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Research Article

Ethnobotanical Study of Medicinal Plants of Banjar and Java Tribes in Pandansari Village, South Kalimantan

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Abstract

In Pandansari village, South Kalimantan, Indonesia, residents from Banjar and Javanese communities traditionally utilize medicinal plants as alternatives to conventional medicine. This study aimed to explore the demographics, plant use practices, and preliminary phytochemical analysis of these plants. Using a qualitative, phenomenological approach, semi-structured interviews and questionnaires were conducted with four purposively selected informants. The findings revealed 52 medicinal plant species. Leaves were the most commonly used plant part (40%), followed by boiling as the preferred processing method (54%) and drinking as the primary route of administration (58%). Two unidentified plants, *asam sembelekan* and *daun malaysia*, were frequently mentioned. Phytochemical screening detected flavonoids, saponins, phenols, and terpenoids in *asam sembelekan*, while *daun malaysia* contained alkaloids, flavonoids, saponins, and terpenoids. These findings provide a foundation for further research on the efficacy and safety of these traditional medicinal plants in this community.

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INTRODUCTION

Indonesia, a megadiverse country, boasts a vast array of plant life[1]. This rich tapestry of plant species serves humanity in numerous ways, including as ingredients in traditional medicine—practices often passed down through generations[2]. Ethnobotanical studies delve specifically into this wealth of knowledge, exploring the potential medicinal properties of plants used by communities for extended periods[3].

South Kalimantan, a province in southeastern Borneo, encompasses both lowlands and highlands, including the Maratus Mountains. The Banjar tribe is the largest ethnic group in South Kalimantan, but others like the Javanese, Bugis, Batak, and Madurese also call this region home[4]. Both the Banjar and Javanese tribes have a rich heritage of using plants for medicinal purposes[5]. The Javanese tradition, known as *golek tombo* or *suwuk*, incorporates prayer and medicinal plants for healing[6].

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The Banjar tribe practices *betetamba*, which translates to treatment or shaman. The Banjar tribe beliefs associate *betetamba* rituals with the influence of nature and the surrounding environment[7,8].

Pandansari Village, located in Kintap District, covers an area of 50.00 km² and lies 9.31 km from the sub-district center. The village is home to a diverse population, including Banjar, Javanese, and other ethnicities. The majority of the community works in farming and gardening. Pandansari Village, Kintap District, boasts well-preserved natural resources. Despite the lack of prior research exploring its natural potential, this village presents a compelling opportunity for investigation. This ethnobotanical study aims to document the medicinal plants used in Pandansari Village. We collect comprehensive data on utilized plant parts, preparation methods, processing techniques, and application methods. Additionally, phytochemical screening was conducted on these plants. This study has the potential to provide valuable data and documentation of the plant species traditionally used by the community for medicinal purposes. Furthermore, it can pave the way for the development of these plants as future therapeutic agents.

MATERIALS AND METHODS

Materials

Medicinal plants were collected from Pandansari Village, South Kalimantan, Indonesia. Analytical grade chemicals and reagents were used throughout the study, including 70% ethanol, distilled water, $FeCl_3$, concentrated HCl, $CHCl_3$, NaOH, magnesium powder, gelatin, Dragendorff's reagent, and Lieberman-Burchard reagent. The following equipment was used for sample collection, preparation, and analysis: cutting tools, measuring tapes, test tubes, macerators, grinders, analytical balances, ovens, and water baths. Documentation of plant materials was facilitated by a digital camera.

Methods

Research design

This study employed a qualitative research approach with a phenomenological perspective[9]. In this case, phenomenology allowed us to delve into the experiences and meanings associated with the use of medicinal plants. Data collection involved semi-structured interviews and questionnaires administered to consenting participants from the village (informed consent was obtained from all participants prior to their involvement in the study). The research was conducted from December 2022 to February 2023 in Pandansari Village, Kintap District, Tanah Laut Regency, South Kalimantan, Indonesia. Additionally, laboratory analyses were performed at the Pharmacognosy-Phytochemistry Laboratory of the Faculty of Mathematics and Natural Sciences Universitas Lambung Mangkurat.

Respondents

Purposive sampling was employed to recruit participants for this study. We specifically targeted traditional healers from the Banjar and Javanese ethnicities residing in Pandansari Village. Inclusion criteria for participation were: (1) experience as a traditional healer, (2) willingness to participate in the study, and (3) knowledge and use of medicinal plants for treatment purposes.

