

Research Article

Ethnobotanical Study and Phytochemical Screening of Medicinal Plants Used by Local People in Belangian Village, South Kalimantan

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Abstract

The local people of Belangian Village are people of the Banjar ethnic group who utilize plants in the surrounding environment for medicinal purposes. This study aims to determine the number of plants, parts of plants that can be used, methods of application, methods of preparation, and phytochemical screening of plants with medicinal properties in Belangian Village. This study employed the descriptive-explorative method. The technique used for data collection was an interview with a semi-structured questionnaire. Respondents of this study were "Pananamba" who were selected by using the Purposive sampling technique. Phytochemical screening was carried out on plants with no previously known scientific names and which had never been tested before. The results showed 17 families and 31 species of plants with medicinal properties. Empirically, the plants were used as medicines for cough, bloody urine, diabetes, cancer, sprue, ulcer, hypertension, skin diseases, nausea, diarrhea, coronary heart disease, sinusitis, kidney stones, cleansing kidneys, menstrual pain, itchy eyes, paralysis, bone pain, increasing stamina, antibiotic, reducing body odor, wounds, bleeding, worm diseases, increasing appetite, boosting the immune system, and yellow fever. The most frequently used part of the plants were the leaves (45%), the most widely used method of preparation was boiling (52%), the most commonly used method of application was by drinking (81%). Phytochemical screening was conducted on three plants: Asam daun, Lukun, and Ulur-ulur. The results of phytochemical screening revealed the presence of quinones, saponins, and terpenoids in Asam daun, saponins in Lukun, and terpenoids in Ulur-ulur.

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INTRODUCTION

Indonesia is rich in diverse natural resources, resulting in various tribes who possess different knowledge, customs, and cultures, one of which is plants utilization¹. An example of plants utilization is using plants as medicine. The knowledge of plants utilization as medicine is passed down from generation to generation. This knowledge is often passed down verbally, so it is necessary to collect information to assist the plants' utilization, development, and preservation². Plants are utilized by ethnic groups or local people in an area as a life-support system, also known as ethnobotany. The ethnobotanical study focuses on studying how a particular ethnic group utilizes plants in its surrounding environment³.

Borneo island is known for its forest, which possesses a high diversity of flora and fauna, some of which have medicinal properties. The Meratus Mountains is a mountain range that divides South Kalimantan into two parts. From a health aspect, the local people living around the Meratus Mountains area still use plants as medicine with the help of someone who is believed to understand and concoct⁴. Dayak and Banjar are the two largest ethnic groups that live around the Meratus

Mountains area. Belangian Village is located in Aranio district, Banjar Regency, South Kalimantan province, and is situated in Meratus Mountains⁵. The forest in Belangian village is still preserved, making it high in biodiversity. The population density of the Belangian village of 2 people/km² is relatively low compared to other villages in Aranio District. The population of Belangian Village is 90 families or 360 people. Generally, the villagers here work as field and vegetable farmers in addition to relying on garden produce in the form of local fruits. In addition to the remote location with transportation problems, other obstacles in this village are the unavailability of health facilities and amateur radio to communicate with the outside world⁶.

The traditional healing process among the Banjar people is named *Batatamba*, and the person who gives treatment is called *pananamba*. *Batatamba* is conducted by using traditional concoctions and 'mantra' or spells from a *pananamba*⁷. Limited access to health care services is one of the factors which causes people of Belangian village to use traditional medicine with the help of a *pananamba* more often. Looking at the potency of those medicinal plants, it is necessary to conduct a phytochemical screening test which is the initial stage to provide an overview of groups of chemical compounds found in plants⁸. This study aims to determine the number of plants, parts of plants that can be used, methods of application, methods of preparation, and phytochemical screening of plants with medicinal properties in Belangian Village.

MATERIALS AND METHODS

Materials

The materials used include the collected plant simplicia, Mg powder, HCl, Dragendorff's reagent, Mayer's reagent, NaOH, distilled water, chloroform, anhydrous acetic acid, and H₂SO₄.

