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Formulation of Body Lotion Ethanol Extract of Kepundung Bark (*Baccaurea Macrocarpa* (Miq.) Mull Arg.) and Antioxidant Activity Test

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ABSTRACT

The bark of kepundung (*Baccaurea macrocarpa* (Miq.) Mull Arg.*)* contains secondary metabolite compounds from polyphenols such as flavonoids, phenolic, terpenoids, and alkaloids, which have the potential for natural antioxidants. This research aims to evaluate of ethanol extract from kepundung bark and formulate the body lotion to test its antioxidant activity using the DPPH method. Body lotion formulas were made with variations in the concentration 0.4, 1.0, and 1.6% of ethanol extract of kepundung bark as active ingredients. The evaluation of body lotion included organoleptic, pH, homogeneity, type of body lotion, stability, viscosity, irritation, and antioxidant activity tests. The results of the physical evaluation of the body lotion meet the requirements. Namely, all formulas are homogeneous, according to skin pH, the viscosity of the preparation ranges from 2500 cP, stable, and does not irritate. The value IC_{50} antioxidant activity of ethanol extract of kepundung bark was 4.04 ppm. The value IC_{50} antioxidant activity body lotion at F1, F2, and F3 respect 41.91, 36.98, and 33.13 ppm. The result showed the best formula is F3 with a value IC_{50} 33.13 ppm. Based on the study, the ethanol extract of depending bark and the body lotion has very strong antioxidant activity.

1. Introduction

Free radicals known as reactive oxygen species (ROS) are crucial to several bodily organ physiological functions. ROS are also known to modulate vascular function by causing damage directly due to the influence of pollutants. In addition, pollutants can penetrate through the stratum corneum to deeper layers of the skin, causing damage to the skin (Kholifah et al., 2024).

Free radicals can bind and damage cell components such as fats, proteins, and nucleic acids, causing premature aging of the skin. Therefore, to avoid the bad effects of free radicals that can damage skin cells in the body and even if they occur for a long time can accelerate the aging process and cancer, to anticipate this, the body needs an important substance that can neutralize free radicals such as antioxidants (Rohmatussolihat, 2015). Antioxidants are substances that bind free radicals to prevent oxidation (Taurhesia et al., 2024). The use of topical preparations containing antioxidants can help the process of neutralizing free radicals on the skin (Chang et al., 2013). The use of natural ingredients as raw materials for cosmetics is a very promising opportunity (Lailiyah et al., 2020). One of the plants that has antioxidant activity is kepundung (Baccaurea macrocarpa) can see (Figure.1). Kepundung is an endemic plant found in Kalimantan, Sumatra, and the Malay Peninsula. These plants

are popular because of their sweet fruit, and their stems are widely used by the community as building materials for houses (Haegens, 2000).

Fig. 1. Kepundung (*Baccaurea macrocarpa*) plant

The result of research conducted by Tirtana et al., (2013) shows that the kepundung (*Baccaurea macrocarpa*) contains secondary metabolites that are widely used as antioxidants, especially the alkaloid, phenolic, and flavonoid compounds. *Baccaurea macrocarpa* fruit flesh showed antioxidant activity with an IC50 33.11 ppm. In addition, research conducted by Erwin et al., (2019) found that the methanol extract of the bark of *Baccaurea macrocarpa* showed strong antioxidant activity (IC50 11.15 ppm). Cream is the cosmetic preparation that practically all women choose and can use to protect the outer skin layer to avoid the bad effects of sun exposure on the skin. Besides that, the cream preparations are comfortable to use (Rabima, 2017). Based on the above, the ethanol extract of kepundung bark was tested and formulated in the form of body lotion from the ethanolic extract of *Baccaurea macrocarpa* bark and the antioxidant activity using the DPPH method.

