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Effectiveness of lotion preparations as emollients from pure palm oil and crude palm oil

Efektivitas sediaan lotion dari minyak sawit murni dan minyak sawit mentah sebagai emolien

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ABSTRACT

Palm oil is naturally red due to the high content of beta carotene. Most of the fatty acids in crude palm oil (CPO) are saturated fatty acids, namely palmitic acid (32-59%), while that in pure palm oil (PPO) is linoleic acid (5-11%). Fatty acids function as a moisturizer for the skin. This study aimed to compare the effectiveness of lotion preparations as emollients from pure palm oil and crude palm oil. The concentration of CPO and PPO in the lotions was 5 and 15% using the oil in water (O/W) base. The effectiveness of lotion preparations as emollients was based on descriptive data from 10 panelists whose skin moisture was tested using a skin analyzer. The result showed that lotions prepared with CPO and PPO at concentrations of 5 and 15% exerted a moisture content of more than 50% in the moist skin category.

Keywords: Emollients, lotion, palm oil.

ABSTRAK

Minyak sawit secara alami berwarna merah karena kandungan beta karoten yang tinggi. Asam lemak yang terkandung pada minyak sawit mentah sebagian besar adalah asam lemak jenuh yaitu asam palmitat 32%-59% sedangkan minyak sawit murni mengandung asam linoleat sebesar 5-11%. Asam lemak berfungsi sebagai pelembab (emolien) pada kulit. Penelitian ini bertujuan untuk mengetahui perbandingan efektifitas sediaan lotion sebagai emolien dari minyak sawit murni dan minyak sawit mentah dengan basis minyak dalam air. Berdasarkan potensi yang dimiliki oleh minyak sawit tersebut, maka dibuatlah sediaan kosmetik berupa lotion dari minyak sawit

mentah dan minyak sawit murni dengan konsentrasi masing- masing 5 dan 15% menggunakan basis minyak dalam air. Data yang dihasilkan secara deskriptif menyatakan bahwa dari 10 orang panelist yang masing-masingnya diuji kelembaban kulitnya sebelum dan sesudah penggunaan lotion minyak sawit mentah dan minyak sawit murni memiliki kadar air melebihi 50% dengan kategori kulit lembab.

***Kata kunci**: Emolien, lotion, minyak sawit.*

Introduction

Several Southeast Asia countries produce palm oil, such as Malaysia, Indonesia, Thailand, and Papua New Guinea. Indonesia has the most extensive oil palm plantation land in the world. Indonesia and Malaysia are the two largest producers of palm oil globally. Palm oil is extracted from oil palm fruits in the mills. Palm oil can be used as a product in industry and cosmetics, but processed palm oil is still limited to crude palm oil (CPO) (Fudholi *et al*., 2015; Fudholi *et al*., 2012; Sopian *et al*., 2007).

CPO with red characteristics due to high beta carotene content. The fatty acids in crude palm oil are mostly saturated fatty acids, namely palmitic acid 32-59%. Pure palm oil is linoleic acid 5% -11%, which functions as an emollient on the skin. Based on the potential possessed by CPO or pure palm oil in increasing the quality value or selling value of palm oil, it can be processed into cosmetic preparations, one of which is a lotion as emollient because it has properties very easily absorbed by the skin and content contained in this palm oil is very good for the skin. (Fudholi et al., 2015; Fudholi et al., 2012).

Lotion with an oil in water (O/W) base has advantages such as a uniform and fast use on a wide surface of the skin, giving a cool and soft effect on the skin, and this Preparation does not feel oily when applied (Sopian et al., 2007). Based on this, a study was conducted to compare the effectiveness of lotion preparations as emollients from pure palm oil and crude palm oil with water-based emulsion using a skin analyzer.

Research Method

Material and Equipment

The materials used are CPO and pure palm oil, cetyl alcohol (Brataco), stearic acid (Brataco), glycerine (Harum Kimia), and TEA (Harum Kimia), propylparaben (Brataco), methylparaben (Brataco) and aqua dest (Harum Kimia). The tools used are digital scales, mortar, pestle, stirring rod, spatula, horn spoon, glass beaker (pyrex), measuring cup (Pyrex), drop pipette, watch glass, rack and test tube, oven, water bath, thermometer, volume pipettes, pH meters, sticky power test equipment, scales, Brookfield, Viscometer petri dishes, porcelain dishes, glass objects and refrigerator.

Lotion Preparation

All ingredients were weighed carefully. The oil phase was heated and melted first above the water bath at a temperature of 70˚C. The water phase was also heated over a water bath at the same temperature. Then the water phase was slowly inserted into the oil phase while constantly stirring by maintaining the temperature above the water bath, then adding distilled water to 100 ml and stirring until homogeneous (Eza et al., 2021). Table 1 shows the formula design of the lotion.

