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CHARACTERIZATION OF MUNDAR PERICARP (*Garcinia forbesii*) EXTRACT FROM BANJAR DISTRICT OF INDONESIA

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ABSTRAK

Mundar (*Garcinia forbesii*) merupakan buah khas Kalimantan Selatan. *Garcinia forbesii* secara empiris digunakan sebagai rempah, kosmetik, dan pengobatan. Tujuan penelitian yaitu mengetahui karakteristik ekstrak mundar dari Kecamatan Karang Intan (KKI) dan Kecamatan Beruntung Baru (KKB) di Kabupaten Banjar. Sampel diambil dari dua tempat, dideterminasi, dan diekstraksi dengan etanol 70%. Ekstrak dikarakterisasi dengan pemerian ekstrak, persen rendemen, skrining fitokimia, profil kromatografi, penetapan kadar fenolik total, kadar air, kadar abu, dan abu tidak larut asam. Hasil karakterisasi menunjukkan ekstrak kulit buah *Garcinia forbesii* dari KKI dan KKB berwarna coklat gelap, bau khas, rasa asam, bentuk kental. Keduanya mengandung flavonoid, fenolik, tanin, saponin, glikosida, dan antrakuinon. Pola kromatografi kedua ekstrak sama dengan tiga bercak dan terkandung alfa-mangosten. Ekstrak dari KKI memiliki rendemen 59,99%, kadar fenolik total 0,888%, kadar air 9,78%, kadar abu total 1,10%, dan kadar abu tidak larut asam 0,06%. Ekstrak dari KKB memiliki rendemen 58,74%, kadar fenolik total 0,823%, kadar air 9,93%, kadar abu total 1,59%, dan kadar abu tidak larut asam 0,04%. Kesimpulan yaitu ekstrak kulit buah *Garcinia forbesii* dari KKI dan KKB memiliki karakter sama secara organoleptis, fitokimia, dan pola kromatografi. Perbedaan pada persen rendemen, kadar fenolik total, kadar air, kadar abu, dan kadar abu tidak larut asam.

Kata Kunci: Ekstrak, Garcinia forbesii, Karakterisasi, Kulit buah mundar

ABSTRACT

The mundar plant (Garcinia forbesii) is a typical fruit of South Kalimantan. The people use mundar empirically as a spice, cosmetic, and medicine. The purpose of this study was to determine the characteristics of mundar extract from Karang Intan and Beruntung Baru districts in Banjar Regency. The collection of plants from two places, plant determination, and extraction with 70% ethanol. The extract was then characterized. The characterization showed that the Garcinia forbesii pericarp extract from both places was dark brown, distinctive odor, sour taste, and thick. Both extracts contained flavonoids, phenolics, tannins, saponins, glycosides, and anthraquinones. The chromatography of both extracts was the same and detected

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to alpha-mangosten. The extract from Karang Intan district has a yield 59.99%, total phenolic content 0.888%, moisture content 9.78%, total ash content 1.10%, and acid insoluble ash content 0.06%. The extract from Beruntung Baru district has a yield 58.74%, total phenolic content 0.823%, moisture content 9.93%, total ash content 1.59%, and acid insoluble ash content 0.04%. Garcinia forbesii pericarp extracts from from two places have the same organoleptical characteristics, phytochemical compounds, and chromatography patterns. The differences are in yield percentage, total phenolic content, water content, ash content, and acid insoluble ash content.
Keywords: *Extract, Garcinia forbesii, Characterization, Mundar pericaps*

INTRODUCTION

The mundar plant (*Garcinia forbesii*) is a typical fruit of South Kalimantan which is in the same genus as the mangosteen (Garcinia mangostana L.). The people of South Kalimantan use mundar empirically as spices, cosmetics, and medicine. *Garcinia forbesii* pericarp extracts and fractions have a strong ability to inhibit the growth of *Staphylococcus aureus* and *Propionibacterium acne* bacteria[(1)]. *Garcinia forbesii* pericarp has antioxidant activity in ethanol, methanol, and distilled water extracts tested using the DPPH method[(2)]. *Garcinia forbesii* has the ability to inhibit cancer growth[(3)].

