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Formulation of The Body Scrub Cream from Purple Sweet Potato (*Ipomoea batatas* L.)

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Abstract

Anthocyanin is an active compound of purple sweet potato, has effect as anti-oxidative, anti-inflammatory, and anti-itching. It make them interesting ingredients for skin treatment. The bio-antioxidant body scrub is one of the popular cosmetic products in SPA industry. Their stability property is one crucial factor to develop a purple sweet potato body scrub cream. The steam and oven heating of tuber were involved on the scrub powder preparation. The oven and non-heating preparation scrub powder provided fine-sized powder more than 50%, but the steaming produced granular particle distribution. Total anthocyanin content in scrub grains was 326.8 mg/100 g, 103.3 mg/100 g and 34.4 mg/100g for steam preparation, oven and non-heating, respectively. The steamed scrub powder preparation method produced stable anthocyanin content in body scrub cream for 25 days observation.

Keywords: Anthocyanin, body scrub formulation, purple sweet potato

Formulasi Krim Lulur Badan dari Ubi Jalar Ungu (*Ipomoea batatas* L.)

Abstrak

Antosianin adalah senyawa aktif yang terkandung dalam ubi jalar ungu, memiliki efek sebagai anti-oksidatif, anti-inflamasi, dan anti-gatal. Efek ini menjadikan antosianin bahan yang menarik untuk perawatan kulit. Lulur bio-antioksidan adalah salah satu produk kosmetik yang populer di industri SPA. Sifat stabilitas mereka adalah salah satu faktor penting untuk mengembangkan krim lulur ubi jalar ungu. Pemanasan umbi dengan uap dan oven termasuk kepada langkah persiapan bubuk lulur. Persiapan bubuk lulur dengan pemanasan oven dan tanpa pemanasan menghasilkan serbuk berukuran lebih dari 50%, tetapi penguapan menghasilkan distribusi partikel butiran. Total kandungan antosianin dalam butiran lulur adalah 326,8 mg/100 g, 103,3 mg/100 g dan 34,4 mg/100g masing-masing untuk persiapan dengan penguapan, oven dan tanpa pemanasan. Metode preparasi lulur dengan cara penguapan menghasilkan kandungan antosianin yang stabil dalam krim lulur badan selama 25 hari pengamatan.

Kata kunci: Antosianin, formulasi lulur badan, ubi jalar ungu

1. Introduction

Scrub is a cosmetic product whose primary function is as a body exfoliant, remove dirt, smooth the skin surface, cleanse the skin and increase body's blood circulation[1]. It is also beneficial to provide skin vitamins, such as antioxidants. Antioxidant is necessary in the maintenance of skin health[2], including skin freshener, skin protection from UV A and UV B exposure, as well as regeneration of healthy skin cells[3]. The use of scrubs is believed to be able to nourish the skin to appear more healthy natural beauty. Scrub is much needed in the spa tourism industry for beauty care products. Purple sweet potato (*Ipomoea batatas* L.) contains high anthocyanins content[4], and other active compound founded in, such as: vitamin C, beta-carotene, caffeoyldaucic acid and its derivatives are very useful for skin health[5]. Purple color in purple sweet potato can give high aesthetic value to the scrub.

The scrub should display stable colors during the production process until the marketing. The purple color of sweet potato is formed by the stability of anthocyanin contents. The enzymatic deactivation process accelerates degradation of the anthocyanin into a brownish quinon derivative[6]. The enzyme deactivation of purple sweet potato before the anthocyanin extraction is an important process for improving anthocyanin stability[7]. Enzymes deactivation involves heat, such as steam, microwave, or oven. It will be reported the influence of anthocyanin content due to heating pretreatment of purple sweet potato and the color stability after 25 days light exposer.

2. Materials and Methods

2.1. Materials and tools

Purple sweet potato (*Ipomoea batatas* L.), citric acid, ethanol 70%, aquadest, stearic acid, span-tween 60, cetyl alcohol, propilenglicol, lanolin, paraffin liquid, propyl- and methyl- paraben, with a pharmacy degree were obtained from PT Brathachem Indonesia, sodium acetic, potassium chloride, and hydrochloride acid from Merck.

The instrumentation were used, such as standard laboratory glass ware, analytical balance (AND-Japan), oven (Binder), blander, hot plate (Cornig), sieve shaker in difference size: 20, 40, 60, and 80 mesh, spectrophotometer UV-Vis (Shimadzu), magnetic stirrer, TLC-visualizer (Camag, Switzerland).