Irritation Test

This test was carried out to check the sensitivity of the skin to an ingredient carried out in volunteers in the arms or back. The technique used in this test is Patch Testing. The preparation was applied to the skin of the inner arm then covered with paper or gauze and then given a plaster. The caused symptoms were observed (Lestari et al. 2018a, b). The Ethical Clearance for protocol of the experiments was issued by the Ethical Committee for Health, Faculty of Medicine and Health Sciences, Jambi University (Reference number: 1625/UN21.8/PT.01.07/2021).

Hedonic Test

The hedonic test on the lotion was done to determine consumer preference for appearance, scent, texture, and softness (after use). This test uses panelists of as many as ten people with a rating scale and numerical scale: moderately dislike (1), slightly like (2), moderately like (3), and like very much (4).

Emollient Test

The ability to increase moisture or emollient test uses a skin analyzer tool by comparing the state of the skin before and after the use of the lotion. The value of the test parameter is moisture content (Lestari *et al*. 2018a, b). category moisture content such as < 25 (very dry skin), 25-35 (dry skin), 35-70 (hydrated skin), and>71 (very hydrated skin).

Table 1: Formulation of pure palm oil lotion and crude palm oil lotion

Ingredients	FI	FII	FIII	FIV
Crude palm oil	5	5	-	-
Pure palm oil	-	-	15	15
Cetyl alcohol	2.690	2.690	2.690	2.690
Stearic acid	4.146	4.146	4.146	4.146
TEA	3.164	3.164	3.164	3.164
Glycerin	3	3	3	3
Propyl paraben	0.15	0.15	0.15	0.15
Methyl paraben	0.3	0.3	0.3	0.3

Results and Discussion

Irritation Test

In this irritation test performed on ten panellists where the test material was selected on the upper arm, the irritation test could also use the arms and back (Sulaksamono, 2016). The results of the irritation test can be seen in Table 2.

In the results that have been obtained, there is no irritation to the volunteers, where there is no side effect in the form of skin redness, itching, or swelling of the skin of the two formulas, where the M/A lotion formula has a slightly higher pH 0.13 of what has been determined by Indonesian National Standard. Still, in this irritation test, there are no reaction or side effects caused. It can be stated that both formulas are safe to use. The lotion CPO and PPO is 5.87 and is still in the safe range according to skin pH, 4.5−6.525. In topical preparations, the effect if the pH is less than 4.5 can irritate the skin. Meanwhile, if the pH is more significant than 6.5, it can cause scaly skin (Lestari et al., 2021).

Based on the research of Lestari et al. l, 2018a that the results of the irritation test that were applied to the peel of gel mask directly on the hands of the panelists, none of the panelists experienced irritation.

Hedonic Test

The results of the hedonic test can be seen in Table 3. These results show that in terms of texture and softness, lotion formulas CPO were preferred by panelists compared to crude palm oil lotion formulas because the pure palm oil lotion formula has a white color compared to oil palm oil formula is still colored yellow. When applied to the second skin, the formula was not a sticky lotion and made the skin softer. So, from the results that have been obtained, pure palm oil lotion formulas were preferred by panelists compared to crude palm oil lotion formulas for use. The results were obtained by means of interviews related to questions about texture, smell, color, and softness (Table 3).

Spreadability Test

The dispersion obtained on the preparations ranged from 4.0-4.5, where there was an increase in the spread diameter, which was directly proportional to the increase in load. CPO and PPO 15% lotions have lower dispersion values. This shows that the higher the concentration of CPO and PPO, the lower the dispersion value. But the value obtained is still in a good range for gel preparations, namely 3−5 cm. Based on the research of Lestari et al. l, 2018a that the results of the mask spreadability test meet the criteria of 3-5 cm

Adhesion Test

The results obtained indicate that the length of time for the adhesive Preparation ranges from 9 minutes to 19 minutes and has complied with the requirements.

Table 2: Results of irritation tests

Formula	Panelist									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pure palm oil lotion	-	-	-	-	-	-	-	-	-	-
Crude palm oil lotion	-	-	-	-	-	-	-	-	-	-

Note: - = no irritation

Table 3: Results of hedonic tests

Category	Crude palm oil lotion 5% concentration				Pure palm oil lotion 15% concentration			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Texture			40	60		20	60	20
Smell	30	50	10	10	30	50	10	10
Colour		10	70	20		30	70	
Softness			80	20	10	40	50	

Note: moderately dislike (1), slightly like (2), moderately like (3), and very much like (4).

The excellent adhesion test time should not be less than 4 seconds. The longer the sticking time, the better the Preparation obtained. The low adhesion ability illustrates that the Preparation is easily separated from the skin so that the effect given is not optimal. The length of time attached to the Preparation can be influenced by the concentration of the active substance used. Based on Lestari et al. (2018a), the results of the mask adhesion test are less than 1 second.