Plants that grow in certain areas with different soil conditions can cause differences in the levels of active compounds and pharmacological activities[(4)]. Research on Capsicum frutescens grown in three different places showed differences in total flavonoid levels. Differences also occurred in the specific and non-specific parameters of these samples[(5)].

Extract is one of the raw materials used for making traditional medicines. Standard parameters of simplisia and extracts include specific and non-specific parameters[(6)]. Based on the description above, the researchers interested in characterizing the extract of *Garcinia forbesii* pericarp. This research is expected to provide information about the test results of specific and non-specific parameters of simplisia and mundar pericarp extract. The aim of this study is to determine the physicochemical characteristics of *Garcinia forbesii* pericarp extract from Karang Intan

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and Beruntung Baru districts in Banjar Regency.

RESEARCH METHOD

1. Tools and Materials

The tools used in this research are hot plate stirrer (Stuart), volumetric flask (Herma), UV lamp 254 and 366 nm, fume hood (Local), macerator, microscope, object glass, oven (Vinco), silica gel 254 plate, volume pipette (Iwaki), propipette (Vitalab), UV spectrophotometry (Genesys), analytical balance (Pioner), vortex (Jeio Tech), waterbath (SMIC).

The materials in this study are *Garcinia forbesii* pericarps, acetic acid (technical), hydrochloric acid (technical), nitric acid (technical), sulfuric acid (technical), gallic acid,
distilled water (technical), $Cd(NO_2)_3$, ethanol (pa), ethanol (technical), ethyl acetate (technical), $FeCl_3$ (technical), fluoroglusin (technical), 1% gelatin, potassium hydroxide (technical), Whatman filter paper, chloroform (technical), n-hexane (technical), sodium chloride, sodium hydroxide, Pb acetate, $Pb(NO_3)_2$, Dragendorff reagent, 5% Folin-Ciocalteau reagent, Mayer reagent, toluene (technical), and alpha mangostin (Sigma-Aldrich).

2. Research Procedure

A. Plant Determination

Determination of *Garcinia forbesii* pericarp sample was carried out at the Basic Laboratory of the Faculty of Mathematics and Natural Sciences, Lambung Mangkurat University, Banjarbaru.

B. Extract preparation

Garcinia forbesii pericarp originated from Banjar Regency, in Kampung Baru Village, Beruntung Baru District and Sungai Alang Village, Karang Intan District, the distance between these two districts is about 50 km. Beruntung Baru district has an altitude of 28 meters above sea level while Karang Intan district has an altitude of 55 meters above sea level.

Garcinia forbesii pericarps were wet sorted to separate dirt or foreign material from the pericarp. Drying is done by oven at 60°C for 3 days, then dry sorted. The dried

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simplisia was then pulverized with a blender and weighed[7,8].

Simplisia powder was weighed, then put into a maceration vessel and immersed in 70% ethanol solvent with a ratio of 1: 10 for 24 hours and stirring every 6 hours, remaceration was carried out 2 times and the solvent was replaced every 1x24 hours. The macerate was separated by filtration using filter paper. Filtration was repeated three times with the same type and amount of solvent. The macerate was evaporated in a waterbath until a thick extract was obtained[9,10].

C. Extract Characterization

a) Extract Description

The extract descriptions included shape, color, taste and smell[11].

b) Yield percentage

The yield extract was obtained from comparing the weight of the extract obtained with the weight of the initial simplisia[11].

c) Phytochemical Screening

Garcinia forbesii pericarp ethanol extract was added to 10 ml of 70% ethanol. The solution was then tested using reagents to identify the presence of alkaloids, flavonoids, terpenoids, steroids, saponins, tannins, glycosides, anthraquinones, and phenolics[12].

d) Chromatography Pattern

The test solutions from three different locations were spotted on a GF254 TLC plate and eluted with n-hexane: ethyl acetate mobile phase in the ratio of 4:6 and 6:4. Stain observation using 254 and 366 nm UV lamp. The Rf values were calculated and compared from all the samples[9].