Methods

Type of research

The type of research used was the descriptive-explorative method, and the data collection method was the interview with the aid of a semi-structured questionnaire (<https://doi.org/10.5281/zenodo.5815108>). Respondents were selected through the purposive sampling technique. This research was conducted from March to June 2020 in Belangian village, Aranio district, Banjar Regency, South Kalimantan.

Research location

The location of the plants could be reached in approximately an hour on foot. The zero point starts at house number 1 RT/RW 01/01 Belangian Village, walk to the north (forest) for 25 minutes, and find a river. A bamboo bridge crosses the river for about five minutes, then through the forest for 20 minutes until you meet the river again, cross the river on foot, then walk in the forest for up to 10 minutes. The sampling area is right around that area. Phytochemical screening was only conducted on plants that had never been tested before. The phytochemical screening included tests for flavonoids, alkaloids, quinones, terpenoids, and saponins.

Research respondents

The criteria for respondents were people of Banjar ethnic group in Belangian Village known as *pananamba*, descendants of father and mother from the Banjar ethnic group, residing in Belangian Village, and using plants to treat a disease. The number of *pananamba* who met the criteria were two people: Mrs. Hasriani and Mr. Ansorullah, which were unwilling to be photographed.

Retrieval procedure of research data

The search for information was carried out by interviewing *pananamba* using a semi-structured questionnaire. The information sought included the names of the plants, benefits of the plants, parts of the plants, methods of preparation, and methods of application of the medicinal plants. The plants obtained were photographed using a camera and measured using a measuring tool.

Preparation of herbarium

The sample was cleaned of dirt and then dried. The plant sample was evenly sprayed with 70% alcohol and then air-dried and pressed using a wooden board. After the plant sample was dried, parts of the plant were arranged on paper for identification.

Phytochemical screening

Identification of flavonoids was conducted by adding hot water to the sample and then filtering it. The filtrate was added with Mg powder, concentrated HCl, and then shaken vigorously. The red, yellow, or orange color formation indicated the test as positive⁹⁻¹¹. Identification of alkaloids was conducted by adding Mayer's and Dragendorff's reagents. The formation of yellowish-white precipitate after adding Mayer's reagent and brick-red precipitate after adding Dragendorff's reagent indicated the test as positive¹². Identification of quinones was conducted by adding NaOH 1 N into the sample solution; the formation of red color indicated the presence of quinones¹³. Identification of saponins was conducted by adding 10 mL aquadest to the sample shaken vigorously for 10 seconds. The test was positive when the foam was formed for 10 minutes with 1-10 cm height¹⁴. Identification of terpenes was conducted by dissolving the sample in 0.5 mL chloroform, adding 0.5 mL anhydrous acetic acid, and dropping 2 mL sulphuric acid through the test tube wall. The formation of a green ring indicated the test as positive.

Data analysis

The plants obtained were identified by their names, benefits, parts of the plants used, methods of preparation, and methods of application. Other data were presented in the form of a percentage diagram of parts of the plants used, preparation methods, and application methods. The percentage was calculated by using the formulas [1] to [3]:

$$\% \text{ part of the plants used} = \frac{\text{the number of a specific part of the plants used}}{\text{the number of all parts of the plants used}} \times 100 \quad \dots [1]$$

$$\% \text{ methods of preparation} = \frac{\text{the number of a specific method of preparation}}{\text{the number of all methods of preparation}} \times 100 \quad \dots [2]$$

$$\% \text{ methods of application} = \frac{\text{the number of a specific method of application}}{\text{the number of all methods of application}} \times 100 \quad \dots [3]$$

RESULTS AND DISCUSSION

Research respondents

The respondents participating in this research were two people, Mr. Hasriani (53 years old) and Mr. Ansorullah (42 years old). Both were born in Aranio with a father and a mother from the Banjar ethnic group. Mr. Hasriani's last education was senior high school (SLTA), and Mr. Ansorullah's last education was an elementary school (SD). Mr. Hasriani worked as a teacher, and Mr. Ansorullah worked as a farmer. Both *pananamba* had practiced traditional medicine for more than ten years.

