



Body Scrub Containing Virgin Coconut Oil, Coffee Grounds (*Coffea arabica* Linn) and Carbon Active Coconut Shell (Activated Carbon *Cocos nucifera* L) as a Moisturiser and a Skin Brightener

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Abstract

Introduction: Virgin Coconut Oil (VCO) contains a lot of medium chain fatty acids. VCO combined with coffee grounds (*Coffea arabica* Linn) and activated carbon (Activated carbon *Cocos nucifera* L) has the potential to form a preparation that can moisturise and brighten the skin. The purpose of this study was to make cosmetic cleansing preparations containing three natural ingredients.

Methods: This study evaluated the organoleptic body scrub preparations, homogeneity, dispensability and pH for three different formulations. *In vivo* test for irritation (oedema and erythema) was carried out on albino rabbits (n = 3) for each treatment group. Clinical irritation testing was performed on the forearm of healthy volunteers, 17 - 45 years of age with no history of allergies (n = 30). Determination of skin moisture content and melanin index was carried out as a measure of effectiveness.

Results: Organoleptic and homogeneity tests showed that preparations had dark black colour, the distinctive smell of coffee, it was homogeneous, spread ability was in the range of 4 cm with the pH at a safe pH for the skin. Irritation results also did not show any oedema and erythema in *in vivo* testing. In clinical testing no irritation occurred by testing the body scrub samples. Body scrubs routinely used by volunteers for 2 months increased moisture on the skin as well as brightness (p < 0.05).

Conclusion: Body scrub creams containing VCO, coffee grounds and activated carbon are preparations that have the potential to be cosmetic cleansers.

Keywords: Body scrub; Virgin coconut oil; Coffee grounds; Activated carbon.

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Introduction

Body scrub is a body care product that can be used to maintain healthy skin. The basic ingredients for body scrubs are always the same, namely as a cleanser.¹ The basic ingredients for body scrubs are usually made from synthetics as well as from natural ingredients derived from herbal plants.² Herbal plants are one that can be used as safe pharmaceutical preparations and as cosmet-

ics that can maintain healthy skin. One of the Indonesian herbal plants that can be used is Virgin Coconut Oil (VCO). The content of saturated fatty acids in VCO can be used as a cosmetic form because it can moisturise the skin and VCO also has a high sun protection factor (SPF).³ In addition, other natural ingredients such as coffee grounds can also be used as cosmetic ingredients in skin

care, because coffee has a high antioxidant content.⁴ Coffee grounds also have a distinctive aroma and rough texture so they can be used to remove dead skin cells.⁵ Coffee grounds also have a long life shelf for 9 months.⁶ Another natural ingredient that can be used is activated charcoal which has detoxification activities.⁷ The body scrubs made in this study were in the form of creams. The cream form has physical stability which can increase the effectiveness of active ingredients on the skin, it is easy to use and to distribute, thus consumers prefer to use cream body scrubs rather than other forms.

Material and Methods

Materials

VCO and activated charcoal were obtained from Galenika (Central Java, Indonesia). Coffee grounds were obtained from several coffee shops in the Balaraja area (Tangerang, Indonesia). Cetearyl alcohol and cetearate (Cera lanæ), phenoxy ethanol, propylene glycol, liquid paraffin, cetyl alcohol, corn starch, polyethoxylated sorbitan and oleic acid (Tween 80), distilled water (Aquadest) were obtained from Brataco (Jakarta, Indonesia).

Methods

The procedure carried out has been approved by the Health Research Ethics Committee, Muhammadiyah University Prof. Dr. Hamka, with ethical approval number 01 / 19.11 / 0240.

Preparation of Body Scrub

Body scrubs were made by using the basic ingredient of Cera de lano, using additives phenoxy ethanol, propylene glycol, liquid paraffin, cetyl alcohol, tween 80.

The procedure for making a body scrub was: Cera de lano was mixed over a water bath (70 °C) and mixed until it was homogeneous with other ingredients. For each formula (Formula I, Formula II and Formula III) VCO with distilled water (70 °C) were added and mixed until a white cream base was formed. Coffee grounds, activated charcoal and corn starch were added, then stirred using a homogenizer for about 5 minutes until a body scrub was formed. The composition of the formulas is shown in Table 1.