2. Materials and Methods

The tools are a rotary evaporator (Hettichzentrifugen), oven (Memert), pH meter (Istek), analytical balance (Boeco), Viscometer Brookfield (Ku-3 V), microscope (Optilab camera), hotplate (Heidolph), furnace (Wise therm), and spectrophotometer UV-Vis PG T92+. The ingredients used are Baccaurea macrocarpa bark, ethanol 70%, ethanol 96%, HCl 1%, stearic acid, cetyl alcohol, paraffin liquid, methyl paraben, propyl paraben, Oleum rosae, glycerin, triethanolamine, norit, aquadest, chloroform, $FeCl_3$, methylen blue, Mg powder, $H_2SO_{4(P)}$ dan DPPH.

2.1. Preparation of samples

Kepundung Bark obtained from Nagari Kajai, Talamau District, West Pasaman Regency, West Sumatera, Indonesia. Dry kepundung bark was cleaned and cut, and then 2 kg was put into a maceration bottle, and 20L ethanol was added to 70%. Then, it was soaked for 6 hours while stirring occasionally and then allowed to stand for 18 hours. After 18 hours, the macerate was filtered through flannel. This filtering process was repeated at least twice, and then the collected macerate was evaporated at 40-50°C until a thick extract was obtained. Then, the examination of specific (organoleptic, yield, solubility) and non-specific parameters (ash content, drying shrink), as well as phytochemical screening, was carried out.

2.2. Preparation of Body Lotion Ethanol Extract from Kepundung Bark

The preparation of the ethanol extract kepundung bark body lotion was made in four formulations with variations in the concentration of the extract. The ingredients, such as stearic acid, cetyl alcohol, and liquid paraffin, were put into an evaporating dish (mass 1). Materials that include the water phase (TEA, glycerin, methylparaben, propylparaben, and aquadest) are put in an evaporating dish (mass 2). Mass 1 and mass two are heated separately on a waterbath to 70-80 ^{0}C. After everything is melted, the water phase and the oil phase are then combined in a hot mortar and stirred slowly until an oil-in-water (O/W) basis is formed. Then, the ethanol extract of kepundung bark was added, and the

flavoring mixture was stirred until homogeneous and put into a container body lotion (Amatullah et al., 2017).

Table 1. The formula of body lotion ethanol extract kepundung bark

Component	Formula (%b/v)			
	F0	F1	F2	F3
Ethanol Extract Baccaurea macrocarpa Bark.	-	0.4	1	1.6
Stearic acid	5	5	5	5
cetyl Alcohol	3	3	3	3
Glycerin	5	5	5	5
Paraffin liquid	7	7	7	7
Triethanolamine	2	2	2	2
Methylparaben	0.18	0.18	0.18	0.18
Propylparaben	0.02	0.02	0.02	0.02
Oleum rosae	0.15	0.15	0.15	0.15
Aquadestad	100	100	100	100

2.3. Evaluation of Physical Quality of Body Lotion Ethanol Extract Kepundung Bark

2.3.1. Organoleptic and homogeneity test

This is done by observing color, flavor, odor, and shape to evaluate the organoleptic of body lotion. Applying a specific quantity of it to a glass object is how the homogeneity test is performed (Panjaitan et al., 2012).

2.3.2. pH test

Using a pH meter. The body lotion preparation was dissolved in distilled water (1:10), and the pH meter was calibrated. The pH value was measured three times (Zulkarnain et al., 2016).

2.3.3. Viscosity test

Viscosity was determined by Brookfield viscometer at a temperature of 25 °C (Prajakta & Shahu, 2020).

2.3.4. Stability test

The Stability test used the freeze and thaw method for six cycles, that is, 12 days. The body lotion was stored at 4ºC for 24 hours and then transferred to 40ºC (oven) for 24 hours. Then, the physical changes occur (whether there is a separation or not). The test was repeated 3 times for each replication of each body lotion formula Gozali et al., (2009).

2.4. Antioxidant Activity

2.4.1. Determination of the Maximum Absorption Wavelength of DPPH

35 ppm DPPH solution was pipetted 4 mL into the vial, and then 2 mL of ethanol was added. Let stand for 30 minutes in a dark place. Measure the absorption of the solution with a UV-visible spectrophotometer at a maximum absorption wavelength of 400-800 nm (Kholifah et al., 2024).

