



FORMULATION AND EVALUATION OF CASTOR OIL (*RICINUS COMMUNIS* L.) LIP BALM FOR MOISTURIZING DRY LIPS

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Abstract

Cosmetics today are not only used for beautification but also for maintaining health. One cosmetic product that has gained special attention is lip care cosmetics. Natural lip balms offer the significant advantage of minimal side effects. This study aims to design and evaluate a castor oil-based lip balm (*Ricinus communis* L.) as a natural moisturizer. Three lip balm formulas were developed with varying concentrations of castor oil, cera alba, cera flava, and additional ingredients such as vaseline album, glycerin, propyl paraben, and BHT. The evaluation included organoleptic, homogeneity, and pH tests. The results showed that Formula II, containing 10% castor oil, delivered the best results, offering a softer, more moisturizing texture, an optimal maroon color, a strong grape essence aroma, and good homogeneity. Additionally, Formula II had a pH of 6.5, which aligns with the physiological pH of the lips. Based on these results, Formula II is considered the most effective and safe lip balm. This study highlights the great potential of castor oil in natural cosmetic formulations that provide protection and hydration for the lips.

Keywords: *Castor Oil, Dry Lips, Lip Balm, Ricinus communis*

Introduction

Cosmetics come from the English word "cosmetics," which is derived from the Greek word "kosmein," which means "to decorate" (Tampubolon, 2023). The use of cosmetics has been known for centuries, and by the 19th century, cosmetics were regarded not only as beauty enhancers but also for health purposes (Adianti & Ayuningrum, 2023). Cosmetics are substances or preparations intended to be applied to the external parts of the human body (such as the epidermis, hair, nails, lips, and external genital organs), or to the teeth and oral mucosa. Their primary purposes include cleaning, adding fragrance, altering appearance, improving body odor, and protecting or maintaining the body's health (BPOM, 2015). Among the cosmetics receiving particular attention today are those designed for lip care.

Lips play a significant role in influencing facial aesthetics. However, due to their limited protective function, they are highly susceptible to environmental factors, as well as various health and cosmetic products, which can lead to damage. Common issues include dry, chapped lips and



loss of color, which not only reduce attractiveness but also cause discomfort and pain (Hanum *et al.*, 2021).

Several types of lip cosmetics are available, such as lipstick, lip gloss, lip balm, liquid lipstick, and lip liner (Tampubolon, 2023). Lip balm, specifically, is used to care for the lips, containing moisturizers and vitamins to maintain lip health (Laila & Wahyuni, 2019). Lip balm is typically made from natural or synthetic waxes, fats, and oils to prevent dryness and protect lips from environmental stressors (Rasyadi, 2022).

However, the use of harmful chemicals in some lip balm products can cause irritation, contradicting the product’s intended role as a lip protector. Natural lip balms are considered safer than synthetic ones, which may cause side effects and skin damage (Tampubolon, 2023). Natural ingredients are preferable due to their lower risk of causing side effects, particularly with long-term use. As a result, natural ingredients are increasingly popular in cosmetic formulations, including lip balms (Laila & Wahyuni, 2019).

One plant used in cosmetics is castor oil, which is a triglyceride composed of various fatty acids such as ricinoleic, oleic, linoleic, palmitic, stearic, and dihydroxy stearic acids (Putri *et al.*, 2021). This oil is extracted from the seeds of the castor plant (*Ricinus communis* L.) and is utilized across various industries, including chemicals, perfumery, and pharmaceuticals. In cosmetic preparations, particularly lip products, castor oil is commonly used to disperse colorants evenly. Castor oil is relatively non-toxic and non-irritating, with functions such as dissolving dyes, stabilizing pigments, and enhancing the shine and flexibility of wax blends (Putri *et al.*, 2021). The aim of this study was to formulate castor oil as a natural moisturizer base in combination with cera alba and cera flava, along with Vaseline album as the base in lip balm formulation, and to conduct evaluation tests on these formulations (Ningrum & Azzahra, 2022).

Material and Methods

This study used an experimental research method aimed at designing, formulating, and evaluating lip balm with castor oil as a moisturizer, using variations in the formula. The research was conducted in the Non-Sterile Laboratory of the Pharmacy Building at the State Islamic University of Maulana Malik Ibrahim Malang.

Tool and Material

The tools used in this study included a stirring rod, evaporating cup, horn spoon, weights, ruler, oven, graduated cylinder (Iwaki), glass slide, analytical balance (Excellent DJ-Series), water bath (Mettler), pH meter (Mettler Toledo), dropper, spatula, and lip balm containers (as needed). The ingredients used were castor oil, glycerin, cera alba, cera flava, butyl hydroxytoluene (BHT), propyl paraben, Vaseline album, coloring agents, and fragrance obtained from Merck, Germany.