Retrieval procedure of research data

Semi-structured interviews were conducted with consenting participants from the Pandansari Village community. Interviews were conducted in Indonesian or the participant's preferred regional language (e.g., Banjarese, Javanese) to ensure clear communication and minimize misunderstandings. The interview guide explored topics related to the traditional use of medicinal plants, including plant names and perceived benefits, utilized plant parts, processing and administration methods, and duration of use. Additionally, a questionnaire was administered to gather information on ownership of medicinal plants, purposes of traditional plant-based treatments, age demographics of plant users, source of knowledge regarding traditional medicine, and length of experience using medicinal plants for treatment.

Phytochemical screening

Phytochemical screening was performed on plant samples identified as potentially novel based on a lack of prior documentation in the scientific literature. These samples were subjected to a battery of tests using the tube method to detect

the presence of various secondary metabolites, including alkaloids, flavonoids, saponins, quinones, phenols, terpenoids, steroids, and tannins. Detailed descriptions of the specific methods employed for each phytochemical test can be found in **Table I**.

Table I. Phytochemical screening[10-12].

Test	Sample volume (mL)	Treatment	Positive result
Alkaloid	3	+ 3 drops of Dragendorff's reagent	Brick-red
Flavonoid	3	+ Mg powder and 3 mL HCl	Yellow, orange, red
Saponin	3	+ 3 mL hot distilled water, then shaken vigorously until foamy + a drop 2N HCl	Foam stabilized for ± 10 minutes
Quinones	3	+ 5 drops of NaOH through the tube wall	Red
Phenol	3	+ 3 drops of FeCl3	Blackish green or dark blue
Steroid	3	+ 3 drops of Lieberman-Burchard reagent	Turquoise
Terpenoid	3	+ 3 drops of Lieberman-Burchard reagent	Red or purple ring
Tannin	3	+ 3 drops of gelatin solution	White color sediment

Data analysis

Data obtained from interviews and questionnaires were analyzed to identify plant names, reported benefits, and utilized plant parts. Additionally, documented plants were examined for morphological characteristics to aid in classification. The results were presented in two main formats: qualitative and quantitative. Qualitative data, including narratives and tables, were detailed the traditional knowledge regarding medicinal plants. Quantitative data was presented in the form of a percentage diagram illustrating the prevalence of specific plant parts used, processing methods employed, and applications of medicinal plants within the Pandansari Village community. The formula used to calculate these percentages was provided in **Equation 1**[13].

$$\%\ Plant\ parts = \frac{\text{Parts of the plant used}}{\text{All parts of the plant used}} \text{x} 100\% \qquad [1]$$

RESULTS AND DISCUSSION

Informants for this study were recommended by the Pandansari Village administration, specifically traditional healers or *penenamba* known for treating patients within the community. Semi-structured interviews were employed to gather data from participants. This interview method allows for flexibility and exploration of new information that may arise during the conversation. Details regarding the research informants are presented in **Table II**.

Table II. Informant data.

Initial name	Age	Gender	Tribe	Residence	Job	Number of plants used	Duration of use (year)
DL	53	Woman	Banjar	Pandansari Village	Midwife	12	>10
AT	50	Man	Javanese	Pandansari Village	Traditional healer	20	>10
SR	51	Woman	Banjar	Pandansari Village	Traditional healer	5	>10
MK	68	Woman	Javanese	Pandansari Village	Midwife	15	>10

Interviews with Pandansari Village residents revealed 52 plant species traditionally used for medicinal purposes. Following identification efforts that included consulting both application practices and relevant literature, 50 plant species were successfully identified. However, two plant species remained unidentified. Collaborations with the Banua Botanical Garden, Banjarbaru, South Kalimantan, and the Indonesian Biology Generation Foundation, Gresik, East Java, are currently underway to identify these unknown species (details on these ongoing efforts can be provided upon request). Data on the identified medicinal plants used in Pandansari Village are presented in **Table III**. Analysis of data revealed nine distinct plant parts utilized for traditional medicine in Pandansari Village by the local healers or *penenamba*. These parts included root, leaf, stem, rhizome, sap, fruit, flower, tuber, and whole plant parts. Leaves emerged as the most frequently used plant part, as illustrated in the percentage diagram presented in **Figure 1**.

Table III. Medicinal plants in Pandansari Village.