Ethnobotany of medicinal plants in Belangian Village

There were 31 species of plants used in traditional medicine. These plants were divided into 17 families, 28 species, and three plants with unknown scientific names, including asam daun, lukun, and ulur-ulur. Seventeen families reported were Graminae, Euphorbiaceae, Rhamnaceae, Convolvulaceae, Piperaceae, Fabaceae, Thymelaeaceae, Asteraceae, Zingiberaceae, Myrtaceae, Rubiaceae, Malvaceae, Verbenaceae, Lamiaceae, Campanu Laceae, Simaroubaceae, and Annonaceae, as shown in **Table I**.

Table I. Medicinal plants used by local people of the Banjar ethnic group in Belangian Village

No	Name (in Indonesian or Banjarese)	Family	Species	Health Benefits	Parts of Plants Used	Method of Preparation	Method of Application
1	Insulin	Ateraceae	<i>Tithonia diversifolia</i>	Diabetes	Leaves	Boiling	by mouth
2	Sirsak	Annonaceae	<i>Annona muricata</i> L.	Stop bleeding after child birth	Leaves	Boiling	by mouth
3	Bilaran tapah	Convolvulaceae	<i>Merremia peltata</i>	Treat cough	Leaves	Boiling	by mouth

4	Lapak bumi/kitolod	Campanulaceae	<i>Lobelia deckenii</i>	Sores, itchy eyes	Flower	Soaking in water	Washed to the eyes
5	Mengkudu	Campanulaceae	<i>Laurentia longiflora</i>	Bone pain	Fruit	Steaming	by mouth
6	Betadine/jarak cina	Euphorbiaceae	<i>Jatropha multifida</i> Linn.	Treat wounds	Leaves	Taking the sap	Smear
7	Keminting/kemiri	Euphorbiaceae	<i>Aleurites moluccana</i>	Antihypertension	Bark	Boiling	by mouth
8	Ubi kayu/singkong	Euphorbiaceae	<i>Manihot utilissima</i>	Ulcer	Bulb	Grating and then squeezing	by mouth
9	Carikan darah	Fabaceae	<i>Spatholobus sanguineus</i>	Open wounds	Root	Taking the sap	Smear
10	Gulinggang/ketepeng cina	Fabaceae	<i>Senna alata</i>	Scabies ringworm itching of the skin	Leaves	pounded	Smear
11	Bambu	Graminae	<i>Bambusa</i> Sp.	Bloody urine	Leaves	Grating and then squeezing	by mouth
12	Pelawan serai/sereh	Graminae	<i>Cymbopogon nardus</i> L. Rendle	Eliminate body odor, crush kidney stones	Leaves	Boiling	by mouth
13	Kumis kucing	Lamiaceae	<i>Orthosiphon aristatus</i>	Cleanse the kidneys	Flower	Boiling	by mouth
14	Jambu biji	Myrtaceae	<i>Psidium guajava</i>	Diarrhea	Leaves	Boiling	by mouth
15	Kapuk	Malvaceae	<i>Ceiba pentandra</i>	Sinusitis	Stem bark	Taking the sap	nose
16	Sinaguri/sidaguri	Malvaceae	<i>Sida rhombifolia</i> L.	Wounds in patients with diabetes	Leaves	Pounding	Smear
17	Pulantan putih/pelawan	Myrtaceae	<i>Tristanopsis merguensis</i>	Antibiotic, deep wounds	Stem bark	Boiling	by mouth
18	Cambai/kemukus	Piperaceae	<i>Piper cubeba</i> L.	Sprue	Leaves	Boiling	by mouth
19	Bidara	Rhamnaceae	<i>Ziziphus mauritiana</i> Lam.	Diabetes, anticancer	Leaves	Boiling	by mouth
20	Kacapiring	Rubiaceae	<i>Gardenia jasminoides</i>	Internal heat	Leaves	Boiling	by mouth
21	Pasak bumi	Simaroubaceae	<i>Eurycoma longifolia</i>	Kidneys, stamina	Root	Boiling	by mouth
22	Gaharu	Thymelaeaceae	<i>Aquilaria malaccensis</i>	Ulcer, hypertension	Leaves	Boiling	by mouth
23	Kembang ulat/pecut	Verbenaceae	<i>Stachytarpheta jamaicensis</i>	Treat kidney stones	Leaves	Boiling	by mouth
24	Jahe	Zingiberaceae	<i>Zingiber officinale</i>	Reduce nausea	Rhizome	Grating and then squeezing	by mouth
25	Kencur	Zingiberaceae	<i>Kaempferia galanga</i>	Cough	Rhizome	Grating and then squeezing	by mouth
26	Kunyit	Zingiberaceae	<i>Curcuma longa</i>	Menstrual pain	Rhizome	Grating and then squeezing	by mouth
27	Temugiring	Zingiberaceae	<i>Curcuma heyneana</i>	Worm diseases	Rhizome	Grating and then squeezing	by mouth
28	Temulawak	Zingiberaceae	<i>Curcuma xanthorrhiza</i> L.	Increase appetite, boost immune system	Rhizome	Grating and then squeezing	by mouth
29	Asam daun	Unknown	Unknown	Treat cough	Lignum	Taken directly from the stem	by mouth
30	Lukun	Unknown	Unknown	Paralysis, bone pain	Lignum	Boiling	by mouth
31	Ulur-ulur	Unknown	Unknown	Hepatitis/liver	Root	Boiling	by mouth

