N	N	N	N	N	N	N	N	N
Consistency	N	N	N	N	N	N	M	M	M
Spreadability	G	G	G	G	G	G	B	B	B

N-Normal, M-Modified, G- Good, B-Bad

To summarize organoleptic properties, consistency and spreadability were found to be stable at room temperature and refrigeration but colour, consistency and spreadability were changed with increasing temperature at the oven. Hence formulation must not store above 40°C.

4 CONCLUSION

The aim of current research work was to prepare lip balm by using maximum possible natural ingredients. Mainly beetroot extract chosen as a colouring agent, Cocoa powder was used as a flavouring agent, Almond oil was used as an emulsion stabilizer and emollient, Vitamin E capsule was used as an antioxidant. The effects of these ingredients on physicochemical properties such as organoleptic characteristics, melting point, consistency and spreadability on formulation were studied. It can be concluded that lip balm formulation was successfully prepared by using these natural additives. Results of various tests implied that the formulation passed various physicochemical tests and safe to use. Based on stability data, the storage condition for the formulation is at room temperature. In the current formulation, petroleum jelly was used as a base, in the future; it can be replaced with a natural base like beeswax shea butter, etc.

Ethical Approval:

As per international standard or university standard ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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