Name	Species	Efficacy	Parts used	Administration method	Processing method
Betel palm	*Areca catechu*	Male stamina	Root	Oral	Boiled
Cogon grass	*Imperata cylindrica*	Stiffness/sore	Root	Oral	Boiled
Avocado	*Persea americana*	High blood pressure	Leaf	Oral	Boiled
Ti plant	*Cordyline fruticosa*	Dysentery	Root	Oral	Boiled
Asam sembelekan	-	Flu and cough	Leaf	Compressed on the forehead	Boiled
Mantangan	*Merremia peltata*	High blood pressure	Stem	Oral	Taken the stem liquid
Madeira vine	*Anredera cordifolia*	Scar	Leaf	Topical on open Wounds	Squeezed
Cotton candy berry	*Muntingia calabura*	Diabetic	Leaf	Oral	Boiled
Cutleaf groundcherry	*Physalis angulata*	All sort of sickness	Whole plant	Oral	Boiled
December tree	*Erythrina subumbrans*	Fever	Leaf	Compressed on the forehead	Squeezed
Daun malaysia	-	Cholesterol	Leaf	Oral	Boiled
Durian	*Durio zibethinus*	Fever	Bark	Steam bath	Boiled
Water willow	*Justicia gendarussa*	Headache	Leaf	Compressed on the forehead	Squeezed
Gale of the wind	*Phyllanthus niruri*	Stiffness/sore	Whole plant	Oral	Boiled
Ginger	*Zingiber officinale*	Cough	Rhizome	Oral	Boiled
Guava	*Psidium guajava*	Diarrhea	Leaf shoot	Oral	Squeezed
Cashew	*Anacardium occidentale*	Diarrhea	Leaf	Oral	Boiled
Purging nut	*Jatropha curcas*	Toothache	Sap	Dripped on cavities	Taken the leaf sap
Lime	*Citrus aurantifolia*	Cough	Fruit	Oral	Squeezed
Shortleaf spikesedge	*Kyllinga brevifolia*	Diarrhea	Whole plant	Oral	Boiled
Cape jasmine	*Gardenia jasminoides*	Fever and cholesterol	Leaf	Compressed on the forehead	Squeezed
Frangipani	*Plumeria acuminata*	Toothache	Sap	Dripped on cavities	Taken the flower sap
Senduduk	*Melastoma malabathhricum*	Wound	Leaf and flower	Topical on open wounds	Pounded
Papaya	*Carica papaya*	Improves bowel movements	Fruit	Oral	Without processing
Rodent tuber	*Typhonium flagelliforme*	Diabetic	Tuber	Oral	Boiled
Coconut	*Cocos nucifera*	Allergy	Water	Oral	Without processing
Moringa	*Moringa oleifera*	Cholesterol	Leaf	Oral	Boiled
Basil	*Ocimum basilicum*	Remove body odor	Leaf	Oral	Squeezed
Hibiscus	*Hibiscus* sp.	Fever	Leaf	Compressed on the forehead	Squeezed
Aromatic ginger	*Kampferia galanga*	Cough	Rhizome	Oral	Boiled
Jack in the bush	*Chromolaena odorata*	Scar	Leaf	Topical on open wounds	Squeezed
Java tea	*Orthosiphon aristatus*	Stiffness/sore	Root	Oral	Boiled
White turmeric	*Curcuma zedoaria*	Improve appetite	Rhizome	Oral	Grated and squeezed
Aloe vera	*Aloe vera*	Stomach acid	Stem	Oral	Taken the stem gel
Shoeblackplant	*Hibiscus rosa-sinensis*	Lowering blood pressure	Fruit	Oral	Dried
Indian mulberry	*Morinda citrifolia*	High blood pressure	Fruit	Oral	Boiled
White mulberry	*Morus alba*	Scar	Leaf	Topical on open wounds	Squezeed
Pineapple	*Ananas comosus*	High blood pressure	Fruit	Oral	Without processing
Cane-reed	*Costus speciosus*	Hemorrhoids	Rhizome	Oral	Soaked
Petawali	*Tinospora crispa*	All sort of sickness	Stem	Oral	Boiled
Stinking passionflower	*Passiflora foetida*	High blood pressure	Leaf	Oral	Boiled
Black pepper	*Piper nigrum*	Diarrhea	Fruit and seed	Oral	Boiled
Snakefruit	*Salacca zalacca*	Chest pain	Sap	Topical	Taken the fruit sap
Lemongrass	*Cymbopogon citratus*	Stiffness/sore	Stem	Oral	Boiled
Betel	*Piper betle*	Whiteness discharge	Leaf	Washing the feminine area	Boiled
Pepper elder	*Peperomia pellucida*	Gout	Whole plant	Oral	Boiled
Soursop	*Annona muricata*	Chest pain	Leaf	Topical	Squezeed
Cucha cara	*Elephantopus scaber*	Gout	Whole plant	Oral	Dried and brewed
Sugarcane	*Saccharum officinarum*	Diabetic	Stem	Oral	Squezeed
Curcuma	*Curcuma xanthorrhiza*	Improve appetite	Rhizome	Oral	Grated and squezeed
Cathedral bells	*Kalanchoe pinnata*	Fever	Leaf	Oral	Boiled

