



## Quality Analysis of Cream Scrub Combination of Moringa (*Moringa oleifera*) Leaf Extract and White Glutinous Rice (*Oryza sativa glutinosa*) Starch

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### Abstract

Premature aging is a health problem that attacks facial skin and is very disturbing appearance. This can be overcome of them with antioxidant compounds. Sources of natural antioxidant compounds in Indonesia are found in Moringa leaves and white glutinous rice. The use of antioxidants is facilitated by making them into cosmetic preparations, one of which is scrub cream. This study aims to determine the physical quality and antioxidant activity of a cream scrub combined with Moringa leaf extract and glutinous rice starch. This research begins with the extraction of moringa leaves and white glutinous rice starch. Moringa leaf extract and white glutinous rice starch obtained were then made into cream scrub preparations at 4 concentration variations, with a comparison of Moringa leaf extract and white glutinous rice starch F0 (0%:0%), F1 (25%:75%), F2 (50%:50%) and F3 (75%:25%). The quality test of the luxurious cream included an organoleptic test, pH test, spreadability test, adhesion test, and irritation test. An antioxidant activity test was carried out using the DPPH method. The results showed that the combination of Moringa Leaf Extract (*Moringa oleifera*) and White Glutinous Rice Starch can be formulated as a cream scrub, with the results of physical quality both organoleptic, pH, spreadability, adhesion, and irritation fulfilling the requirements, and antioxidant activity in the strong category at F3.

**Keywords:** moringa leaves, white glutinous rice, antioxidant, scrub cream

### Introduction

The increasing use of cosmetics among the public encourages the development of cosmetics both in variety and quantity. This is in line with technological developments and

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individual perceptions of attractive, healthy, and beautiful self (Sabrina Dewi Basir et al., 2022). Premature aging is a health problem that attacks facial skin and is very disturbing appearance (Yusharyahya, 2021). This can be overcome of them with antioxidant compounds (Aizah, 2016), which is a substance that can slow down or prevent the oxidation process (Lung & Destiani, 2018). The body needs antioxidants that come from outside the body, which can be obtained from natural ingredients (Haerani et al., 2018).

One source of natural antioxidant compounds in Indonesia is found in Moringa leaves (*Moringa oleifera*) and white glutinous rice (*Oryza sativa* L. var *glutinosa*). Moringa plant is known as a multipurpose plant and has medicinal properties (Krisnadi, 2015), and antioxidant activity (Widiastini et al., 2021). Apart from Moringa leaves, a superior commodity that can be used as a source of antioxidants is white glutinous rice (*Oryza sativa* L. var *glutinosa*). White glutinous rice has an active compound called gamma oryzanol, which has a strong antioxidant effect (Allifa et al., 2020). The high antioxidant content can accelerate collagen production so that the skin becomes smoother (Lulu et al., 2022).

Antioxidant levels decreased as the concentration of the extract decreased, thus causing the antioxidant activity to decrease. This could be due to the fewer particles of the compound, or the reduced content due to chemical and physical degradation (Putu Tara Hradaya & Husni, 2021). To overcome this, a combination of two types of antioxidants can be done, in the hope of producing higher antioxidant activity, which is known as a synergistic effect (Vifta et al., 2019). Based on this description, research was carried out on the quality analysis of creamy body scrub preparations combination of moringa leaf extract (*Moringa oleifera*) and white glutinous rice starch (*Oryza sativa glutinosa*), to determine the physical quality and antioxidant activity of the combined moringa leaf extract and white glutinous rice starch.

### **Literature Review**

The use of antioxidants is facilitated by making them in cosmetic preparations (Rompis et al., 2019), including scrub preparations. Scrub is a preparation used to remove dirt and dead skin cells that cannot be completely removed by soap, as well as to provide moisture and restore skin softness (Isfianti, 2018). Scrub can remove dead skin cells that accumulate on the surface of the skin so that it is clean, smooth, and bright. Body scrub in cream form is better because it can be used on all skin types (Alibasri & Syafah, 2019). Cream scrubs are scrubs that are shaped like a thick paste or dough and can be used directly on the skin in damp conditions or when it has been moistened first (Isfianti, 2018). Currently, people are more inclined towards traditional cosmetics that use natural raw materials so that they do not have side effects on the human body, and have the advantage of being rich in beneficial nutrients and minerals (Istiqomah et al., 2021). Treatment of traditional scrubs is one of the treatments that many people choose, because of its efficacy and safety factors (Rahmadevi et al., 2020).