2.2. Scrub grain sweet potato preparation

Purple sweet potato is collected, sorted and washed clean. The yams were divided into 3 groups. The A and C groups were cut with a size of 1 cm cubic, the B group sliced with 0.1 cm thickness. The A group was steamed at boiling water temperature within 7 minutes, then blended and afterward dried at an oven at 70°C for 12 hours. The B group: the sliced tuber were dried in the oven at 70°C for 12 hours, and then powdered with a blender. The C group, cubical copped tubers sweet potatoes were directly blended, and then dried in an oven at 70°C for 12 hours. The 100 grams of powder sieved shaker with multi-stage sieve ranging from mesh of 20, 40, 60, and 80 for 15 minutes. The particle size distribution of the powders was calculated from the sieving results of each mesh. The water content of powder was determinate by using moisture balance.

2.3. Total anthocyanin determination

Anthocyanin present in purple sweet potato based on absorbance changing in tow difference pH values (colored at pH 1.0 and colorless at pH 4.5), while the results were expressed as equivalent of cyaniding-3-glucoside3. Five gram powdered yam extracted with 15 mL of 70% ethanol on ultrasonic bath for 30 minutes. The 2 mL of extract was used to anthocyanin determination[8].

2.4. Body scrub formulation

The base on the pre-formulation study, it found out the formula of body scrub cream consists of 10% powdered yam, 7% stearic acid, 2% span-tween, 4% cetyl alcohol, 1% propylene glycol, 5% paraffin liquidum, 5% lanoline, 0.2% methyl paraben, 0.05% propyl paraben, in add with aquadest up to 100%. The oil phase, such as paraffin, lanolin, stearic acid, cetyl alcohol, span 60, and propyl-

paraben, is mixed, and then heated to 70 °C. Water phases, such as aquadest, propylene glycol, tween 80, and methyl-paraben are mixed and then heated to 70°C. The two phases are stirred with a mixer to form a cream base, after the cream base is formed, add 10% of the sweet potato powder to it, stirred to form a homogeneous body scrub cream.

2.5. The anthocyanin stability in body scrub

The anthocyanin stability was observed from purple color changes of body scrubs. The body scrubs were placed next to the laboratory window for 25 days. Color changes were observed under TLC-Visualizer by using white light lamp.

2.6. Body scrub evaluation

The body scrub cream was evaluated for organoleptic, pH, consistency, spreadability, irritability, washability and grittiness.

3. Result and Discusion

The scrub powders of the three preparation methods showed in Fig. 1 (under), while the particle size distribution of these powders is presented in Fig. 1(upper). The water content of powders A (the steamed tubers preparation), B (the oven drying preparation), and C (direct blender preparation) was 5.718%, 5.717%, and 5.695%, respectively. The drying at the oven at 70°C for 12 hours produced less than 10% moisture content. This water content meets the requirements set by the herbal pharmacopeia Indonesia.

The preparation method A provided granular particle distribution, where fine size was only 35% of the total powder. The method B and C produced fine-sized powder more than 50%. The particle size distribution of scrub powder influenced on the spreadability of body scrub cream, its stickiness, the exfoliant power, and introduced irritation. The particle size distribution of the three developed scrub powder preparations consisted of micro and grain particle governed good spreadability of body scrub cream. Study of exfoliate powder of body scrub cream, which their particle size distributed between 20 and 50 meshes, showed that the scrub with particle size of 30/40 mesh has excellent skin-lifting ability. The majority particle sizes of developed scrub powder were 40 mesh, so could be predicted has good ability to remove skin dead cell.

Total anthocyanin content in scrub grains was 326.8 (mg/100 g) for A, 103.3 (mg/ 100 g) for B, and 34.4 (mg/100g) for C. Steaming sweet potatoes for 10 minutes reduced peroxidase activity by 100%[9]. Steaming preparation of scrub powder could

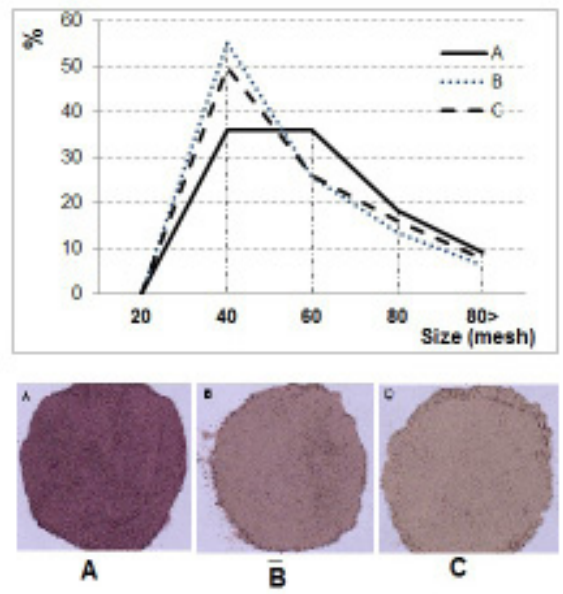

Figure 1. Scrub powder and particle sizes distribution. A, B, and C are scrub grain sweet potato preparation methods; A: steamed heating pre-treatment, B: oven heating pre-treatment, and C: non-heating pre-treatment.