Table 1: Body scrub formulations containing Virgin coconut oil*, ground coffee and activated carbon

Formulation	Body Scrub Formula		
	F1	F2	F3
Virgin coconut oil (VCO)	5	15	25
Activated carbon	1	3	5
Coffee grounds	9	7	5
Cera lanæ (mix of cetearyl alcohol and ceteateat 33)	14	14	14
Phenoxy ethanol	0.8	0.8	0.8
Propylene glycol	10	10	10
Liquid paraffin	5	5	5
Cetyl alcohol	2	2	2
Corn starch	6	6	6
Tween 80	3	3	3
Distilled water ad	100	100	100

* Virgin coconut oil (VCO) is coconut oil that is extracted. VCO is made with copra or dried coconut meat that is removed from the shell and pressed to extract natural oils. Tween 80 it is made from polyethoxylated sorbitan (chemical compounds derived from the dehydration of sugar alcohol) and oleic acid, a fatty acid found in animal and vegetable fats.

Evaluation of Body Scrub

Organoleptic Test

Organoleptic testing was done visually with the changes in shape, colour and smell of body scrub preparations. The test was carried out for 8 weeks with examination time intervals, namely at week 0, 2, 4, 6 and 8 at 25 °C.

Homogeneity Test

To clarify the homogeneity of body scrub preparations, homogeneity testing was carried out using a microscope (Olympus CX23) with magnification (magnification of 40 times). A number of samples were smeared on the glass preparation then the top was covered with a glass preparation. Sample testing was done by taking 3 parts of the body scrub preparation, namely top, middle, bottom.⁸

Spread ability

Samples (0.5 g) of each formula were placed in the centre of the Petri plate, then the Petri plate was placed on top. A load of 150 g was given for 1 minute at 25 °C, after which the diameter of the spread was measured. The diameter of the dispersive power should be in the range 3 - 5 cm.⁹

pH Evaluation

The pH evaluation was carried out using a pH meter (Mettler Toledo S220). The sample was made as 1 % solution, ie 1 g sample was dissolved in 100 mL of distilled water. The acceptable pH was considered in the range 4.5-6.5.⁹

Effectiveness of Body Scrub

The humidity tester used the Dermalab combo (Cortex) tool. Volunteers with the inclusion criteria were 17 - 45 years old, with healthy skin (n = 30). Non-inclusion criteria were: pregnant and breastfeeding women and/or those that at that time were using drugs that can affect the condition of the skin. It was recommended that volunteers apply the body scrub sample twice a week. Determination of skin moisture content and melanin index was carried out at 0, 1 and 2 months after usage.

Pre-Clinic and Clinical Evaluation of Body Scrub

In Vivo Evaluation of Irritation

In vivo test for irritation (oedema and erythema) was carried out on albino rabbits (n = 3) for each treatment group. The test animals were shaved and then given body scrub samples with their respective formulas (F1, F2 and F3). The sample

given was smeared with non-reactive gauze. The degree of irritation was measured after 1, 24, 48 and 72 hours. Measurements were made by giving a score: (0) negative reactions; (1) a little irritation; (2) bordered edge irritation; (3) moderate drainage (± 1 mm rising edge); (4) severe irritation (rising edge $> \pm 1$ mm and extending beyond the curb). The score depended on the severity of the skin reactions was produced.¹⁰

Evaluation of Clinical Irritation

Clinical irritation testing was performed on the forearm of volunteers (n = 30), with an area of 2.5 x 2.5 cm. The criteria for volunteers were: 17 - 45 years of age, healthy, with no history of allergies. After the basting was done, it was left closed for 24 hours, then the observation was carried out for 72 hours. The irritation reaction is characterised by redness, itching and swelling. Measurements were made by giving a score: (0) negative reactions; (1) redness; (2) hives; (3) swelling.¹¹

Results

Preparation and Evaluation Body Scrub

A body scrub has been successfully made with a cream base. Organoleptic evaluation by conducting visual observations (Figure 1a), showed that the body scrub sample containing VCO, coffee

grounds and activated carbon had a dark black colour with a very sharp distinctive smell of coffee. Homogeneity testing has been carried out under a microscope (Figure 1b). The results of the ob-