Skin Moisture Level

The results obtained in the emollient test conducted on ten panelists with women aged > 25 years to 30 years showed that giving did not have different effects on both lotion formulas. In the results obtained, both formulas showed an increase in the moisture percentage in the skin after using the two lotions. Skin moisture before using pure palm oil lotion is 46.47%. Pure palm oil lotion formula with a concentration of 15% showed a moisture level of 55.00%, while a pure palm oil lotion formula with a concentration of 15% showed a moisture level of 53.83%. The crude palm oil lotion formula with a concentration of 15% showed a moisture level of 56.82%, while the formula for oil palm oil lotion with a concentration of 15% showed a moisture level of 60.20%. The higher the concentration of pure palm oil in lotion preparations, the higher the moisture content of the skin in the panelists in the very hydrated category, whereas in the Preparation of crude palm oil lotions, the higher the concentration of crude palm oil, the smaller the moisture content of the skin on the panelists. This is due to the influence of other components on crude palm oil, where the other content has no emollient effect (Trenggono, 2007).

Conclusion

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concentration was 15% and had a moisture content exceeding 50% in the moist skin category.

Reference

Balsam MS and Sagarin E. 1972. Cosmetic Science and Technology, Volume I, 2nd edition, Willey Interscience. London Sydney-Toronto, New York.

Betageri G and Prabhu S. 2002. Semisolid Preparation. in Swarbrick, J., &Boyland, J. C., (Eds) Encyclopedia of Pharmaceutical Technology 2nd Ed. New York: Marcel Dekker Inc.

Eza. 2021. Physicochemical properties test of fractionated lotion of dichloromethane extract of breadfruit peel (*Artocarpus atilis*). Journal Applied Science University Jambi 5(2): 122-126.

Fudholi A, Sopian K, Alghoul MA, Ruslan MH and Othman MY (2015). Performances and improvement potential of a solar drying system for palm oil fronds. Renewable Energy 78: 561-565.

Fudholi A, Ruslan MH, Othman MY, Azmi MSM, Zaharim A and Sopian K (2012). Drying of palm oil fronds in the solar dryer with finned double-pass solar collectors. WSEAS Transactions on Heat and Mass Transfer 7(4):105-114.

Lestari U, Lestari I and Syam NR (2018a). Antioxidant activity and irritation test of peel off pure palm oil gel mask as emollient. Proceeding of International Conference on Pharmaceutical Research and Practice, Universitas Islam Indonesia: 182-185.

Lestari I, Lestari U and Gusti DR (2018b). Antioxidant activity and irritation test of peel-off gel mask of ethanol extract of pedada fruit (*Sonneratia caseolaris*). Proceeding of International Conference on Pharmaceutical Research and Practice, Universitas Islam Indonesia: 79-85.

Lestari U, Farid F, Yuliawati, Pratama S. 2021. Irritation test and effectiveness of facial humidity skin from peel-off gel mask based on date palm seeds powder (*Phoenix dactylifera*). Journal BIGME 1(2): 1-5

Lismiati. 2021. Physicochemical properties test of fractionated sunscreen of dichloromethane extract of breadfruit peel (*Artocarpus atilis*). Journal Farmasetis 10(2): 123-124.

Lachman L, Herbert, AL and Joseph LK. 2008, Pharmaceutical Industry Theory and Practice. Issue III: 1119-1120. Jakarta: Publisher of the University of Indonesia.

Mitsui T, New Cosmetic Science. 1st Edition, Elsevier Science, Amsterdam, 1997.

Martin A, Swarbick J and Cammarata A. 1993. Physical Pharmacy Edition III. Translated by Yoshita. Jakarta: UI Press.

Sopian K, Supranto, Othman MY, Daud WRW and Yatim B (2007). Double-pass solar collectors with porous media are suitable for higher-temperature solar-assisted drying

systems. Journal of Energy Engineering 133(1): 13-18.

Supranto, Sopian K, Daud WRW, Othman MY and Yatim B (1999). Design of an experimental solar-assisted dryer for palm oil fronds. Renewable Energy 16: 643-646.

Sulaksamono, M. 2016. Advantages and Disadvantages of Patch Test (patch test) In Efforts to Uphold the Diagnosis of Occupational Skin Diseases (Occupational Dermatosis). Health Section and Work Equality Faculty of Health Public. Airlangga University, Surabaya.

Trenggono, 2007. Handbook of Introduction to Cosmetics. Jakarta: PT Gramedia General Library.

Wilkinson, JB, Moore, RJ 1982. Harry's Cosmetology. 7th Edition. Chemical Publishing: New York.