2.5. Determination of Antioxidant

2.5.1. Ethanol Extract Kepundung Bark

A sample solution was made with a concentration of (1; 2; 3; 4; 5) ppm from the main solution of Baccaurea macrocarpa bark extract 100 ppm, with a pipette of (0.1; 0.2; 0.3; 0.4; 0, 5) mL into a 10 mL measuring flask ad ethanol to the limit. Pipette 2 mL of sample solution of each concentration into the vial, then add 4 mL of DPPH 35 ppm. Then, it was analyzed using a UV-visible

spectrophotometer. Antioxidant activity was determined by calculating the % inhibition and IC_{50} value (Kholifah et al., 2024).

2.5.2. Body Lotion Ethanol Extract of Kepundung Bark

The main body lotion solution was made from the ethanol extract of Baccaurea macrocarpa bark with a concentration of 100 ppm. Then, we pipetted as much as F0 (6; 7; 8; 9; 10) mL, F1, F2, and F3 (1; 2; 3; 4; 5) mL into a 10 mL volumetric flask and added ethanol to the limit. Thus, sample solutions were obtained with concentrations of F0 (60, 70, 80, 90, 100) ppm, F1, F2, and F3 (10, 20, 30, 40, 50) ppm. 2 mL of each sample solution was pipetted into a vial, and 4 mL of DPPH 35 ppm was added. The mixture was homogenized and left for 30 minutes in a dark place until a yellow color formed (DPPH color decayed from purple to yellow). Absorption was measured using a UV-visible spectrophotometer at a maximum wavelength of 400-800 nm. Antioxidant activity was determined by calculating the % inhibition and IC_{50} value.

2.5.3. Calculation of Percentage Inhibition (% Inhibition) and Value IC_{50}

Antioxidant activity can be measured using the formula (1):

$$\% \text{ inhibition} = \frac{(\text{Control absorbance} - \text{DPPH absorbance})}{\text{Control absorbance}} x\ 100\% \quad \ldots\ldots\ldots (1)$$

IC50 was calculated using a linear regression equation with the concentration value as the x-axis and the percentage of inhibition as the y-axis (Badarinath et al., 2010).

3. Results and Discussion

Table 2. Results of Examination of Specific and Non-Specific Parameters Ethanol Extract of *Baccaurea macrocarpa* Bark and Phytochemical Screening

Examination	Observation
Organoleptic	
Shape	Viscous liquid
Color	Reddish brown
Smell	Aromatic
Flavour	Bitter
Yield of extract	8.16%
Solubility	
In water	Slightly soluble (1:60)
In ethanol 70%	Soluble (1:18)
In ethanol 90%	Soluble (1:15)
Ash content	2.29%
Drying shrink	10.49%
Phytochemical screening	
Flavonoids	+
Phenolic	+
Terpenoids	+
Alkaloids	+
Saponins	-
Steroids	-

The result of determining the ash content was 2.29%. The ash content test aims to determine the number of inorganic compounds or mineral salts remaining during the combustion process. The lower the ash content value, the higher the purity. The drying shrinkage of the extract was 10.49%. For drying shrinkage, no conditions or ranges of values are allowed. The aim is to find out the percentage of compounds lost during the heating process, not only water but other evaporated compounds (Kesehatan, 2020). Phytochemical characterization of the ethanol extract of kepundung stem bark showed positive results for flavonoid, phenolic, terpenoid, and alkaloid compounds. Based on the literature, it is stated that flavonoids have high antioxidant activity (Muslihah, 2007). The results of

examination of specific and non-specific parameters ethanol extract of *baccaurea macrocarpa* bark and phytochemical screening can see on Table 2.

3.1. Organoleptic and homogeneity test

An organoleptic test of the ethanol extract from the kepundung bark was carried out for 6 weeks. The organoleptic parameters observed were shape, color, and smell see (Table 3). The results obtained are F0, F1, F2, and F3, each in the form of a viscous, typical with a distinctive fragrance, However, variations in the addition cause a difference in color of body lotion, which can be seen in Figure 2. Observations carried out for 6 weeks showed no physical changes. This indicates that the body lotion preparation is physically stable during storage.