The plant parts used were leaves with 45%, stem 7%, root 10%, rhizome 16%, stem bark 10%, flower 6%, fruit 3%, and bulb 3% (Figure 1). The most widely used preparation method was boiling with 52%, followed by pounding 6%, taking the water 3%, soaking 3%, grating and then squeezing 23%, and steaming 3% (Figure 2). Methods of applying medicinal plants used by local people of Banjar ethnic group in Belangian Village were by mouth with 81%, smeared on the wound 13%, nose 3%, and washed to the eyes 3% (Figure 3).

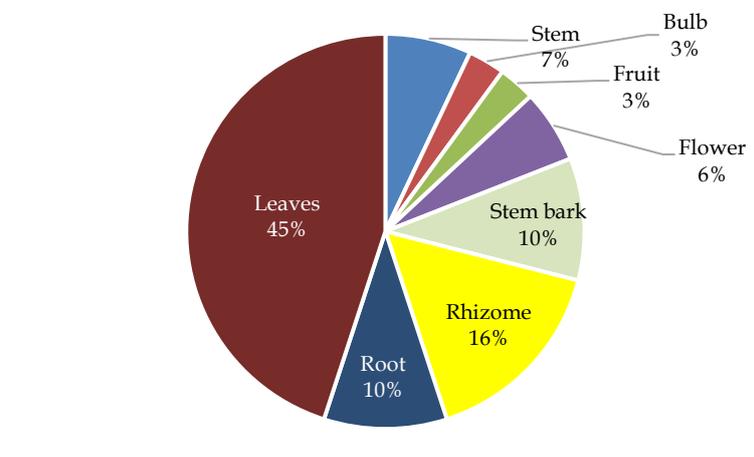


Figure 1. Percentage of plant parts used

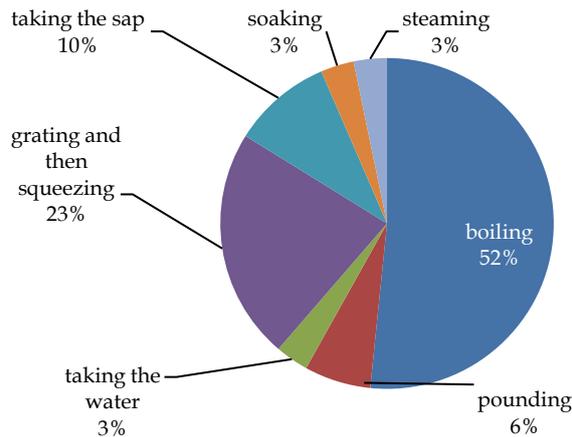


Figure 2. Percentage of plants preparation methods used

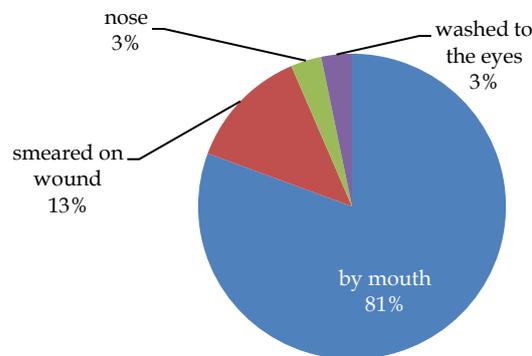


Figure 3. Percentage of plants application methods used

Phytochemical screening

A phytochemical screening test was carried out on unknown plants such as asam daun, lukun, and ulur-ulur. The compounds tested were quinones, saponins, terpenes, flavonoids, and alkaloids. Several compounds from the flavonoid group have shown antioxidant activity, anti-inflammatory, heart disease prevention, hepatoprotective, anticancer, and antiviral potential¹⁵. Alkaloid group compounds often have biological activities such as antimalarial, antiviral, antibacterial, cytotoxic, antitumor, antifungal, analgesic, and cholinesterase inhibition activities^{16,17}. In general, saponin group compounds can break down erythrocytes, and their presence is developed through hemolytic tests. The hemolytic properties are generally attributed to the interaction between saponins and sterols of the erythrocyte membrane^{18,19}. The results of phytochemical screening showed that asam daun contained quinones, saponins, and terpenoids, lukun contained saponins, and ulur-ulur contained terpenoids (Table II), while plant of asam daun, lukun, and ulur-ulur shown in Figure 4. The three plants were identified because the results of phytochemical tests had not been found.

Table II. Results of phytochemical screening

Phytochemical compounds	Procedure	Sample		
		Asam daun	Lukun	Ulur-ulur
Quinones	Sample + 2 drops of NaOH	+	-	-
Saponins	Sample + 10 mL distilled water, shaken vigorously for 10 seconds	+	+	-
Flavonoids	Sample + 3 drops of HCl + Mg powder	-	-	-
Alkaloids	Sample + 3 drops of Dragendorff's reagent	-	-	-