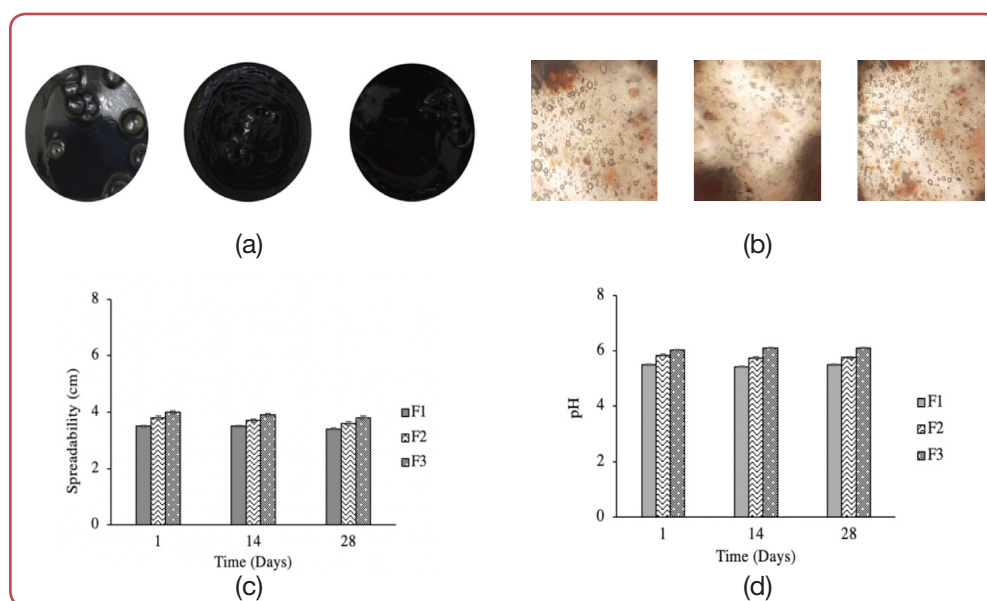


Figure 1: Evaluation of body scrub of VCO, grounded coffee and activated carbon (F1, F2 and F3): (a) Organoleptic test; (b) Homogeneity test; (c) Spreadability test; (d) pH

* F1, F2, F3: different formulation of ingredients

servations showed that the results of each sample were homogeneous with no lumps. The dispersion test was successfully carried out for 1, 14 and 28 days (Figure 1c). The diameter of the F1, F2, and F3 spread ability tests met the requirements because they were in the 3-5 cm range and there was no significant difference between samples $p > 0.05$. Body scrubs had an acceptable pH and were in a pH range that is safe for the skin (Figure 1d).

Pre-Clinic and Clinical Evaluation of Body Scrub

The rabbits were divided into four test groups (n = 3) (Figure 2a). In testing with groups formulation 1, 2 and 3 and observations made after 1, 24, 28 and 72 hours, it was shown that body scrubs were safe to use and did not cause oedema or erythema in rabbits.¹²

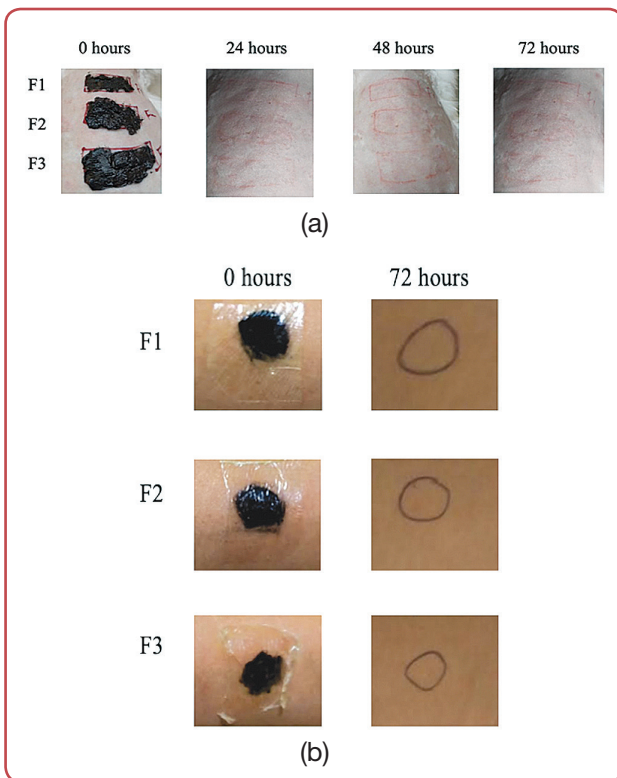


Figure 2: Pre-clinic and clinical evaluation of body scrub of VCO, ground coffee and activated carbon (F1, F2 and F3): (a) Evaluation in vivo of irritation; (b) Evaluation of clinical irritation
* F1, F2, F3: different formulation of ingredients

Clinical testing on human skin were performed on three test groups (n = 30). Observation on volunteers was carried out for 72 h (Figure 2b). The results of clinical testing using body scrubs F1, F2 and F3 confirmed negative reactions to the skin of the volunteers, meaning that no irritation occurred by testing the body scrub samples.