Homogeneity testing is carried out to see the mixability of the active substance with the carrier material so that it can provide maximum effect after application. The results obtained in the body lotion preparation are all homogeneous formulas.

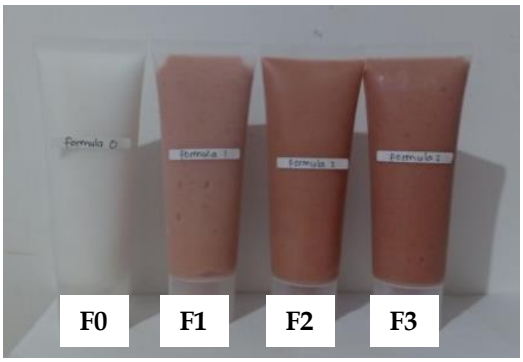

Fig. 2. Formula body lotion ethanol extract of kepundung bark

3.2. pH test

To prevent negative consequences like irritation and dry skin, the pH of each formula must be determined in order to calculate the body lotion's pH to resemble the pH of the skin. The results, which can be seen in Table 3, show that the pH is different but still in the skin pH range, which ranges from 4.5 to 7.5 (Kosasih, 2013). The pH of a pharmaceutical preparation is a crucial parameter because it is related to the condition of the skin. A pH value < 4.5 can cause irritation and rash on the skin, while a pH value > 7.5 will affect skin elasticity, which will cause the skin to become dry (Safitri & Jubaidah, 2019).

3.3. Viscosity test

Viscosity has an impact on both therapeutic outcomes and user comfort. If body lotion has a range of viscosity which is 2,000-50,000 cP (SNI-16-3449-1996). The results of the viscosity calculation can be seen in Table 3.

3.4 Stability test

The body lotion examination was carried out for 6 cycles with a temperature (40±2oC) and a temperature (4±2ºC) each for 24 hours. There are no physical changes until the 6th cycle, as can be seen in Table 3.

3.5 Antioxidant Activity

An antioxidant activity test was carried out by UV-visible spectrophotometry using the DPPH method. Using this technique, the DPPH solution as free radicals, will interact like antioxidant compounds change to be non-radical 1.1, -diphenyl-2-pycrilhydrazine (Molyneux, 2004). The determination of the maximum absorption wavelength of 35 ppm DPPH solution resulted in the maximum absorption at a wavelength of 516.0 nm (fig. 4) with an absorbance of 0.550. Testing the antioxidant activity of the ethanolic extract of Baccaurea macrocarpa bark obtained IC50 value = 4.04 ppm, which is categorized into a very strong antioxidant group. In this method, vitamin C is used as a

comparison with IC50 value = 7,54 pp. These results show that the antioxidant activity of the ethanol extract of kepundung bark is higher than the activity of vitamin C as seen from the IC50 value, but the activity category is both included in the very strong category.

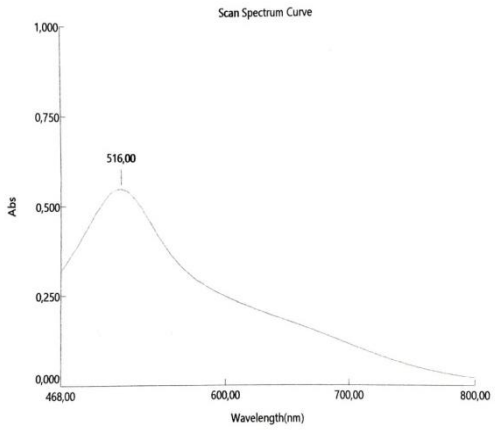

Fig. 3. DPPH Maximum Wavelength Measurement Results

Use body lotion that contains ingredients that have an antioxidant effect, which can protect the skin from sunlight. Testing the antioxidant activity of body lotion ethanol extract kepundung bark in all formulas obtained results with IC_{50} values F0 = 100.54 ppm, F1 = 41.91 ppm, F2 = 36.98 ppm, and F3 = 33.13 ppm. From the results obtained, the body lotion of ethanol extract kepundung bark at F0 was categorized into medium class antioxidants, while F1, F2, and F3 were categorized into very strong antioxidants. F1, F2, and F3 contain ethanol extract of kepundung bark, which is thought to be the flavonoid compounds contained therein that are responsible for this antioxidant activity.

