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Physical Evaluation and Anti-Aging Effect of Red Bean Ethanolic Extract (*Vigna angularis* (Wild.) Ohwi & Ohashi) Peel-Off Gel Mask

Bayu Eko Prasetyo^{1*,2}, Dwi Rafika³, Lia Laila¹, Fat Aminah¹

¹Department of Pharmaceutical Technology, Faculty of Pharmacy, Universitas Sumatera Utara, Medan, 20155, Indonesia; ²Nanomedicine Center of Innovation, Universitas Sumatera Utara, Medan, 20155, Indonesia; ³Faculty of Pharmacy, Tjut Nyak Dhien University, Medan, Indonesia

Abstract

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***Correspondence:** Bayu Eko Prasetyo, Department of Pharmaceutical Technology, Faculty of Pharmacy, Universitas Sumatera Utara, Medan, 20155, Indonesia; Nanomedicine Center of Innovation, Universitas Sumatera Utara, Medan, 20155, Indonesia. E-mail: bayu@usu.ac.id

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BACKGROUND: The product development of an anti-aging dosage for human skin is a very interesting issue because every human wants to be looked young as long as possible. A studies and development of plant that contain of antioxidant properties need to be studied further.

AIM: The aim of this research was to formulate and evaluate the physical and anti-aging effect of the Peel-Off Gel Mask from Red Bean Ethanol Extract (PGMRB).

METHODS: The Extract Ethanol of Red Bean was extracted by maceration methods with ethanol 96%. The Peel-off base was consisted of Polyvinyl alcohol, glycerin and carbomer 940. The gel formulation was made in 3 formulas (F1, F2, and F3) consisted with 1%, 3% and 5% ethanol extract, respectively. The blank formula (F0) was also prepared as a control formula. The evaluation of gel formulation included organoleptic test, pH determination, stability test, homogeneity test, peeling time, irritation test and anti-aging effect test included moisture level, skin pore size, the evenness test and dark spot test by using skin analyzer.

RESULTS: All of the formula showed a homogen, pH around 6, peeling time less than 20 minutes, no irritation and stable for 12 weeks storage at room temperature. The treatment with PGMRB demonstrated an improvement on the moisture level, pore size, evenness and the number of black spots with F3 containing 5% extract as the best formula.

CONCLUSION: The ethanol extract of red bean can be formulated become a peel-off gel mask and having the anti-aging effect.

Introduction

Naturally, human has been interested to prevent aging process and looked young as long as possible. So many efforts and treatment that they have done as anti-aging for their skin. But anti-aging definition is not always meaning the biological process that changes in organism; it has been changed and emphasizes more on the quality of life [1].

So many people had been done everything to repair the effect of aging, and one of the efforts is the

antioxidant use. Antioxidant can prevent and delay the aging process to be happened. Natural antioxidant can be produced from vegetables, fruits and another source and one of them is from Red Bean (*Vigna angularis* (Wild.) Ohwi & Ohashi). This seed contains with protein, oligosaccharide and also very rich in the secondary metabolites like saponin, phytates, phenolic compounds, flavonoids, isoflavones, etc [2].

There are some cosmetic approaches have been developed for anti-aging purposes. Some formulations are phytosomal gel [3], microemulsion dosage form [4] or peel off mask [5]. Peel off mask is one of the cosmetics that can be used to protect the

face. It can be used as the remedy to treat facial skin. Some polymers which can form a thin layer on face can be used as an ingredient of the formula [6]. Polyvinyl alcohol is one of the choices because it can form a strong thin layer, short time to dry and can protect the skin [7].

Based on that reason, the researcher interested to formulate the ethanol extract of Red Bean in peel off gel mask formulation, evaluate the physical characterization, and measure the anti-aging effect in volunteers.

Material and Methods

Red beans were obtained from traditional market in Medan, North Sumatera Province, Indonesia. The gel base like polyvinyl alcohol (PVA), carbomer 940, sodium lauryl sulfate, glycerin, methyl paraben was obtained from Bratachem (Indonesia).

The ethanol extract of red bean was made by maceration methods using 96% ethanol as stated in the 3rd Indonesian Pharmacopoeia [8]. Rotary evaporator was used to separate the solvent from the extract until the crude extract was produced. Formulation of peel off gel base was made based on modification method from Rieger [9]. The gel base was made by dissolving the polyvinyl alcohol in water. Carbomer 940 was developed in hot water to form mucilage. This mucilage was then mixed with polyvinyl alcohol in water and other excipients (methyl paraben, sodium lauryl sulfate and glycerin). The mixture was mixed gently until homogeny and formed peel-off gel base. The extract was then added with this base to form gel formulation.

Preparation of PGMRB were conducted by adding the gel peel-off base (GPB) to the ethanol extract of Red bean in several formula, F1, F2 and F3 with some variation of red bean ethanolic extract concentration, 1%, 3% and 5%, respectively. The base was added slowly and mixed until homogeny and become gel. The gel base without extract also prepared as blank sample (F0). The formula can be seen in Table 1.