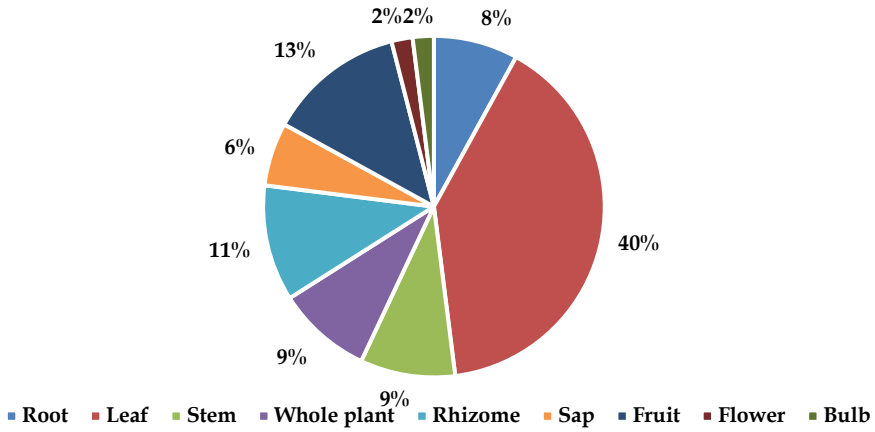

Figure 1. Parts of plants that have medicinal properties used in Pandansari Village.

Phytochemical screening was performed on two unidentified medicinal plants, *asam sembelekan* and *daun malaysia* (**Figure 2**), as reported by the Pandansari Village community. The results revealed notable differences in their secondary metabolite profiles, with the presence of saponins and terpenoids being the only shared constituents (**Table IV**). Notably, *asam sembelekan* exhibited the presence of phenolic compounds, which possess known antitussive (cough-relieving) properties[14]. This finding aligns somewhat with the reported use of this plant for ailments like coughs within the community[15]. Conversely, *daun malaysia* was found to contain alkaloids and flavonoids, secondary metabolites with established cholesterol-lowering activity[16,17]. This observation warrants further investigation into the potential anti-hyperlipidemic properties of *daun malaysia*, particularly considering its traditional use in the community for unspecified ailments.

a **b**

Figure 2. (**a**) *Asam sembelekan* and (**b**) *daun malaysia*.

Table IV. Phytochemical screening of *asam sembelekan* and *daun malaysia*.

Phytochemical compounds	Samples	
	Asam sembelekan	*Daun malaysia*
Alkaloids	-	+
Flavonoids	-	+
Saponins	+	+
Quinones	-	-
Phenols	+	-
Steroids	-	-
Terpenoids	+	+
Tannins	-	-

Note: +: Presence; -: Absence

A literature review identified previously reported secondary metabolite profiles for the 50 documented medicinal plants (**Table V**). Of the eight secondary metabolite classes tested on the two previously investigated plants, *I. cylindrica*, *M. peltata*, *D. zibethinus*, *J. gendarussa*, *Z. officinale*, *C. aurantifolia*, *H. rosa-sinensis*, and *C. xanthorrhiza* exhibited the greatest diversity, each containing six identified metabolite types. Conversely, *S. zalacca* lacked reports of any of the tested metabolites. Among the identified metabolites, flavonoids were the most prevalent, detected in 40 plants. This finding aligns with the established knowledge of flavonoids being one of the most widespread classes of secondary metabolites in various plant species[18]. Saponins and alkaloids followed in abundance, identified in 32 and 30 plants, respectively. Conversely, quinones were the least common, only reported in three plants. This scarcity is likely due to their derivation from the oxidation of hydroquinones, which may not be present in significant quantities within many medicinal plants[19].

Table V. Secondary metabolite from medicinal plants in Pandansari Village.

