A simple formulation of lip balm using carrot extract as a natural coloring agent

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Abstract. This study aims to determine the optimum combination of cera alba formulations in the manufacture of lip balm using carrot extracts as natural dyes corresponding to the SNI. The physical properties determined on the basis moisturizing lip wax. The method used is Research and Development. The study begins by macerating botanicals carrots with solvent n-hexane and concentrated by rotary evaporator. Furthermore, the manufacture of lip balms with various additions cera alba concentration which are 9%, 12.9%, and 16.4% and carrot extract concentration are 0.009%, 0.172% and 0.24%. To test the stability of lip balms, homogenity and organoleptic tests were carried out for 20 days at room temperature storage by observing changes in color, smell, and texture, pH test, rub test, and irritation test. The formulated lip balm is expected to be an alternative to be used as a moisturizer that is environmentally friendly and has minimal side effects compared to lip balm currently on the market.

1. Introduction
Lip balm is the basis of wax applied to the lips as a moisturizer that are not easily dried and cracked. Typically used for lip moisturizer that require protection, e.g. at low air humidity circumstances or because the temperature is too cold to prevent water evaporation and mucosal epithelial cells lips [1]. As a result of poor protection function, the lips are very susceptible to environmental influences so that when the air is too hot can cause the lips to dry, chapped, and dull-colored [2].

Generally, lip salve is a cosmetic preparation made with the same base with a base of the lipstick, but there are some differences between the lipstick with a lip moisturizer mainly function. Lipstick is used to give color to the lips while moisturizing lip function is to provide protection and are provided without any colors that look transparent. Lipbalm often contains chemical composition such as beeswax or carnauba wax, camphor, cetyl alcohol, lanolin, paraffin, and petrolatum. Natural cosmetic lip balm will be in great demand by the public if processed with various uniqueness with priority colorful and made from natural ingredients without side effects.

Many previous studies have used natural ingredients as lip balm compositions, including the use of kenanga flower oil as emollients [1-6], Rosella flower extract as an essence [4,5], and red melinjo extract as a natural dye [7,8]. In contrast to the research already mentioned, the natural material used in this study is cera alba and carrot tuber. This study aimed to obtain the optimum combination formulations best lip balm with various additions cera alba concentration and dosage formulations will be developed lip balm that contains natural dye extract carotenoids from carrot root. Addition of a carotenoid extract
in addition to providing color, also serves as sun protector so as to protect the lips from damage by UV-A and UV-B [4].

2. Method

2.1. Plant material
Plant material used in the formulation of lip balm is carrot. Carrot plants are obtained from the Green & Organic Plantation, Pasir Jambu, Ciwidey. Carotenoids in carrot tubers in addition to providing color, can also be used for cosmetic purposes, namely to treat facial and skin beauty, maintain moisture and soften the skin.

2.2. Equipment and materials
The tools used in this research is a beaker, analytical balance, stir bar, spatula, rotary evaporator oven, watch glass pipette, timber tongs, a water bath, a universal indicator, and a container of lip balm. While the materials used are carrot powder, solvent n-hexane, *cera alba*, shea butter, orange and esensial.

2.3. Preparation of carrot extract
*Simplicia* carrots as much as 309.00 grams extracted by maceration using n-hexane as much as 1236 mL. Extraction old made 48 hours 34 minutes (2 days). The next stage, the evaporation of the solvent was performed using a rotary evaporator. Evaporation long 75 minutes at a temperature of 50°C. Then, for concentrating the extract conducted oven at a temperature of 400C for 15 hours 7 minutes. And carrot extract obtained 1.33 g of semi-solid.

2.4. Preparation of lip balm
The method used in this research is the Research and Development which aims to determine the optimum formulation *cera alba* base combination in the manufacture of lip balm using carrot extracts as natural dyes corresponding to the SNI.

In the manufacture of lip balm is done by melting *cera alba* above the water bath until the temperature of 65°C, and then fused *cera alba* added shea butter to a temperature of 750°C and stirred until homogeneous. Next, add carrot extract and orange essential added to the mixture while stirring until the temperature of 80°C. Once homogeneous, pour into a container and measuring the pH of the mixture using universal indicator. Then, allowed to stand at room temperature until the mixture solidifies perfect.