## Research Method

### Materials

The materials used include moringa leaves (*Moringa oleifera*) obtained from the Prambanan Klaten area, white glutinous rice starch (*Oryza sativa* L. var glutinosa) obtained from the Delanggu Klaten area, stearic acid, cetyl alcohol, propylene glycol, triethanolamine, distilled water, DPPH powder, ethanol 70%, methanol pa. The tools used include a blender, knife, sieve, stirring rod, porcelain cup, mortar and pestle, beaker, measuring cup, spatula, water bath, cosmetic pot/container, parchment paper, flannel cloth, pH stick, spreadability tool, filter paper, glass objects, horn spoons, measuring flasks and digital scales.

The research procedure involved several stages, namely preparation of moringa leaf extract, preparation of white glutinous rice starch, formulation and preparation, as well as evaluation of the combination scrub preparation of moringa leaf extract and white glutinous rice starch.

1. Preparation and manufacture of Moringa Leaf Extract refers to research (Amanah et al., 2021), (Rauf et al., 2021). Choose Moringa leaves that are fresh and not wilted. Moringa leaves are collected, washed, and wet sorted, then chopped and dried. Then do the dry sorting and pulverized into powder. Moringa leaf powder weighed 515 grams, then transferred to a dark bottle, and added 5 L of 70% ethanol, then stirred, and closed. After that, it is allowed to stand for 3 x 24 hours. In the immersion process, shake at least 3 times. The results of the soaking process are filtered and then concentrated over a water bath with a temperature of 50°C to obtain a thick extract.
2. Preparation of White Glutinous Rice refers to research (Hairiyah et al., 2022). White glutinous rice is powdered using a blender. Next, to flatten the white sticky rice, squeeze it until a white precipitate appears. The precipitate of white glutinous rice is dried in the sun to obtain white glutinous rice starch.
3. Formulation and manufacture of a Combination Body Scrub with Moringa Leaf Extract and White Glutinous Rice Starch according to Table 1. The formulation of the basic scrub cream formulation refers to research (Ittiqo & Anderiani, 2017). Body scrub preparations were made with variations in concentration with 4 formulas for the comparison of moringa leaf extract and white glutinous rice starch.

Table 1. The formula for Cream Scrub Combination of Moringa Leaf Extract and White Glutinous Rice Starch

Material	F0 (g)	F1 (g)	F2 (g)	F3 (g)
Moringa Leaf Extract	-	3,75	7,5	11,25
White Glutinous Rice Starch	-	11,25	7,5	3,75
Stearic Acid	5	5	5	5
Cetyl Alcohol	2,5	2,5	2,5	2,5
Propylene Glycol	7,5	7,5	7,5	7,5
Tretanolamine	2,5	2,5	2,5	2,5
Aquadest (ml)	Add 50	Add 50	Add 50	Add 50

Note: F0 = Formula without the addition of extract (0%:0%), F1 = Formula with the addition of moringa leaf extract and white glutinous rice starch with a ratio (25%:75%), F2 = Formula with the addition of moringa leaf extract and rice starch white glutinous rice with a ratio (50%:50%), F3 = Formula with the addition of moringa leaf extract and white glutinous rice starch with a ratio (75%:25%).

The preparation of Combination Body Scrub Cream of Moringa Leaf Extract and White Glutinous Rice Starch refers to research (Syam et al., 2021), (Ittiqo & Anderiani, 2017). The

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ingredients for each scrub formulation were weighed, then separated into two groups, namely the oil phase and the water phase. The oil phase consists of cetyl alcohol and stearic acid. The aqueous phase consists of propylene glycol and TEA. The oil phase is melted in a water bath at 70 °C (mass 1). The water phase was dissolved in water at 80 °C, and stirred until homogeneous (mass 2), then mass 1 and mass 2 were mixed while stirring slowly to form a scrub base (mass 3). Then added moringa leaf extract and stirred until homogeneous. Let it cool and put it in a container and label it.

