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Ethnobotanical Study of Medicinal Plants for the Circulatory System in Kaloy Village, Tamiang Hulu Subdistrict, Aceh Tamiang Regency

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Abstract: *This study aims to document the traditional knowledge of the local community in Kaloy Village, Tamiang Hulu Subdistrict, Aceh Tamiang Regency regarding the use of medicinal plants for treating circulatory system disorders. The methods used include in-depth interviews, direct observation, and documentation involving 90 respondents from various age groups and two key informants. The results show that the community's trust in medicinal plants remains high, particularly among individuals aged over 50. A total of 10 plant species were identified and used to treat diseases such as hypertension, high cholesterol, anemia, stroke, and diabetes. The most commonly utilized plant parts were leaves and rhizomes, with traditional processing methods such as boiling, pounding, and chewing. The study also calculated the Index of Cultural Significance (ICS) to assess the cultural importance of each species in the community. These findings indicate that ethnobotanical knowledge is still well preserved among the older generation but is beginning to decline among the youth.*
Keywords: *Ethnobotany; medicinal plants; circulatory system; Kaloy Village; index of cultural significance*

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INTRODUCTION

Aceh Tamiang Regency, which partly encompasses the Gunung Leuser National Park, is recognized for its remarkable plant biodiversity. Previous studies have reported the diverse utilization of plants in this region, ranging from food sources and construction materials to handicrafts and medicinal purposes (Simarmata et al., 2022). Within this context, ethnobotany plays a pivotal role in documenting traditional ecological knowledge embedded in local communities. It not only reveals how communities perceive and manage biodiversity, natural resources, and cultural heritage, but also provides insight into the extent of local knowledge and practices related to the use of plants in daily life (Safitri et al., 2023).

Medicinal plants, in particular, hold significant economic and therapeutic value due to their efficacy in preventing and treating various diseases. Their applications extend across preventive care, therapeutic treatment, rehabilitation, and reproductive health, with deep roots in traditional medicine systems worldwide (Li et al., 2023). In many countries, including Indonesia, medicinal plants remain an integral part of primary healthcare systems because they are considered affordable, accessible, and relatively safe (Cordero et al., 2023). However, this rich heritage of traditional knowledge is under threat, as it is predominantly preserved by older generations, while younger generations increasingly show limited interest in maintaining and transmitting it (Syamsuddin et al., 2022).

For centuries, Indonesian communities have relied on medicinal plants to manage a wide spectrum of health conditions, including those related to the circulatory system (Handayani et al., 2022). The cardiovascular system—comprising the heart, blood vessels, and blood circulation—represents one of the most vital physiological systems. Yet, cardiovascular diseases (CVDs) continue to be the leading cause of mortality globally and remain a major public health concern with rising prevalence (Prihatini et al., 2022). In this regard, the exploration of medicinal plants as alternative or complementary therapeutic options for CVDs has become increasingly relevant (Shaito et al., 2020).

In Aceh Tamiang, local communities traditionally employ medicinal plants to address diverse health problems, and this knowledge is sustained through oral transmission and experiential practices. An ethnobotanical study conducted by Nufus (2022) in Karang Baru District documented such uses; however, no research has specifically examined medicinal plants employed to treat circulatory system disorders in Tamiang Hulu District. This research gap highlights the need for further investigation to preserve, validate, and potentially integrate this traditional knowledge into broader health frameworks.

Therefore, this study aims to document and analyze the traditional use of medicinal plants in Kaloy Village, Tamiang Hulu Subdistrict, Aceh Tamiang Regency, with a focus on treatments for circulatory system disorders. Specifically, it seeks to identify the plant species used, the plant parts utilized, preparation methods, and the Cultural Significance Index (ICS), thereby providing a comprehensive understanding of the ethnobotanical practices of the community.

METHOD

Time and Location of Research

This research will be conducted from November 2024 to February 2025 in Tamiang Hulu Subdistrict, Aceh Tamiang Regency. Plant identification will be carried out at the Plant Systematics Laboratory, Faculty of Mathematics and Natural Sciences, Universitas Sumatera Utara (FMIPA USU).