Table 1: Formula of PGMRB in variation extract concentration

Composition	F0	F1	F2	F3
Ethanol Extract of Red Bean	0	1%	3%	5%
Peel-off gel base	Ad 100	Ad 100	Ad 100	Ad 100

The physical evaluation was conducted to evaluate the characterization of PGMRB. The parameters of characterization were included organoleptic test, homogeneity test, pH determination, peeling time test and physical stability test for 4 weeks. Evaluation of form, color changes and odor were done visually for organoleptic evaluation. The pH

determination was conducted by using pH meter calibrated with standard solution. The samples were diluted in water before tested. The homogeneity Test was conducted by putting a certain amount of gel to a piece of glass and checked visually whether it showed a homogeny composition or not. The peeling time test was conducted by calculate the required time for the gel to form a mask when applied to the skin.

In physical stability test, all of the parameters including organoleptic test, homogeneity test, peeling time test and pH measurement were checked every week during storage for 12 weeks at room temperature. The irritation test for the gel was conducted with patch test. The gel was applied on the back of the ear, three times a day for 3 days. The positive response including redness, itching and swelling indicates an allergy to the volunteers' skin.

The anti-aging test was followed by 12 women volunteers. The gel formulation was applied to the skin face of volunteers aged 20 until 30 years old. The test was conducted for 4 weeks and the condition of skin was checked before and after applying the PGMRB. The parameter of moisture level, pore size, evenness and black spot of the skin were detected using Aramo SG[®] skin diagnosis system. All of the data were presented as a mean \pm Standard deviation.

Results

The physical evaluation of PGMRB showed that the gel was homogeny, transparent and had no visible coarse grains to the glass test. The organoleptic test also showed that this formulation was very stable. No color and odor changes after 12-week storage in room temperature. The irritation test showed none of the volunteers having a problem when using the gel formulation. The physical results of PGMRB can be seen in Table 2.

Table 2: The Result of Physical Evaluation for PGMRB

No	Parameters	Formula			
		F0	F1	F2	F3
1	Organoleptic test:				
	Consistency	Semisolid	Semisolid	Semisolid	Semisolid
	Colour	Transparent	Reddish brown	Reddish brown	Reddish brown
2	Odour	Specific	Specific	Specific	Specific
	Homogeneity	Homogeny	Homogeny	Homogeny	Homogeny
3	PH				
	After preparation	6.2	6.1	5.9	5.7
4	After 12 weeks	6.2	6.0	5.8	5.6
	Physical stability in the room temperature	Stable	Stable	Stable	Stable
5	Peeling Time	18 minutes, 5 second	18 minutes, 22 second	18 minutes, 40 second	19 minutes, 21 second
6	Irritation test	No irritate	No irritate	No irritate	No irritate

The pH was also stable after the gel kept in room temperature for 12 weeks. The changes of PH for 12 weeks can be seen in Figure 1.

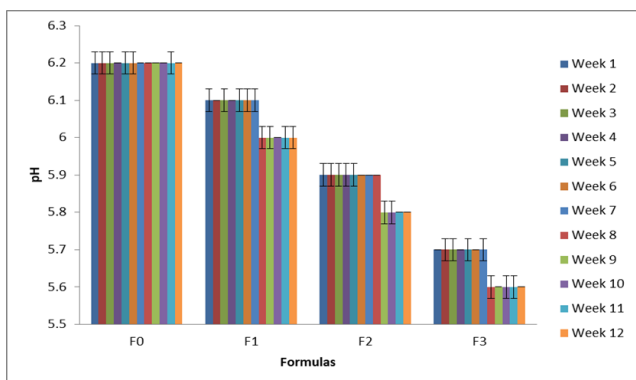


Figure 1: The pH measurement of PGM RB for 12 weeks stored at room temperature. (Mean \pm Sd, n = 3)

The effect of PGMRB as anti-aging was evaluated including the moisture level, skin pore size, skin evenness and spot measurement. From the study, the moisture levels of skin from all volunteers increased after they had treatment with PGMRB for 4 weeks (Figure 2).

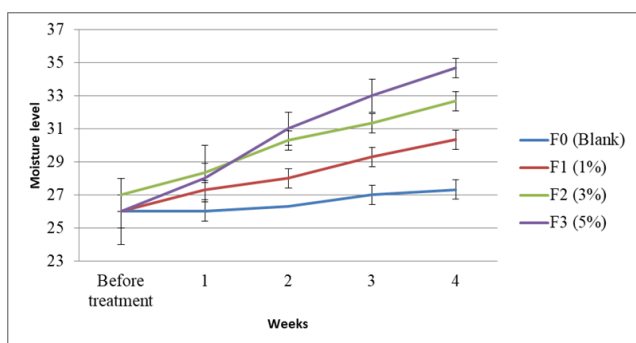


Figure 2: The PGMRB effect on moisture level after 4 weeks treatment

The pore size of skin after 4 weeks treatment also showed improvement whereby the pore size of the volunteer's skin decreased (Figure 3).