4. Quality Test of Body Scrub Combination of Moringa Leaf Extract and White Glutinous Rice Starch, referring to research (Alibasri & Syafah, 2019), (Jamilatun et al., 2023), (Andiva et al., 2023). 1). Organoleptic tests include texture, color, and odor. 2). The pH test was carried out by testing the scrub preparation with universal pH. 3). The spreadability test was carried out by taking 0.5 gram of scrub and placing it in the middle of a round glass with a diameter of 15 cm, another glass being placed on top of it and leaving it for 1 minute, and then measuring the diameter of the scrub. Added a load weighing 50 grams on top and left for 1 minute then measured again the diameter of the scrub. Continue adding 50 grams of weight so that the total load is 100 grams. Leave it for 1 minute and then measure the diameter of the scrub again. The last recorded results were obtained. 4). The adhesion test was carried out by applying 0.3 grams of scrub to a thin layer on a glass object. Another glass object is placed on top of the scrub preparation, then pressed with a 1 kg load for 5 minutes. Place the glass object on the test kit, then release the weight weighing 80 grams and record the time until the two objects are released. 5). The Irritation Test was carried out by applying the scrub to the forearms of each panelist as many as 5 people, then observing for 5 minutes the symptoms that occurred. This test is carried out for 2 days in a row, and observed if symptoms of redness and edema (swelling) occur on the skin.

Antioxidant Test of Cream Preparations Combination of Moringa Leaf Extract and White Glutinous Rice Starch, referring to research (Yunita et al., 2021), (Hehakaya et al., 2022). First, preparation of 40 ppm DPPH solution. This was done by adding 4 mg of DPPH powder to a 100 ml volumetric flask. Then the volume was made up with methanol up to the mark and shaken until homogeneous. Second, manufacture of 1000 ppm mother liquor. It was carried out by scrubbing as much as 50 mg dissolved in methanol, then put into a 50 ml volumetric flask. The volume is added with methanol up to the mark and shaken until homogeneous. Third, the preparation of series test solutions of 20, 60, 100, 140, 180 ppm. It is done by pipetting the mother scrub solution 0.2; 0.6; 1; 1.4 and 1.8 (ml). Put into a 10 ml volumetric flask. The volume was added with methanol up to the mark. Fourth, determining the maximum wavelength. It was carried out in this way, 2 ml of 40 ppm DPPH solution was put into the vial then added 2 ml of methanol, was shaken until homogeneous, put into a cuvette using a methanol blank, and measured at a wavelength of 510-530 nm using Uv-Vis spectrophotometry. Fifth, Measurement of the Absorption of Antioxidant Cream Scrub Activity. It was carried out in this way, 2 ml of the antioxidant scrub series test solution was put into the vial added with 2 ml of 40 ppm DPPH solution, then shaken until homogeneous and incubated in a dark room for 30 minutes then absorption was measured with a Uv-Vis spectrophotometer.

## Result and Discussion

Sample preparation was carried out before the formulation and testing was carried out, which included the preparation of moringa leaf extract and white glutinous rice starch. The process of extracting Moringa leaves using the maceration method uses 70% ethanol with a ratio of 1:10, while white glutinous rice starch is carried out by taking the precipitate produced from white glutinous rice juice. The initial weight of Moringa leaves is 500 grams, and the weight of the thick extract of Moringa leaves is 80.543. So the yield obtained is 16.108%.

The results of moringa leaf extract and white glutinous rice starch were formulated into scrub preparations and then organoleptic tests, pH tests, spreadability tests, adhesion tests, irritation tests, and antioxidant activity were carried out with the results shown in Table 2.