2.5. Preparations testing lip balm

2.5.1. Homogeneity test. Homogeneity test is done by applying a lip balm on a flat transparent glass surface.

2.5.2. Test appearance. Organoleptic test was done by observing the change in color, texture and smell of lip balm dosage of each dosage during storage at room temperature on days 1, 5, 10, 15 and 20.

2.5.3. pH test. pH tests carried out by dipping a universal indicator into mixture lip balm, then change color on paper indicators tailored to the universal table.

2.5.4. Topical test. Smear test carried out on each of the preparations made by applied to the skin with the back of his hand three times basting.

2.5.5. Irritation test. Irritation test was observed in the presence of a positive reaction in the form of itching, swelling and redness of the panelists after 10 minutes made basting.
3. Results and discussion

3.1. Formulations lip balm
To get a lip balm with carrot extract as a natural colorant formulation needs to be done with several different treatments. This is to determine the best formulation is based on homogeneity, organooleptic, pH, topical, and irritation. Variation of lip balm formulations shows in Table 1. Three variations of the lip balm formulation were made to find out which were the best compositions at various tests (section 2.5).

| Table 1. Composition formulations lip balm. |
|---------------------------------------------|
| **Formulation** | **Number (%)** | **F1** | **F2** | **F3** |
| Shea butter | 90 | 86 | 82.4 |
| Cera alba | 9 | 12.9 | 16.4 |
| orange essential | 0.9 | 0.86 | 0.82 |
| carrot extract | 0.009 | 0.172 | 0.24 |

3.2. Test appearance, homogeneity, and pH
The results of the organoleptic evaluation, homogeneity test, and pH test of the difference lip balm formulations showed in Table 2.

| Table 2. The results of the organoleptic evaluation, homogeneity test, and pH test. |
|-----------------------------------------------|
| **Formulation** | **Smell** | **Color** | **Texture** | **Homogeneity** | **pH** |
| F1 | Orange | bright yellow | Not hard, soft | Homogeneous | 5 |
| F2 | Orange | Orange | Quite hard, soft | Homogeneous | 5 |
| F3 | Orange | Orange concentrated | Very hard | Homogeneous | 5 |

Based on Table 2, organooleptic tests are carried out by observing change in color, texture and smell of lip balm preparations against each formulation during storage at room temperature on days 1, 5, 10, 15 and 20. At a concentration of cera alba 9 %, lip balm had a good texture, because it remains hard texture, not mushy and not watery or slimy. At the concentration of 12.5%, lip balm has a texture quite loud and a bit soft. Meanwhile, at a concentration of 16.4% stocks unfavorable texture due within 5 days of storage texture louder lip balm and topical power is reduced. This result This result is expected to occur because every additional candle base is very influential on the level of violence lip salve [1].

The resulting color of three lip balm is different because every preparation had a different carrot tuber formulation, which are 0.009%, 0.172% and 0.24%. In addition, 0.009% carrot tuber extract produce bright yellow color, carot tuber concentration 0.172% and 0.24% had a dark orange color. All the preparation does not undergo discoloration until day 20. The amount of carrot extract addition has an effect on the intensity of the color because carrot extract contains orange color pigments derived from the carotenoid content in it.
All lip balm preparations have the scent of citrus because of the addition of essential oranges to cover the distinctive smell of lip balm which is influenced by the mixture of night base (cera alba) and the distinctive smell of extract used in the formulation [7]. Observation of the smell of lip balm is done once every 5 days within 20 days in storing room temperature, the essential orange in the preparation of lip balm is still stable and does not change its smell.

The homogeneity test on the lip balm preparation using each carrot extract was examined for homogeneity by applying lip balm on a transparent flat glass surface. The results of the application are homogeneous because there are no coarse grains on the smeared glass. This shows that the composition of the lip balm preparation is homogeneous. Whereas in the pH test, from the three lip balm preparations formulations had a pH of 5. A good lip balm had an acidity value near pH of lip skin physiology i.e. 4-5 [8,9].