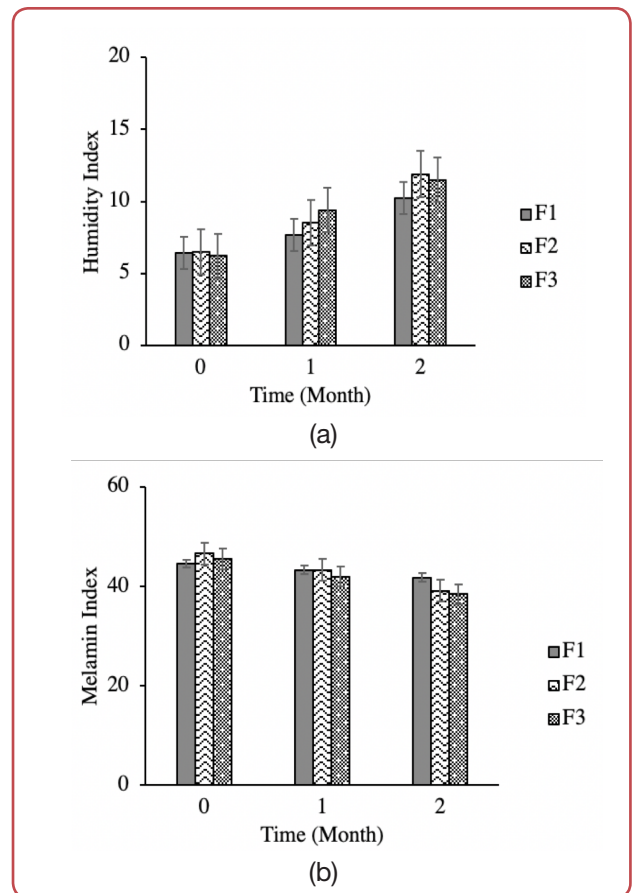


Figure 3: Effectiveness of Virgin coconut oil body scrub, ground coffee and activated carbon (F1, F2 and F3): (a) Humidity index; (b) Melamine index
* F1, F2, F3: different formulation of ingredients

Effectiveness of Body Scrub

The effectiveness of VCO body scrubs, coffee grounds and activated carbon by performing moisture testing is shown in Figure 3a. Observations were made before being given treatment and after being given treatment for 0, 1 and 2 months. Body scrubs used by volunteers for 2 months routinely increased moisture on the skin with a significance value of $p < 0.05$ without significant difference between formulas (Kruskal-Wallis test, $p > 0.05$). The results of brightness testing on VCO body scrubs, coffee grounds and activated carbon on the skin of volunteers (Figure 3b) showed that there was a significant difference between the time intervals of observation $p < 0.05$.

Discussion

The results of the observations showed that each sample was homogeneous with no lumps. Homogeneity is influenced by the forming ingredients

between the water base and the oil base forming a good cream mass. Good spread ability is obtained because the ingredients that make up cream of cetyl alcohol are fatty alcohols which form a white solid, such as wax, and catereat is an oil/water (O/W) base which can form a dense and oily mass like butter.

In tests on days 1, 14 and 28, it was found that there was no significant change in pH in body scrub samples during the storage period $p > 0.05$. The pH was safe because catereat base material can form a stable pH in cosmetic preparations. In addition, the content of activated carbon has a water content of 15 % which can increase the pH in the skin pH range (4.5 - 6.5). Also, evaluation of body scrub preparations obtained good results because VCO has the stability for 48 days, where this stability affects homogeneity/appearance, changes in colour, odour, consistency, pH and viscosity.¹³

Body scrub preparations with VCO active substances, coffee grounds and activated carbon are safe for use on human skin.¹⁴ The absence of irritation to the skin is also influenced by the physical and chemical properties of VCO which is very good for use as a moisturiser on the skin. Coconut dregs which have the ability as antioxidants are also able to absorb into the skin layer, where antioxidants can neutralise free radicals.^{15, 16}

Comparative data between the three formulas did not have a significant difference in the increase in skin brightness in the volunteers ($p > 0.05$). The effectiveness of body scrub is supported by the presence of antioxidant abilities in coffee grounds which can increase collagen productivity in the skin. The antioxidant content in skin care products, particularly vitamin C, has been shown to be beneficial in reducing melanin pigmentation in the skin.

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Conclusion

VCO body scrub with coffee grounds and activated carbon with various formulas 1, 2 and 3 were successfully carried out with several evaluations confirmed. The difference in concentration in each formula did not affect the evaluation results of body scrubs. The pH of each formula was still in the safe range for the skin. The pH results were correlated with *in vivo* testing as well as clinical irritation testing carried out for 72 h without oedema and erythema in the skin of the volunteers. The results of testing the effectiveness of moisture and brightness on VCO body scrubs with coffee grounds and activated carbon found: the longer the scrub was used, the more moisturised and brighter volunteer skin was.

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Conflict of interest

None.

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