Terpenoids	Sample + 0.5 mL kloroform + 0.5 mL anhydrous acetic acid, + 2 drops of H ₂ SO ₄ through the test tube wall	+	-	+

+: Present; -: absent



Figure 4. Plant of (a) asam daun, (b) lukun, and (c) ulur-ulur

Several researchers have also carried out research on ethnobotany. Syaifuddin *et al.*²⁰ reported that 24 types of medicinal plants had been used by the people of West Mandiangin Village, Banjar Regency, South Kalimantan. In addition, it was also reported that the Dayak tribe used several plants as medicinal ingredients in Haratai Village, Loksado. There are 110 medicinal plants with various families, including Poaceae, Lauraceae, Rutaceae, Zingiberaceae, Sapindaceae, Palmae, Graninae, Myrtaceae, Myristicaceae, and others²¹. Empirically the medicinal plants are used for rheumatism, gout, lumbago, jaundice, ulcers, postpartum care, bloody bowel movements, abdominal pain, diarrhea, knee weakness, crowds, chickenpox, bone pain, *Sawan*, anemia, relieving dandruff, strengthening the legs to be strong walking, and malaria. Moreover, the medicinal plants are used for herbal contraception, fever, headache, toothache, ringworm, immunity, flu, stopping bleeding, strong medicine, bloody cough, swollen gums, diabetes, ambient, and kidney abnormalities.

CONCLUSION

There were 31 medicinal plants used by local people of the Banjar ethnic group in Belangian Village South Kalimantan. The most frequently used part of the plants were the leaves (45%). The most widely used method of preparation was boiling (52%). The most widely used application method was by drinking (81%). The results of phytochemical screening showed that Asam daun contained quinones, saponins, and terpenoids; Lukun contained saponins; and Ulur-ulur contained terpenoid.

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AUTHORS' CONTRIBUTION

Sutomo: conceptualization, data curation, formal analysis, funding acquisition, methodology, project administration, resources, supervision, validation, and writing - review & editing. **Vita Vitriana Awaliyah:** investigation, visualization, and writing - original draft. **Arnida:** data curation, formal analysis, methodology, supervision, validation, and writing - review & editing.

DATA AVAILABILITY

Semi-structured questionnaire deposited at <https://doi.org/10.5281/zenodo.5815108>.

CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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