Table 2. Quality of Cream Scrub Combination of Moringa Leaf Extract and White Glutinous Rice Starch

Formulas	Organoleptic (Texture, Color, Fragrance)	pH	Spread Power (cm)	Stickiness (second)	Irritation	IC <sub>50</sub> Value (Antioxidant properties)
F0	Semi solid, white, odorless	5	7,2	4,5	No irritation	668,225 (Very weak)
F1	Semi solid, yellow, characteristic of starch	6	5,8	13	No irritation	111,06 (Moderate)
F2	Semi solid, yellowish green, typical of Moringa leaf extract	4	6,3	7,2	No irritation	104,89 (Moderate)
F3	Semi solid, yellowish green, typical of Moringa leaf extract	6	6,1	5,8	No irritation	74,51 (Strong)

Note: F0 = Formula without the addition of extract (0%:0%), F1 = Formula with the addition of moringa leaf extract and white glutinous rice starch with a ratio (25%:75%), F2 = Formula with the addition of moringa leaf extract and rice starch white glutinous rice with a ratio (50%:50%), F3 = Formula with the addition of moringa leaf extract and white glutinous rice starch with a ratio (75%:25%).

Organoleptic tests are used to examine the physical appearance of cream scrub using the five senses, which include texture, color, and aroma. Based on the results of the organoleptic test, the texture of each formula is semi-solid, this is due to the presence of a combination of emulsifiers namely stearic acid and cetyl alcohol. In addition, stearic acid can improve the consistency of the preparation (Rofifah, 2020). Aroma, F0 (base formula) does not smell, F1 has a starchy aroma because the use of a combination of white glutinous rice starch is more than moringa extract. While F2 and F3 have a distinctive aroma of Moringa leaf extract. Color, F0 are white, F1 are yellow, while F2 and F3 are yellowish green. This is by the statement (Pratama et al., 2020) that the color formed in the preparation can be influenced by the color of the constituent materials. The greater the concentration of the active ingredient used as a constituent, the color and smell of the cream preparation can be affected.

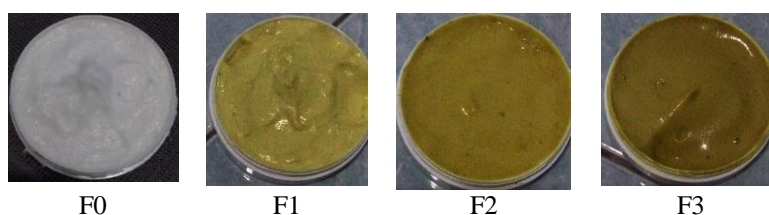


Figure 1. Cream Scrub Combination of Moringa Leaf Extract and White Glutinous Rice

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The pH test aims to determine the pH of the cream scrub. pH is an important factor in testing scrub because scrub are applied for external use intended for the skin, the result of a pH that is too acidic will cause skin irritation while a pH that is too alkaline will cause dry skin (Andiva et al., 2023). The results of testing the pH of the cream scrub from moringa leaf extract and white glutinous rice starch, namely F0 of 5, F1 of 6, F2 of 5, and F3 of 6. The pH requirements of topical preparations are 4.5-6.5, so the pH results on Scrub made from moringa leaf extract and white glutinous rice starch complied with the requirements. The results of this pH test are by research (Ittiqo & Anderiani, 2017) that the pH of topical preparations has a pH of 6.8 or not less than 4.5 and not more than 6.5.

A spreadability test was carried out to determine the speed of spread of the scrub on the skin and to determine the softness of the preparation when applied to the skin. A spreadability test is carried out to ensure the even distribution of the scrub when applied to the skin. The spreadability of the scrub is shown by the diameter and the spread area concerning the added load. The spreadability requirement for topical preparations is 5-7 cm (Lestari et al., 2017). The results of the spreadability test at F0, F1, F2, and F3 were 7.2 cm; 5.8cm; 6.3 cm, and 6.1 cm. According to (Forestryana et al., 2020) the wider the area of spread produced by preparation, the better the ability to spread the preparation when applied topically. Body scrub is easier to spread because of the presence of propylene glycol which functions as a humectant (Wicaksana & Rachman, 2018), which is to maintain the level of water content in the cream by reducing water evaporation so that the cream scrub can spread more easily and maintain moisture. The results of this study indicated that the spreadability test in cream scrub preparations of moringa leaf extract and white glutinous rice starch met the requirements.