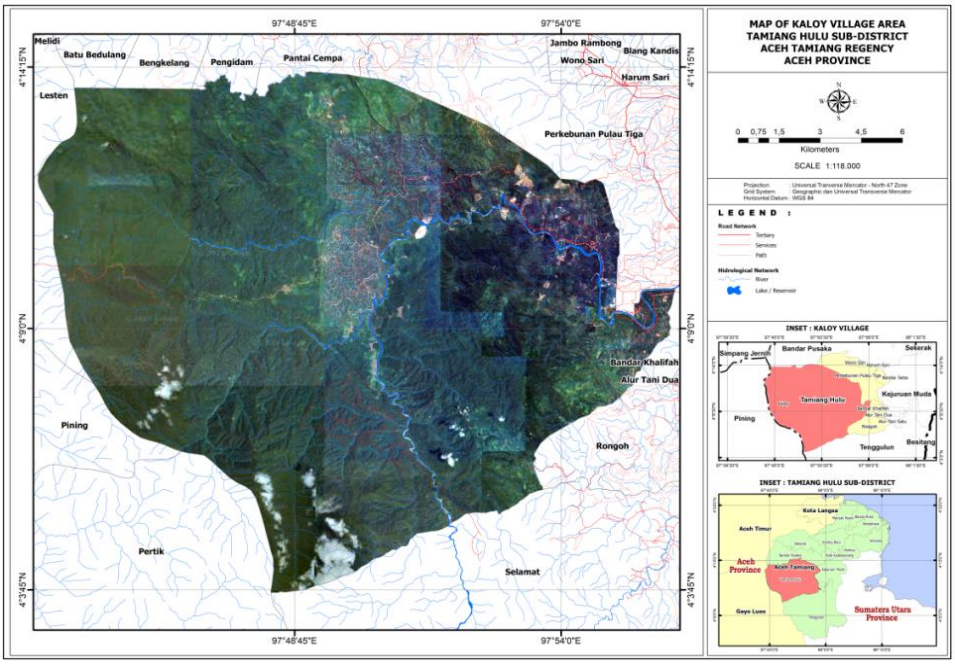

Figure 1. Research location

The research was conducted in Kaloy Village, located in Aceh Tamiang Regency, Aceh Province, in the eastern part of Sumatra Island, Indonesia. This area is characterized by diverse geographical features, including dense tropical vegetation, a complex river system, agricultural lands, and rural settlements. Kaloy Village was selected as the study site because it still has relatively well-preserved forests and community-managed gardens, and the local population continues to maintain traditional medicinal practices using medicinal plants.

The river system in this area plays an important role in supporting both the local ecosystem and the livelihoods of the surrounding communities. It functions as a source of clean water, irrigation, and a means of local transportation. The road infrastructure shown on the map indicates the level of accessibility to the research location and the presence of human land-use activities. The land cover in the research area includes natural forests (both primary and secondary), agricultural or plantation areas, bodies of water, and an interconnected river network.

Data Collection Methods

Field data collection was conducted through open-ended interviews and the distribution of questionnaires. Open-ended interviews were conducted in-depth and in an unstructured manner with key informants, namely members of the Kaloy Village community in Tamiang Hulu Subdistrict who possess knowledge about medicinal plants used as alternative treatments for various diseases. The research sample consisted of traditional healers and general community members. Sampling was carried out using a survey method, which included interviews, observations, and documentation.

The population in this study consisted of residents of Kaloy Village, Tamiang Hulu Subdistrict, Aceh Tamiang Regency. The research sample included types of medicinal plants used to treat circulatory system disorders. Respondents were divided into two categories: key informants and non-key informants. Key informants included traditional healers and massage therapists, while non-key informants were patients of the healers—namely, general members of the community residing in Kaloy Village, Tamiang Hulu.

To determine the number of samples in this study, the researcher used the Slovin's formula (Field, 2024), as follows:

$$n = \frac{\mathrm{N}}{1 + \mathrm{Ne}^2}$$

Explanation:
n = Sample size
N = Population size
e = Margin of error, set at 10%

Based on this formula, a total of 90 respondents were obtained from Kaloy Village. Interviews were conducted with 90 respondents and 2 key informants, who were categorized into three age groups:
a. 15–29 years old (adolescents/young adults)
b. 30–49 years old (adults)
c. Over 50 years old (elderly)
Each age group consisted of individuals who met the data criteria, had experience and knowledge of alternative medicine, and had used medicinal plants for treatment.

Plant Identification

Plants collected from the field were subsequently identified using the following reference books:

a. Wide of Rice in Indonesia (Soejrani et al., 1987)
b. Exotic Flora of Flowering Ornamental Plants (Suryowinoto, 1997)
c. Flora of the Mountains of Java (Van Steenis, 2010)

Data Analysis

The data were analyzed using both descriptive and quantitative methods. Descriptive analysis was carried out by grouping plant species based on local name, scientific name, family, plant parts used, and methods of preparation (single or mixed use). Meanwhile, quantitative analysis was performed by calculating the Index of Cultural Significance (ICS) and measuring the level of knowledge degradation using the following formulas:

Index of Cultural Significance (ICS)

$$\mathrm{ICS} = \sum_{i=1}^{n} (q\ x\ i\ x\ e)$$

Explanation:
n = Number of plant uses
q = Quality value of the plant
i = Intensity of plant use
e = Exclusivity of plant use

RESULTS AND DISCUSSION

Community Beliefs in Medicinal Plants in Kaloy Village, Tamiang Hulu Subdistrict

Based on interviews conducted with local residents, the level of community belief in the efficacy of medicinal plants in Kaloy Village, Tamiang Hulu Subdistrict, Aceh Tamiang, was obtained and is presented in Table 1.