3.3. Topical test
The lip balm preparation is said to have good topical effect if the lip balm surface can moisturize the skin of the lips [10]. A topical test is done by applying lip balm on the back of the hand skin with 3 times applying. Based on the results obtained, the preparation of lip balm with a concentration of cera alba 9% oily and can moisturize dry lip skin. At the concentration of cera alba 12.5% of the power is a little smooth because the texture produced is quite hard. Whereas at a concentration of 16.4% the topical power is not good because the texture produced is so hard that the topical power decreases. When lip balm is applied to the lips, it acts as a sealant which prevents loss of moisture through evaporation. This protection allows the lips to rehydrate through the accumulation of moisture in the interface of the lip balm-stratum corneum [11]. Of the three concentrations it does not cause inherent color for a long time when applied.

3.4. Irritation test
Irritation test was conducted to determine the reactions produced by the skin after basting. Irritation test was observed in the presence of a positive reaction in the form of itching, swelling and redness. Lip salve safe dosage will not cause irritation and is harmful to the skin when used [6]. Based on the results of the test observations irritation of the panelists found that of all formulations do not cause irritation of the skin after 10 minutes basting were repeated 3 times. From the results of this irritation can be concluded that preparation is safe to use a lip balm.

4. Conclusion
Based on the research that has been done can be concluded that the formulation of the preparation the best lip balm is the addition of cera alba concentration of 9% and carrot extract can be used as natural dyes. During the test formulations using a lip moisturizer carrot extracts as natural dyes do not change color, odor, and texture, homogeneous structure, and does not cause skin irritation after 10 minutes basting on the skin.

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References
[1] Sutarna T H, Jenderal U and Yani A 2016 Formulasi Sediaan Lipbalm Minyak Bunga Kenanga (Cananga oil) Sebagai Emolien ResearchGate
[2] Mehta R C 2014 Clinical Assessment of a Combination Lip Treatment to Restore Moisturization and Fullness The Journal of Clinical Aesthetic Dermatology 2(12) 44-45
[3] Stahl W and Sies H 2005 Bioactivity and protective effects of natural carotenoids Biochimica et Biophysica Acta 1740 101–107
[4] Nurany A, Sri A, Amal S and Estikomah S A 2018 Formulasi Sediaan Lipstik Ekstrak Bunga Rosella (Hibiscus Sabdariffa) Sebagai Pewarna Dan Minyak Zaitun (Olive Oil) Sebagai Emolien Pharmasipha 2(1) 1–9

[5] Safitiri 2010 Formulasi Sediaan Lipstik Dengan Ekstrak Kelopak Bunga Rosella (Hibiscus sabdariffa L.) Sebagai Pewarna (Medan: Fakultas Farmasi Universitas Sumatera Utara)

[6] Sutarna T H, Jenderal U and Yani A 2016 Formulasi Sediaan Lipbalm Minyak Bunga Kenanga (Cananga oil) Sebagai Emolien ResearchGate

[7] Perdanakusuma O and Wulandari Z 2003 Optimasi Proses Pembuatan Lipstik Dengan Penambahan Berbagai Konsentrasi Malam Lebah Teknologi Industri Pertanian 14(3) 95–100

[8] Dian Y, Siregar I and Utami P 2014 Pemanfaatan Ekstrak Kulit Melinjo Merah (Gnetum Gnemon) sebagai Pewarna Alami pada Pembuatan Lipstik 4(2) 98–108

[9] Keithler W R 1956 Formulation of Cosmetic dan Cosmetic specialist (New York: Drug dan Cosmetic Industry)

[10] Tranggono R I and Fatma L 2007 Ilmu Pengetahuan Kosmetik (Jakarta: Gramedia Pustaka Utama)

[11] Madans A, Katie P, Christine P, Shailly P 2012 Ithaca Got Your Lips Chapped: A Performance Analysis of Lip Balm BEE 4530 4–5