Table 3. Results of Evaluation of Body lotion Ethanol Extract of kepundung bark

Evaluation	Observation			
	F0	**F1**	**F2**	**F3**
Organoleptic				
Shape	Viscous	Viscous	Viscous	Viscous
Smell	Typical	TypicalBright	Typical	TypicalDark
Color	White	pink	Pink	pink
pH test	7.29	7.30	7.31	7.32
Homogeneity test	Homogeneous	Homogeneous	Homogeneous	Homogeneous
Viscosity test (cP)	2599	2584	2569	2559
Stability test	Not separated	Not separated	Not separated	Not separated
Antioxidant activity, value IC50 (ppm)	100.54	41.91	36.98	33.13

4. Conclusion

A series of studies that have been carried out provide results that can be concluded that antioxidant activity of ethanol extract kepundung (*Baccaurea macrocarpa*) bark is category as very strong with an IC50 value of 4.04 ppm. Ethanol extract of *Baccaurea macrocarpa* bark can be formulated in the form of body lotion and have very strong antioxidant activity with IC_{50} values of 33.13 ppm on 1.6%.

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Competing Interests

The authors declare no conflict of interest.

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References

Amatullah, L., Cahyaningrum, T., & Fidyaningsih, A. (2017). Efektifitas antioksidan pada formulasi skin lotion ekstrak Mesocarp Buah Lontar (Borassus Flabellifer) terhadap Tikus Putih Jantan Galur Wistar secara In-Situ. In *Journal of Pharmaceutical Science and Clinical Research*, 2(1), 25. DOI:10.20961/jpscr.v2i01.5236.

Badarinath, A. V, Rao, K. M., Madhu, C., Chetty, C. M. S., Ramkanth, S., Rajan, T. V. S., & Gnanaprakash, K. (2010). A review on in-vitro antioxidant methods: comparisions, correlations and considerations. In *International Journal of PharmTech Research*, researchgate.net. https://www.researchgate.net/profile/Bhavesh-Tiwari/post/Can_anyone_suggest_the_best_technique_to_estimate_the_level_of_antioxidant_compounds_in_a_plant_extract/attachment/59d62e5fc49f478072e9efd3/AS%3A273574751866880%401442236711585/download/ANTIOXIDANT+3.pdf

Chang, C. T., Chang, W. L., Hsu, J. C., Shih, Y., & Chou, S. T. (2013). Chemical composition and tyrosinase inhibitory activity of Cinnamomum cassia essential oil. In *Botanical Studies*. Springer. https://doi.org/10.1186/1999-3110-54-10

Erwin, E., Pusparohmana, W. R., Sari, I. P., Hairani R., and Usman, U. (2019). GC-MS profiling and DPPH radical scavenging activity of the bark of Tampoi (Baccaurea macrocarpa). In *F1000Research*, pmc.ncbi.nlm.nih.gov. https://pmc.ncbi.nlm.nih.gov/articles/PMC6915813/

Gozali, D., Rusmiati, D., & Utama, P. (2009). Formulasi dan Uji Stabilitas Mikroemulsi Ketokonazol Sebagai Antijamur Candida albicans dan Tricophyton mentagrophytes. In *Fakultas Farmasi. Universitas Padjadjaran-Jatinangor*. https://www.scribd.com/doc/75102330/Formulasi-Dan-Uji-Stabilitas-Mikroemulsi-Ketokonazol-Sebagai-Antijamur-Candida-Albicans-Dan-Tricophyton-Mentagrophytes

Haegens, R. (2000). Taxonomy, phylogeny, and biogeography of Baccaurea, Distichirhops, and Nothobaccaurea (Euphorbiaceae). *Blumea. Supplement*. https://repository.naturalis.nl/pub/526368

Kesehatan, R. D. (2020). Parameter Standar Umum Ekstrak Tumbuhan Obat. In D. P. O. Tradiosional (Ed.), *Kesehatan* (Cetakan Pertama). Scribd. https://www.scribd.com/document/637297916/Parameter-Standar-Umum-Ekstrak-Tumbuhan-1