Plants	Alkaloids	Flavonoids	Saponins	Quinones	Phenols	Steroids	Terpenoids	Tannins	References
Areca catechu	+	+	-	-	-	-	+	+	20
Imperata cylindrica	+	-	+	-	+	+	+	+	21
Persea americana	+	+	+	-	-	-	-	-	22
Cordyline fruticosa	-	+	+	-	-	-	+	+	23
Merremia peltata	+	-	+	+	+	-	+	+	11
Anredera cordifolia	+	+	+	-	+	-	+	-	24
Muntingia calabura	-	+	+	-	+	-	+	+	25
Physalis angulata	+	-	-	-	-	-	-	+	26
Erythrina subumbrans	+	+	+	-	+	-	-	+	27
Durio zibethinus	+	+	+	-	-	+	+	+	28
Justicia gendarussa	+	+	+	-	+	+	+	-	29
Phyllanthus niruri	+	+	-	-	+	+	+	-	30
Zingiber officinale	+	+	+	-	-	+	+	+	31
Psidium guajava	-	-	-	-	-	-	+	+	32
Anacardium occidentale	-	+	-	-	+	-	+	-	33
Jatropha curcas	+	+	+	-	+	-	-	-	34
Citrus aurantifolia	+	+	+	-	+	+	-	+	35
Kyllinga brevifolia	+	+	-	-	-	-	-	+	36
Gardenia jasminoides	-	+	+	-	+	-	-	-	37
Plumeria acuminata	-	+	-	-	-	-	-	+	38
Melastoma malabathhricum	+	+	+	-	-	+	-	-	39
Carica papaya	-	+	+	-	-	+	-	+	40
Typhonium flagelliforme	-	+	-	-	-	-	-	+	41
Cocos nucifera	+	+	+	-	-	+	-	-	42
Moringa oleifera	-	-	-	-	-	-	-	-	43
Ocimum basilicum	+	+	+	-	-	-	-	+	44
Hibiscus sp.	-	+	-	-	-	-	-	-	45
Kampferia galanga	-	+	+	-	+	-	-	-	46
Chromolaena odorata	-	+	-	+	+	+	-	+	47
Orthosiphon aristatus	+	+	+	-	-	+	-	-	48
Curcuma zedoaria	-	+	+	-	-	-	-	-	49
Aloe vera	-	+	-	-	-	-	-	-	50
Hibiscus rosa-sinensis	+	+	+	-	-	+	-	+	11
Morinda citrifolia	+	-	+	+	+	-	+	+	51
Morus alba	-	+	+	-	-	+	-	+	52
Ananas comosus	-	+	+	-	-	+	+	+	53
Costus speciosus	-	+	-	-	-	-	-	-	54
Tinospora crispa	-	+	+	-	-	+	-	+	55
Passiflora foetida	+	-	-	-	-	+	-	-	56
Piper nigrum	+	+	-	-	+	-	-	-	57
Salacca zalacca	+	-	-	-	+	-	-	-	58
Cymbopogon citratus	-	-	-	-	-	-	-	-	59
Piper betle	+	+	+	-	-	-	+	+	60
Peperomia pellucida	-	+	+	-	-	-	-	+	61
Annona muricata	+	+	+	-	-	+	-	+	62
Elephantopus scaber	+	-	-	-	-	-	-	+	63
Saccharum officinarum	-	-	+	-	-	+	-	+	64
Curcuma xanthorrhiza	+	+	-	-	-	-	-	+	65
Kalanchoe pinnata	+	+	+	-	+	-	+	+	66

Note: +: Presence; -: Absence

CONCLUSION

This study documented 52 medicinal plants traditionally used by the Banjar and Javanese communities in Pandansari Village. These plants reportedly address various ailments, including male stamina enhancement, stiffness, hypertension, dysentery/diarrhea, flu/cough, wounds, fever, toothache, headache, allergies, cholesterol, diabetes, and vaginal discharge. Leaves were the most commonly utilized plant part, boiling the preferred processing method, and drinking the favored administration route. Further investigations are warranted to validate the reported efficacy of these plants and explore their potential bioactive compounds.

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AUTHORS' CONTRIBUTION

Conceptualization: Sutomo, Alif Vera Aprilianes, Nani Kartinah, Arnida
Data curation: Sutomo, Alif Vera Aprilianes, Nani Kartinah, Arnida
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Resources: Sutomo, Arnida
Software: -
Supervision: Sutomo, Nani Kartinah, Arnida
Validation: Sutomo, Arnida
Visualization: Sutomo, Alif Vera Aprilianes
Writing - original draft: Alif Vera Aprilianes, Khoirunnisa Muslimawati, Nabila Hadiah Akbar
Writing - review & editing: Sutomo, Nani Kartinah, Arnida

DATA AVAILABILITY

None.

CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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