e) Determination of Total Phenolic Content

A standard solution of 1000 ppm gallic acid was made, then diluted to 30, 40, 50, 60, 70, and 80 ppm. A total of 0.5 mL of each concentration was reacted with 2.5 mL of 5% Folin-Ciocalteau reagent, shaken and left for 8 minutes[13,14]. Added 2 mL of NaOH and vortexed and left during operating time. A sample of 50 mg was put into a 10.0 mL flask and dissolved with ethanol p.a until the limit mark. Take 0.5 mL and then treated in the same way as the standard compound. The absorbance results of the samples

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were integrated into the standard curve equation of the standard compound[15,16].

f) Water Content

Garcinia forbesii extract was put into a round bottom flask and 200 ml of toluene was added. The flask was heated for 100 minutes until all the toluene boiled, allowed to stand until room temperature until the water and toluene layers separated completely. The water volume was read and the water content is calculated in percent of the original extract weight[7].

g) Ash Total Content

Weigh 3 g of the thick extract of *Garcinia forbesii* pericarp and put it into a silicate crucible that has been weighed. Incinerate slowly, until finished at 800 °C, cool and weigh[7].

h) Acid Insoluble Ash Content

The ash obtained from the determination of total ash content is boiled with 25 mL of dilute HCl for 5 minutes. The acid insoluble part was collected, filtered using ash-free filter paper, washed with hot water and incinerated in a crucible until the weight remained constant[17].

RESULT AND DISCUSSION

1. Determination Result

The determination results showed that the plant samples used were *Garcinia forbesii* plant species based on the test result certificate number 040c/LB.LABDASAR/I/ 2019. Determination aimed to ensure and identify that the plant samples used[11]. Images of *Garcinia forbesii* are presented in the image below.

Picture 1. *Garcinia forbesii* Tree and Fruit

2. Extract Characterization Results

The description of *Garcinia forbesii* pericarp extract aimed to emphasize the characteristics and simple initial recognition of plants using the five senses[18]. Both extracts have a dark brown color, distinctive odor, sour taste, and thick form. The data obtained from this research is almost the same as the data obtained from similar

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studies[2].

Picture 2. Extract of *Garcinia forbesii*

The calculation of yield percentage aimed to determine the number of compounds that are extracted with certain solvents so that the amount of simplisia used for the extraction process can be determined[(17)]. The yield percentage of both extracts are presented in the table below.

Table 1. Yield Percentage of *Garcinia forbesii*

No	Origin	Yield ± SD (%)
1	Karang Intan	59,99 ± 0,61
2	Beruntung Baru	58,74 ± 0,17

The largest yield obtained from the extraction of *Garcinia forbesii* pericarp simplicia powder was 59.99%. In another study that conducted extraction using three different solvents, it showed a difference that was not significant from this study regarding the yield obtained[(2)].

The phytochemical screening methods are carried out by the color change reaction or the formation of a precipitate with a particular reagent[(17).] The test data of phytochemical screening results can be seen in the table below.

Table 2. Phytochemical screening

No	Phytochemical	Karang Intan	Beruntung Baru
1.	Alkaloids	-	-
2.	Flavonoid	+	+
3.	Phenolic	+	+
4.	Tannin	+	+
5.	Saponin	+	+
6.	Terpenoid	-	-
7.	Steroid	-	-
8.	Glycoside	+	+
9.	Anthraquinone	+	+

The results of phytochemical screening showed that *Garcinia forbesii* pericarp contains flavonoids, tannins, saponins, glycosides, anthraquinones and phenolics. Another study using the same plant showed that *Garcinia forbesii* pericarp extract contains phenols and tannins[(11)]. Phytochemical screening conducted by other researchers found that ethanol extract of *Garcinia forbesii* pericarp contains flavonoids, phenols and saponins[(19)].