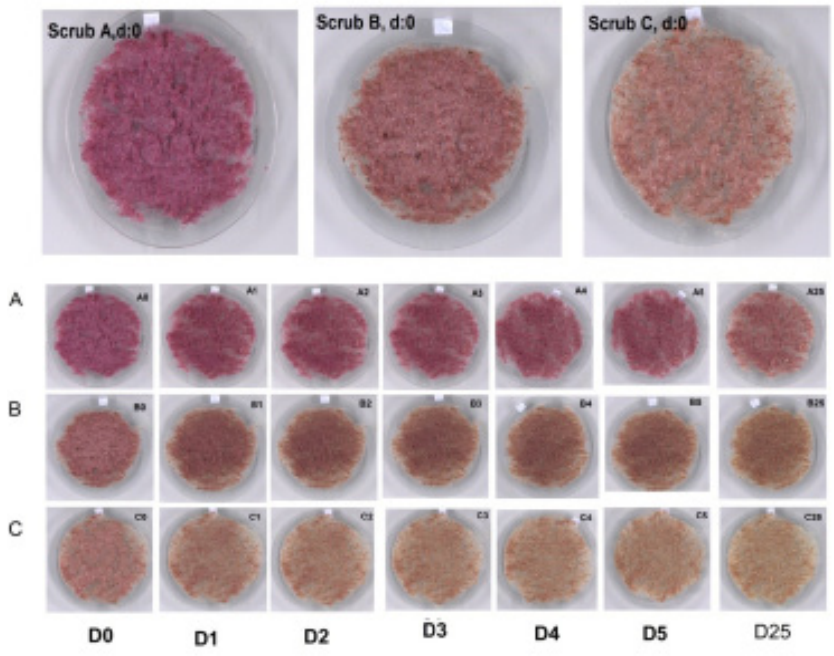

Figure 2. The body scrub cream (upper side) and the color stability test for 25 days (under side). A, B, and C are scrub grain sweet potato preparation methods and the number after that is the days of observation; A: steamed heating pre-treatment B: oven heating pre-treatment, and C: non-heating pre-treatment.

ensure inactivation of degrading enzymes and prevent alteration of anthocyanin. The oven heating tuber governed not fully the peroxidase enzyme inactivation, so the anthocyanin degradation was still observed. The unheated scrub powder preparation did not involve enzyme degradation, so that anthocyanin degradation occurred more rapidly than the other methods. The steaming tuber was the better scrub powder preparation method. Steamed scrub powder provided a very intensive purple color, in compare to other scrub powders. The anthocyanin content in the steamed scrub powder is 10 times higher than the unheated scrub powder. The purple color intensity of the scrub powder reflected the level of its anthocyanin content.

Fig. 2 presented the body scrub creams (upper side) and the color stability test for 25 days under light exposed (under side). The evaluation of body scrub cream showed in table 1. The parameter properties

No	Parameters	Observation		
		Scrub A	Scrub B	Scrub C
1	Color	dark purple	purple	purplish brown
2	Odor	odorless	odorless	odorless
3	Consistency	creamy	creamy	creamy
4	pH	4.5	4.5	4.5
5	Spreadability	excellent	good	good
6	Wash ability	easy washable	easy washable	easy washable
7	Grittiness	small gritty particle	small gritty particle	small gritty particle
8	Irritability	non irritant	non irritant	non irritant
9	Extrudeability	easy extruded	easy extruded	easy extruded

Table 1. Evaluation of body scrub cream

of the developed body scrub creams were almost the same, exclude the purple color intensity. The purple color correlated to their total anthocyanin content[10]. Oxidation degradation of anthocyanin reacted to form brown condensation product[11]. Light exposed of body scrub creams for 25 days induced completely brown condensate for body scrub B and C, but not for A. It means the steamed scrub powder preparation method governed a stable anthocyanin. The steam method was done at temperatures 70-90°C. The anthocyanin contents with red colour have stability at elevated temperatures (70-90°C). The stability of putative health-promoting polyphenols of was not markedly affected by the thermal treatment[7].

4. Conclusion

Steamed sweet tuber deactivated peroxidase enzymes and increases the stability of anthocyanin purple color in the body scrub. Steaming preparation method produced powder, which was suitable particle distribution for body scrub cream.

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