Open Access Health Scientific Journal
https://oahsj.org/index.php/oahsj Vol. 6 No. 2 August 2025, pp. 236-241

Research article

Formulation And Physical Quality Test Of Black Glutinous Rice (Oryza Sativa L. Var. Glutinosa) And Olive Oil Body Scrub

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ARTICLE INFO

Keywords:
Anthocyanin,
Body scrub,
Glutinousrice,
Olive oil.

ABSTRACT

Background: The purpose of using a body scrub is to remove dead skin cells and dirt, and unclog pores, resulting in brighter, whiter skin. Many types of body scrubs are available today, each with a variety of benefits, from smoothing to whitening. Black glutinous rice is currently a popular choice for use in cosmetics. Black glutinous rice contains 109.52–256.61 mg of anthocyanin per 100 grams. The antioxidant activity of anthocyanins can be enhanced by the presence of other phytochemicals, such as flavanols, catechins, or vitamins, which are also commonly found in fruit.
Methods: This research method is experimental in making body scrub preparations from black sticky rice as the active ingredient with varying concentrations of 5%, 10%, and 15%. Evaluation of the body scrub preparations by looking at the results of the physical quality of the preparations which include organoleptic tests, homogeneity tests, pH tests, adhesion tests, and spreadability tests. The body scrub preparations will be tested for 3 days and stored at room temperature. Data are analyzed descriptively by comparing them to the Indonesian National Standard.
Results: The results of the study showed that the preparation met the physical quality requirements, the results of organoleptic quality, namely the formulation of body scrub preparations F1, F2, and F3. The results of the pH test of F1, F2, F3 were in the range of 6.03-6.48, the results of the spreadability test showed results in the range of 4.48-6.98, and the adhesion test produced a range of 0.2.30 -0.2.45.
Conclusion: The conclusion of this study is that the formulations F1, F2 and F3 with the addition of olive oil have good physical quality, are stable and meet the Indonesian National Standard.

I. Introduction

Body scrubs are increasingly recognised as essential cosmetic products that offer a multitude of benefits for skin health and appearance. Their primary function is to exfoliate the skin, effectively removing dead skin cells that accumulate on the skin's surface. This process not only promotes a brighter complexion but also enhances the skin's firmness, reduces visible signs of ageing, and serves as a potent anti-aging agent. The benefits of body scrubs are largely attributed to the active ingredients they contain, which can vary significantly depending on the formulation.

The application of a body scrub is a straightforward process, typically involving the even distribution of the product across the body. After allowing the scrub to dry slightly, users gently massage the product into their skin before rinsing it off with water (Suhartatik et al., 2013). This ritual not only revitalises the skin but can also serve as a moment of self-care, contributing to overall well-being.

One particularly noteworthy ingredient found in some body scrubs is black glutinous rice flour. This ingredient is rich in purple anthocyanin pigments, which are known for their powerful antioxidant properties. Antioxidants play a crucial role in protecting the skin from oxidative stress caused by free

Received 15 June 2025; Accepted 25 July 2025; Published 1 August 2025
 DOI: https://doi.org/10.55700/oahsj.v6i2.97

radicals, which can lead to premature ageing and various skin conditions (Sari et al., 2025). The antimicrobial compounds present in black glutinous rice flour further enhance its appeal as a skincare ingredient, providing a natural means of combating bacteria that can cause skin issues. Additionally, its anti-inflammatory properties help soothe irritated skin, making it suitable for a wide range of skin types. When used as a body scrub, black glutinous rice flour significantly optimises the exfoliation process. The texture of the flour provides a gentle yet effective means of sloughing off dead skin cells, revealing the fresh, healthy skin underneath. The antioxidants found in black glutinous rice also play a vital role in skin health by activating vitamin B1, which is essential for maintaining a vibrant complexion. Moreover, vitamin B1 is known to combat magnesium deficiency, a condition that can lead to dull and lifeless skin. The inclusion of iron and protein in black glutinous rice contributes to an overall brighter appearance, as these nutrients are vital for skin vitality and resilience (Swastika et al., 2013).

The active ingredients in body scrubs are often derived from natural sources, reflecting a growing trend towards natural skincare. One such ingredient that has garnered attention is olive oil, which is frequently incorporated into cosmetic formulations for its numerous skin benefits. Olive oil contains lactic acid and alpha hydroxy acid, both of which are instrumental in the exfoliation process. These substances not only aid in the removal of dead skin cells but also enhance the skin's natural moisture factor, resulting in a more hydrated and supple appearance (Suhartatik et al., 2013).

The synergy between these ingredients highlights the importance of understanding how various components of body scrubs work together to provide comprehensive skincare benefits. For instance, the combination of antioxidants from black glutinous rice and the moisturising properties of olive oil creates a holistic approach to skin health. This not only addresses immediate concerns such as dryness and dullness but also contributes to long-term skin vitality.