Method

Formulation making lip balm

Formulation stock moisturizer lips (lip balm) made like on table following:

Table 1. Composition of castor oil formula

| Component | Formula (g) | | |
|----------------|-------------|-------------|-------------|
| | F1 | F2 | F3 |
| Castor oil | 2.7 | 3.6 | 6.6 |
| Cera flava | 2.82 | 1.5 | 0.9 |
| Cera alba | 4.87 | 3.6 | 3.6 |
| Glycerin | 2.4 | 3.6 | 3.6 |
| Propyl paraben | 0.06 | 0.06 | 0.06 |
| BHT | 0.0006 | 0.0006 | 0.0006 |
| Fragrance | 0.15 | 0.15 | 0.15 |
| Color | 3 | 0.03 | 0.03 |
| Vaseline album | Add to 30 g | Add to 30 g | Add to 30 g |

First, the ingredients—castor oil, glycerin, cera alba, cera flava, propyl paraben, BHT, and vaseline album—are weighed according to the formula design. Cera alba and cera flava are melted in a water bath at 62°C until fully liquefied. Vaseline album is melted separately in a cup over a water bath at 33°C and then added to the melted cera mixture at its melting temperature. Afterward, glycerin, propyl paraben, and BHT are added, and the mixture is stirred until it becomes homogeneous. Finally, the dye and flavor are incorporated, and the mixture is left to cool slightly before being poured into containers and allowed to solidify (Laila, 2020).

Evaluation Preparation Moisturizer Lips

Test Organoleptic: The organoleptic test aims to evaluate the appearance, odor, color, and texture of the formulated lip balm. This test is conducted by observing the color, aroma, and texture of the lip balm (Agustiana & Herliningsih, 2019). Observations are made at a controlled room temperature (26°C ± 2) on days 1, 7, 14, 21, and 28 of storage.

Test Homogeneity: The homogeneity test is conducted to detect the presence of coarse grains when the lip balm is applied to a glass slide. The presence of such grains indicates that the lip balm is not homogeneous, suggesting that the components are not evenly dispersed (Supartiningsih *et al.*, 2021). To perform the test, a small amount of the lip balm is applied onto a glass slide, covered with another glass slide, and pressed. The sample is then observed for homogeneity. The lip balm is considered homogeneous if no solid grains or colored spots are visible. This test is conducted on days 1, 7, 14, 21, and 28 (Laila *et al.*, 2019).

Test pH: The pH test is conducted to determine the acidity level of the lip balm and ensure that it meets the physiological pH requirements of the lips. According to SNI 16-4399-1996, the pH of lip balm should range between 4.5 and 8.0 (Imani & Shoviantari, 2022). The pH measurement is performed using a calibrated pH meter, with readings taken three times. The electrode of the pH meter is inserted into the lip balm preparation and left until the reading stabilizes. The pH of the lip balm should be between 4.0 and 6.5, which aligns with the physiological pH of the lips. This test is conducted on days 1, 7, 14, 21, and 28 (Yulyuswarni, 2018).

Results and Discussion

In this formulation, cera alba and cera flava are used as base and stiffening agents, providing the lip balm with a dense or firm texture (Rowe *et al.*, 2009). Since the texture of Formula I was too hard, the amounts of cera alba and cera flava were reduced in Formulas II and III. Castor oil was used at concentrations of 5%, 10%, and 12.5% in Formulas I, II, and III, respectively, serving as both an active ingredient and emollient within the appropriate range (Rowe *et al.*, 2009). The addition of castor oil improved the softness and moisture of the lip balm. Other ingredients included BHT as an antioxidant, glycerin as a humectant, propyl paraben as a preservative, and vaseline as an emollient to help enhance lip balm moisture (Ningrum *et al.*, 2022).

The lip balm was formulated using three different compositions. Formula I produced a denser texture with a deep maroon color and a strong grape essence aroma. Formula II resulted in a softer, more moisturized texture, maintaining the maroon color and strong grape essence aroma. Meanwhile, Formula III had a texture that was too soft, with a maroon color and a slightly weaker grape essence aroma. Based on physical characteristics, Formula II was considered the best. The denser texture of Formula I was due to the higher amounts of cera alba and cera flava, whereas Formula II's softer texture was a result of reducing these ingredients. Castor oil played a key role in influencing both the texture and homogeneity of the lip balm, acting as an emollient and humectant to make the lip balm softer and more moisturized (Rowe *et al.*, 2009).

In Formula I, a thin layer of wax appeared on the surface of the preparation, but it disappeared after a few days. Formula II exhibited homogeneity without any separate layers, while Formula III displayed poor mixing, showing distinct white and red layers. Therefore, Formula II

was considered the best in terms of homogeneity (Ambari *et al.*, 2020). There were no significant differences in the pH measurements among the three formulas. Formula I had a pH of 6.42, Formula II 6.5, and Formula III 6.79, indicating that Formulas I and II fall within the suitable pH range for lip skin (Ambari *et al.*, 2020).

Conclusion

Based on the evaluation of the three lip balm formulas, it can be concluded that Formula II is the most optimal. This formula demonstrated superior results in organoleptic, homogeneity, and pH tests, with a soft and moist texture, ideal color and aroma, good homogeneity, and a pH level suitable for lip skin. Therefore, Formula II is considered the most effective and safe for use as a lip balm.

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