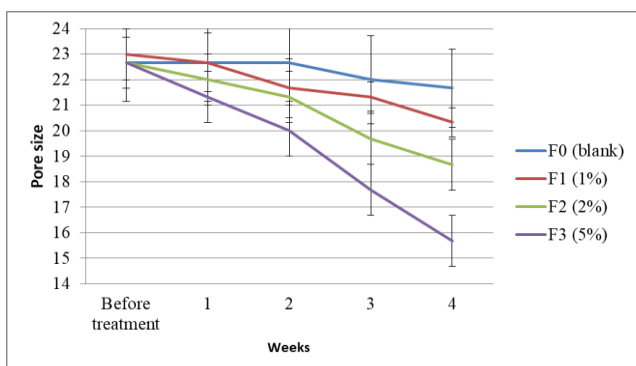


Figure 3: The PGMRB Effect on the skin pore size after 4 weeks treatment

This test also showed the decreasing of evenness from all volunteers. The F3 with 5% Extract concentration showed the best effect to decrease the evenness (Figure 4).

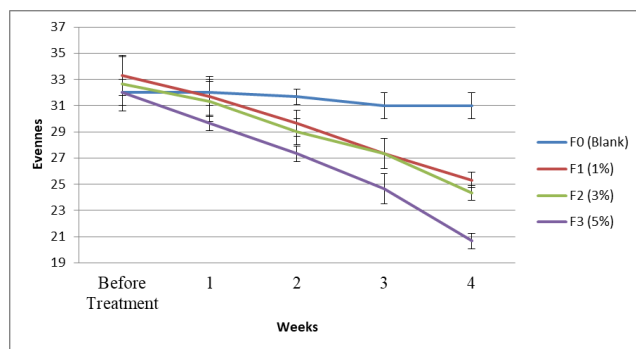


Figure 4: The PGMRB Effect on the Evenness after 4 weeks treatment

The spot test was also very important to show the anti-aging effect from the formula. The black spot also decreased for all formulations compared with the blank, and F3 was the best formula. The spot value for 4 weeks treatment can be seen at Figure 5.

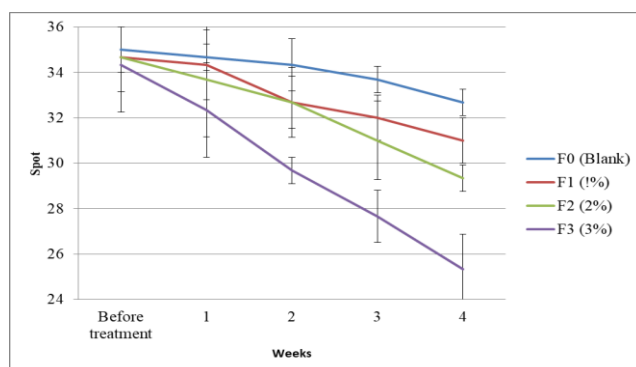


Figure 5: The PGMRB effect on the dark spot after 4 week treatment

Discussion

The pH determination for PGMRB that we see that the higher extract concentration of red bean, the gel become more acid, but this pH still fulfilled the safety criteria for human. The normal human skin pH is in the range of 4-6 [10]. The cosmetic uses with formulation pH near or in the range will be safety and it will not disturb the function of the skin.

The peeling time for this formula showed that all of the gel formula became mask less than 20 minutes. This time was still acceptable and considered not to long. After 12 weeks stored at room temperature, the peeling time became longer compared to the fresh prepared. Since the formula contained with glycerin which is hygroscopic, so it has high affinity to absorb and catch water molecule from the air and decrease the water evaporation from the dosage form [11]. In addition, all of the formula did not show irritant effect to the skin after use and it was considered safe.

The initial condition of moisture level was

dehydration and after 4 weeks treatment, the PGMRB helped to increase the moisture level become normal compared with blank. The highest moisture level obtained was for F3 that contain 5% ethanol extract of red bean. It means that the formula can help to increase and keep the moisture condition of human skin. The criteria of moisture level based on Aramo [12] are (0-29) Dehydration, (30-50) Normal and (51-100) hydrated. For the skin pore size test, at the initial condition, the skin pore size was in large criteria and after 4 weeks treatment it became better in small criteria for all volunteers. The pore size criteria based on Aramo [12] are: Small: 0-19, Large: 20-39 and Very large: 40-100. The evenness criteria are Smooth (0-31), Normal (32-51), and Rude (52-100). All of the formulations showed good evenness effect compared with blank.

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