Ritual of using a body scrub can be seen as an opportunity for mindfulness and self-care. The act of massaging the scrub into the skin can promote circulation, which is beneficial for overall skin health. This process can also serve as a moment of relaxation in a busy lifestyle, allowing individuals to focus on their wellbeing and engage in a sensory experience that enhances their mood.

Body scrubs represent a multifaceted approach to skincare, offering a range of benefits that extend beyond mere exfoliation. The incorporation of natural ingredients such as black glutinous rice flour and olive oil not only enhances the efficacy of these products but also aligns with a broader movement towards natural and holistic skincare solutions. As consumers become increasingly aware of the importance of skin health, the demand for effective, natural body scrubs is likely to continue growing. By understanding the individual components and their synergistic effects, individuals can make informed choices that support their skin's health and enhance their overall beauty regimen.

II. METHODS

The tools used were an electric scale, a spoon, a stirring rod, a dropper, a porcelain mortar and stamper, a beaker, a scrub container, and parchment paper.

The materials used were black glutinous rice flour, olive oil, propylene glycol, stearic acid, triethanolamine, cetyl alcohol, methyl paraben, SLS, distilled water, tissue paper, label paper, filter paper, aluminum foil, and a handkerchief.

Research Design
The body scrub formulation is shown in the following table:

Table 1. Body Scrub Formulation

Material	Purpose	F1 (%)	F2 (%)	F3 (%)
Black glutinous rice flourm	Scrub	5	10	15
Olive oil	Emolien	5	5	5
Cetyl alcohol	Oil base	4	8	16
Propilen glikol	Humektan	6	6	6
Natrium Lauryl Sulfat (SLS)	Emulgator	6	6	6
Trietanolamine (TEA)	Emulgator	4	4	4
Metil paraben	Preservatif	0,4	0,4	0,4
Stearate acid	Oil base	10	10	10
Aquadest	Solvent	Ad 100	Ad 100	Ad 100

Making a body scrub
Weigh the oil phase ingredients, namely 20 grams of stearic acid and 4 grams of cetyl alcohol, put them in a porcelain cup and heat them in a water bath. Weigh the water phase ingredients, namely 6 grams of ppg, 4 grams of TEA, 0.4 grams of methyl paraben, 6 grams of glycerin, 10 grams of sorbitol and put them in a beaker glass and add distilled water and heat them in a water bath. The oil phase is first put in a heated mortar, then added to the water phase and stirred until homogeneous. Add 10 grams of black glutinous rice flour to the mortar and stir until homogeneous and a creamy texture is formed, then add 10 grams of olive oil, mix until homogeneous, then continue with the evaluation test.
Data analysis
This study analyzed the physical quality of body scrub preparations made from black glutinous rice and olive oil using a descriptive method. The data obtained were described using statistical analysis. The specification requirements for the analysis included testing for significant differences in the results of pH tests, spreadability, and adhesion of the body scrub preparations

III. RESULT

In the physical quality test, the organoleptic results showed that during storage for 3 days, the body scrub preparation did not experience any changes in color, distinctive odor, slightly thick shape, and fine grain texture. The homogeneity of the body scrub preparation showed homogeneous results, this can be seen that all particles were evenly distributed on the object glass and none clumped (Hadi et al., 2024). It can be concluded that during storage there were no changes and all preparations were stable both from the observation of organoleptic results and also homogeneity.
The results of the physical quality test on the body scrub preparation using black sticky rice and olive oil can be seen in the following table 1 and result of pH, adhesive power, and body scrub spreadability tests can be seen in the following table 3.

Table 2. Organoleptic test results of body scrub from black glutinous rice and olive oil

Organoleptic test	F1	F2	F3
Color	Light purple	Light purple	Light purple
Odor	Typical	Typical	Typical
Shape	Slightly thick	Slightly thick	Slightly thick
Texture	Scrub grain	Scrub grain	Scrub grain
Homogeneity Test	Homogeneous	Homogeneous	Homogeneous

Table 3. Results of pH, adhesive power, and body scrub spreadability tests

Evaluation test	Result		
	F1	F2	F3
pH	6,64	6,79	5,71
	5,72	5,67	6.86
	5,73	6,64	6,89
Mean±SD	5,73±0,5382	6,64±0,6080	6,3±0,8344
Spreadability test	4,431	6,678	6,985
	4,473	6,652	6,991
	4,536	6,658	6,992
Mean±SD	4,473±0,0528	6,658±0,136	6,991±0,0038
Adhesion test	02,48	02,40	02,56
	02,40	02,32	02,32
	02,04	02,42	02,48
Mean±SD	02,4±0,2344	02,42±0,6428	02,48±1,2036