The adhesion test was carried out aiming to find out the time needed for the scrub cream to adhere to the skin. Good adhesion allows the cream scrub to not easily come off and the longer it sticks or is in contact with the skin, so it can produce a longer and as-expected effect. The results of the stickiness test on the scrub cream had a stickiness of 4.5 seconds, F0 for 4.5 seconds, F1 for 13 seconds, F2 for 7.2 seconds, and F3 for 5.8 seconds. The results of this study are supported by research (Ittiqo & Anderiani, 2017), with stickiness results ranging from 4 - 58 seconds. The results of this study, of the four formulas meet the requirements of the adhesion test, namely  $\geq 4$  seconds (Alibasri & Syafah, 2019).

Irritation test is a test performed on humans to prevent hypersensitivity reactions. The irritation test was carried out with the help of volunteers. Irritation test on the preparation was carried out by applying scrub cream on the forearms of 5 people for 2 consecutive days. Symptoms that arise are observed, generally, irritation will soon be indicated by skin reactions such as redness and itching. The results of testing the four formulas showed no irritation to the skin. The results of this test are supported by research (Purwandari et al., 2018) that scrub cream preparations do not show redness and itching. From the results of this study, it is known that cream scrub from moringa leaf extract and white glutinous rice starch are safe to use as topical preparations.

Testing the antioxidant activity of the cream scrub preparations was carried out using the DPPH (2,2-diphenyl-1-picrylhydrazyl) method (Hehakaya et al., 2022). Determination of the antioxidant activity of luxurious cream of moringa leaf extract and white glutinous rice starch begins with determining the maximum wavelength of the DPPH. The maximum wavelength measurement results obtained were 518 nm with an absorbance value of 0.773. The maximum wavelength obtained is then used to find the absorbance of the sample to determine its antioxidant activity. The absorbance value obtained is used to calculate the percentage of free radical inhibition or % inhibition which is then determined by the  $IC_{50}$  through a linear equation, this value indicates the strength of the antioxidant activity. Inhibition Concentration 50% ( $IC_{50}$ ) is a number indicating the concentration of the sample which can inhibit the DPPH oxidation process by 50%.

The results of the study showed that the  $IC_{50}$  value of the scrub cream was F1 at 668.225 in the very weak category, F2 at 111.06 in the medium category, F3 at 104.89 in the medium category, and F3 at 74.51 in the strong category. The difference in the  $IC_{50}$  value of each of these formulas indicates that the antioxidant activity of the cream scrub can be affected by the ratio of the active ingredients used. F3 has strong antioxidant activity because the active ingredients of Moringa leaves are more abundant than white glutinous rice starch. Moringa leaves have stronger antioxidants than active ingredients that contain vitamin C (Hardiyanti, 2015), so a formula containing more Moringa leaves will produce high antioxidant activity. This is by research (Rauf et al., 2021), the results of antioxidant activity tests on Moringa leaf extract which has been formulated into cosmetic preparations are included in strong antioxidants.

The stronger the nature of the antioxidant activity, the stronger it is to protect the body from free radical attacks, such as UV rays. To protect the skin from free radicals, antioxidants are needed which work to inhibit the formation of free radicals. The use of luxurious cream from moringa leaf extract and white glutinous rice can be an alternative source of antioxidants to counteract free radicals on the skin. In addition, white glutinous rice also has a brightening effect, a compound called the gamma oryzanol compound, which can accelerate collagen production so that the skin becomes smoother and brighter.

## **Conclusion**

The combination of moringa leaf extract and white glutinous rice starch can be formulated as a cream scrub, with the results of physical evaluations of both organoleptic, pH, spreadability, adhesion, and irritation fulfilling the requirements, as well as strong category antioxidant activity at F3.

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***Quality Analysis of Cream Scrub Combination of Moringa (Moringa oleifera) Leaf Extract and White Glutinous Rice (Oryza sativa glutinosa) Starch***

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