Thin layer chromatography pattern is a test conducted to determine the initial picture of the compound content[(12)]. The

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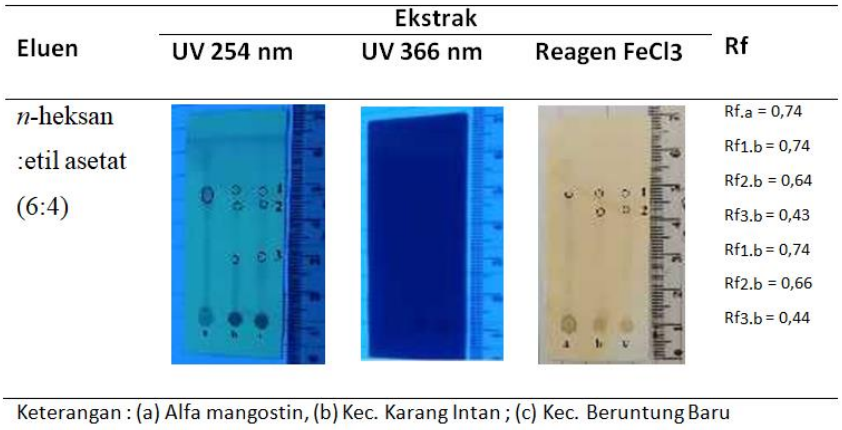
chromatography results can be seen in the figure below.



Picture 3. Chromatography Pattern of *Garcinia forbesii* Extract

The chromatography pattern showed that the Rf values in the samples from Karang Intan and Beruntung Baru are not significantly different. There are three spots. The chromatogram pattern of ethanol extract of *Garcinia forbesii* pericarp has polar and nonpolar compounds. This chromatogram pattern also used a comparison compound, alpha mangostin. Alpha mangostin is a marker compound found in Garcinia mangostana which is still in the same genus as *Garcinia forbesii*[7,20]. The Rf value of alpha mangostin was found to be 0.74. This value is the same as the Rf value in the ethanol extract of *Garcinia forbesii* pericarp. It is possible that this compound is alpha mangostin because the Rf value obtained is the same, with testing under the same conditions and one TLC plate[17].

The determination of total phenol content aimed to determine the amount of total phenol compounds contained in *Garcinia forbesii* pericarp. The method used in determining this content is the Folin-Ciocalteu method[12]. The preliminary test results showed the maximum wavelength obtained was 742 nm with an operating time of 20 - 28 minutes. The standard curve equation obtained is y = 0.0109x - 0.0156 with a correlation coefficient (r) value of 0.998. The determination result are presented in the table

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below.

Table 4. Determination Result of Total Phenolic Content of *Garcinia forbesii*

No	Origin	Content	RSD
1.	Karang Intan	0,888%	0,23
2.	Beruntung Baru	0,823%	0,14

The highest total phenol content of *Garcinia forbesii* pericarp extract came from Karang Intan District, 0.888% ± 0.002% (w/w) gallic acid equivalent, which means there was a phenol content of 0.888 ± 0.002 mg in 1 mg of extract. Total phenolic content is one of the parameters in extract standardization[5]. The total phenol content of the large sample from Karang Intan District had a higher value than the sample from Kampung Baru. Based on data testing using the independent sample T-test, the sig (2-tailed) value of 0.000 was obtained, which means there was a significant difference between the total phenol content of Karang Intan District and Untung Baru District.

The test results are presented in the table below.

Table 5. Determination Result of Water Content, Total Ash Content, and Acid Insoluble Ash Content from *Garcinia forbesii* Extract

No	Origin	Water	Content Total Ash	Acid Insoluble Ash
1.	Karang Intan	9,78%	1,10%	0,06%
2.	Beruntung Baru	9,93%	1,59%	0,04%

Water content determined the purity of an extract and the extract's resistance to mold contamination[6]. A good water content value is not more than 10% to avoid fungal growth in the extract[7,17].

The value of total ash content of *Garcinia forbesii* extract shows that the total ash content in the extract originating from Karang Intan District is higher than the one from Untung Baru District. The average value of the acid insoluble ash content of the extract is very small, indicating that the content of inorganic compounds contained in the G. forbesii pericarp extract is relatively low[7].

CONCLUSION

The research results showed that *Garcinia forbesii* extracts originating from Karang Intan

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District and Untung Baru District had the same characteristics in organoleptic terms, phytochemical compounds and chromatographic patterns. Differences were found in the yield percentage, total phenolic content, water content, ash content, and acid insoluble ash content.

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