IV. DISCUSSION

Based on the data obtained, the results showed that during 3 days of storage, neither F1, F2, and F3 experienced any changes. The results of the pH test of the preparation showed a pH value that was within the appropriate range for topical preparations, namely 4.5–6.5 (Tungadi et al., 2023). The pH of the preparation affects the taste when applied to the skin so it needs to be considered, if the pH is too acidic it can cause skin irritation and vice versa if the pH of the basic preparation will result in dry and scaly skin (Iskandar et al., 2021). The results of the spreadability test are said to meet the requirements of the spreadability test if the range is around 5-7 cm (Ansel, 2008). The results of F1, F2, and F3 show the spreadability value that is within the range, this is in accordance with the theory that the greater the spreadability, the greater the ability of the active substance to spread on the skin more widely. The results of the adhesion test of F1, F2, and F3 show that the preparation still meets the range, namely <4 seconds (Tungadi et al., 2023). This is related to the ability of the preparation to adhere to and be absorbed by the skin so as to provide the expected therapeutic effect. The results of data analysis using the SPSS application obtained a sig value >0.05. This shows that the sample is normally distributed and homogeneous (Ismail, 2022). In the ANOVA test, the sig value was <0.05, which means there was no difference between the preparations (Devita et al., 2021).

The recent study conducted on the stability and performance of topical preparations F1, F2, and F3 over a three-day storage period has yielded promising results. Notably, there were no observable changes in the formulations, indicating a high level of stability under the conditions tested. This finding is particularly significant in the realm of pharmaceutical preparations, where stability is paramount to ensure efficacy and safety for the end user. The stability of a formulation can be influenced by various factors, including the pH levels, which play a critical role in determining the overall performance of topical applications.

The pH of a topical preparation is a crucial parameter that directly influences its safety and effectiveness when applied to the skin. According to the data collected, the pH values of F1, F2, and F3 fell within the ideal range of 4.5 to 6.5, as highlighted by Tungadi et al. (2023). This pH range is essential because it closely mirrors the natural acidity of human skin, which typically ranges from 4.5 to 5.5, thereby ensuring compatibility and minimising the risk of irritation. When a formulation is too acidic, it can lead to skin irritation, manifesting as redness, itching, or even burns. Conversely, if the pH is too alkaline, it can strip the skin of its natural oils, leading to dryness and flakiness, as noted by Iskandar et al. (2021). These potential adverse effects underscore the importance of rigorous pH testing during the formulation process to guarantee that the final product is safe for consumer use.

In addition to pH, the spreadability of a topical preparation is another critical factor that determines its usability and effectiveness. The spreadability test results for F1, F2, and F3 indicated values within the acceptable range of 5 to 7 cm, as established by Ansel (2008). This metric is essential because a greater spreadability indicates a higher capacity for the active ingredients to disperse evenly across the skin surface, thereby enhancing absorption and therapeutic efficacy. For instance, a preparation with

excellent spreadability ensures that the active compounds can reach a larger area of skin, which is particularly beneficial for treatments targeting extensive skin conditions such as eczema or psoriasis. The ability to spread easily also contributes to user satisfaction, as it enhances the overall application experience.

Adhesion test results for F1, F2, and F3 demonstrated that the preparations adhered to the skin for less than four seconds, which is within the acceptable range as per the findings of Tungadi et al. (2023). This rapid adhesion is indicative of the formulations' effectiveness in adhering to the skin and subsequently being absorbed, which is crucial for achieving the desired therapeutic effects. The relationship between adhesion and absorption cannot be overstated; if a product does not adhere well to the skin, it will not be able to deliver its active ingredients effectively. This is particularly important in the context of topical medications, where the goal is to ensure that active ingredients penetrate the skin barrier and exert their effects at the target site.

The statistical analysis of the data using the SPSS application provided further insights into the formulations. The significance value obtained was greater than 0.05, indicating that the samples were normally distributed and homogeneous, as noted by Ismail (2022). This statistical validation is crucial as it supports the reliability of the experimental results, allowing for confidence in the conclusions drawn about the formulations' performance. Moreover, the ANOVA test revealed a significance value of less than 0.05, suggesting that there were no significant differences between the preparations. This lack of variance implies that all three formulations, F1, F2, and F3, performed similarly in terms of stability, pH, spreadability, and adhesion, which is a promising outcome for future development and potential commercialisation.

Comprehensive analysis of the topical preparations F1, F2, and F3 over a three-day storage period reveals that they exhibit excellent stability and performance characteristics. The pH levels are well within the safe range for topical applications, minimising the risk of skin irritation or adverse effects. The spreadability and adhesion tests further demonstrate that these formulations are capable of delivering active ingredients effectively, which is essential for therapeutic efficacy. Additionally, the statistical analysis confirms the reliability of the data, indicating that there are no significant differences among the formulations. This study not only highlights the importance of formulation stability and performance testing but also sets the groundwork for future research and development in the field of topical preparations, ultimately aiming to enhance patient care and treatment outcomes.

V. CONCLUSION

Based on the results of physical quality tests conducted on the black glutinous rice and olive oil body scrub, the results showed that the body scrub was quite stable. This was demonstrated by the absence of changes and its compliance with standards for organoleptic properties, homogeneity, pH, spreadability, and adhesion.

VI. ACKNOWLEDGMENTS:

Thank you to all respondents and all those who have contributed to this research.

VII. CONFLICTS OF INTEREST

No conflict of interest was found during the research

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