Kholifah, E., Fitriani, V., & Shobah, A. N. (2024). Formulation and antioxidant activity analysis of Jotang Herb (Acmella paniculata) extract mask cream. *Journal of Fundamental and Applied Pharmaceutical Science*, *4*(2), 70–80. https://doi.org/10.18196/jfaps.v4i2.19341

Kosasih, A. (2013). *Ilmu Penyakit Kulit dan Kelamin Edisi 6*. Jakarta: Fakultas Kedokteran UI.

Lailiyah, M., Saputra, S. A., & Sari, F. (2020). Antioxidant activity and sun protection factor evaluation for cream formulation of purified roasted corn silk extracts (Zea Mays L. Saccharata). *Pharmaciana*, *10*(3), 371. https://doi.org/10.12928/pharmaciana.v10i3.17780

Molyneux, P. (2004). The use of the stable free radical diphenylpicrylhydrazyl (DPPH) for estimating antioxidant activity. In *Songklanakarin J. sci. technol*. academia.edu. https://www.academia.edu/download/39013361/Molineux_07-DPPH.pdf

Muslihah, H. (2007). *Antioksidan Alami dan Radikal Bebas Potensi dan Aplikasi dalam Kesehatan*. Yogyakarta: Kanisius.

Panjaitan, E. N., Saragih, A., & Purba, D. (2012). Formulasi gel dari ekstrak rimpang jahe merah (Zingiber officinale Roscoe) gel formulation of red ginger (Zingiber officinale Roscoe) extract. In *Journal of Pharmaceutics and Pharmacology*. 1(1), 9-20. https://www.semanticscholar.org/paper/Formulasi-Gel-Dari-Ekstrak-Rimpang-Jahe-Merah-Gel-(-Panjaitan-Saragih/ab34090e699073e05e166a3c557a65c62bcd0634

Prajakta, S., & Shahu, K. (2020). Formulation and evaluation of vanishing herbal cream of crude drugs. *Asian Journal of Pharmaceutical Research and Development*. DOI: https://doi.org/10.22270/ajprd.v8i3.725

Rabima, R. (2017). Uji stabilitas formulasi sediaan krim antioksidan ekstrak etanol 70% dari biji melinjo (Gnetum gnemon L.). *Indonesia Natural Research Pharmaceutical Journal Universitas,* 2(1), 107-121. https://journal.uta45jakarta.ac.id/index.php/INRPJ/article/view/834

Rohmatussolihat, R. (2015). Antioksidan, penyelamat sel-sel tubuh manusia. In *Biotrends*.

Safitri, C., & Jubaidah, L. (2019). Formulasi dan uji mutu fisik sediaan lotion ekstrak kulit buah jagung (Zea mays L.). In *Jurnal Insan Farmasi Indonesia*. 2(2), 175-184. DOI: https://doi.org/10.36387/jifi.v2i2.394

Taurhesia, S., Rosdiana, D.N., & Pratami, D.K. (2024). The Formulation and test of antioxidant activity from Serum gel of the extract Chrysanthemum flower (Chrysanthemum Indicum L.). *Journal of Natural Product for Degenerative Diseases*, *1*(2), 57–66. DOI: https://doi.org/10.58511/jnpdd.v1i2.6376

Tirtana, E., Nora, W., & Afghani, J. (2013). Analisa proksimat, uji fitokimia dan aktivitas antioksidan pada buah tampoi (Baccaureamacrocarpa). In *Jurnal Kimia Khatulistiwa*, 2(1), 42-45. https://jurnal.untan.ac.id/index.php/jkkmipa/article/view/1761/1703

Zulkarnain, A. K., Marchaban, M., Wahyuono, S., & Susidarti, RA. (2016). Pengaruh konsentrasi mahkota dewa terhadap stabilitas lotion–krim serta uji tabir surya secara spektrofotometri. *Majalah Farmaseutik*. https://journal.ugm.ac.id/majalahfarmaseutik/article/view/24124