Table 1. Level of community belief in the medicinal properties of plants in Kaloy Village, Tamiang Hulu Subdistrict

No	Age Group Respondents	Belief (%)	Do Not Belief (%)
1.	A (15-29 years)	15,56	17,78
2.	B (30-49 years)	31,11	2,22
3.	C (>50 years)	32,22	1,11
	Total (%)	**80,00**	**20,00**

Based on Table 1, the level of community belief in medicinal plants in Kaloy Village, Tamiang Hulu Subdistrict, is relatively high, reaching 80.00%. This indicates that the majority of the population still believes in the use of traditional medicinal plants as a form of alternative treatment. When analyzed by age group, individuals over the age of 50 demonstrated the highest level of belief (32.22%), followed by those aged 30–49 years (31.11%), suggesting that older and middle-aged individuals tend to preserve traditional beliefs in herbal medicine.

In contrast, the 15–29 age group showed a higher level of disbelief (17.78%) than belief (15.56%), most likely due to the influence of modernization and limited access to information regarding the benefits of traditional medicinal plants. In general, the

older generation possesses broader knowledge and experience in the use of medicinal plants, while the younger generation tends to develop belief only after experiencing the benefits firsthand. (Yowa et al., 2019).

Community Knowledge of Medicinal Plant Species in Kaloy Village, Tamiang Hulu Subdistrict

The results of interviews conducted with the local community revealed the level of public knowledge regarding the types of medicinal plants in Kaloy Village, Tamiang Hulu Subdistrict, as presented in Table 2.

Table 2. Community knowledge level of medicinal plant species in Kaloy Village, Tamiang Hulu Subdistrict

No	Age Group Respondents	Do Not know (%)	Not Knowing Enough (%)	Enough to Know (%)	Know (%)	Very Knowledgeable (%)
1.	A (15-29 years)	12,22	15,56	5,56	0,00	0,00
2.	B (30-49 years)	2,22	4,44	22,22	4,44	0,00
3.	C (>50 years)	1,11	2,22	11,11	14,44	4,44
	Total (%)	**15,56**	**22,22**	**38,89**	**18,89**	**4,44**

Based on Table 2, the level of knowledge regarding medicinal plants in Kaloy Village, Tamiang Hulu Subdistrict, varies by age group. Age group C (>50 years) has the highest level of knowledge, with 4.44% classified as highly knowledgeable and 14.44% as knowledgeable. This reflects a strong understanding of medicinal plants due to experience and traditions passed down through generations. Age group B (30–49 years) ranks second, with 22.22% moderately knowledgeable and 5.56% knowledgeable, indicating that this productive age group still retains a good understanding of medicinal plant benefits despite increasing exposure to modern medicine. Age group A (15–29 years) has the lowest level of knowledge, with 12.22% having no knowledge and 15.56% having little knowledge. This suggests low interest and limited exposure to traditional knowledge among the younger generation.

Respondents over the age of 40 reported using medicinal plants out of habit and trust in their proven benefits. In contrast, the preservation of medicinal plant knowledge among younger generations is relatively low, primarily due to their lack of interest in learning and discussing traditional herbal medicine (Eurika et al., 2024). All informants agreed that traditional medicine, which has been passed down through generations, has proven effective, and therefore, they continue to uphold this cultural practice (Bastaman et al*.,* 2021).

Types of Plants Used as Medicine by the Community in Kaloy Village, Tamiang Hulu Subdistrict

Based on the data analysis from interviews with respondents from various communities in Kaloy Village, Tamiang Hulu Subdistrict, information was obtained regarding the types of traditional medicinal plants used and utilized by the local people to treat various illnesses. This information is presented in Table 3.

Table 3. Types of traditional medicinal plants used by the community in Kaloy Village, Tamiang Hulu Subdistrict

No.	Common Name	Latin Name	Uses
1	Ginger	*Zingiber officinale*	Diarrhea, Stomach disorders, Fever, Hypotension, Cough, Fatigue, Stroke, Abdominal pain, Blood sugar, Headache, Typhoid, Cholesterol, Varicose veins

No.	Common Name	Latin Name	Uses
2	Bay Leaf	*Syzygium polyanthum*	Cholesterol, Abdominal pain, Cold, Cough, Fatigue, Hypotension, Hypertension, Stomach, Fever, Diarrhea, Stroke
3	Betel Leaf	*Piper betle*	Hypotension, Abdominal pain, Cough, Headache, Fatigue, Stomach, Cholesterol, Hypertension, Stroke, Fever
4	Soursop Leaf	*Annona muricata*	Stomach, Fever, Cough, Diarrhea, Hypotension, Hypertension, Cholesterol
5	Tamarind	*Tamarindus indica*	Hypotension, Abdominal pain, Cough, Hypertension, Fatigue, Stroke, Stomach, Diarrhea, Cholesterol
6	Turmeric	*Curcuma longa*	Hypotension, Abdominal pain, Cough, Fatigue, Stomach, Stroke, Cholesterol
7	Java Turmeric	*Curcuma xanthorrhiza*	Cough, Fatigue, Cholesterol, Stomach, Hypotension, Hypertension, Stroke
8	Aromatic Ginger	*Kaempferia galanga*	Hypotension, Abdominal pain, Fatigue, Cholesterol, Stomach, Hypertension, Stroke
9	Galangal	*Alpinia galanga*	Hypotension, Abdominal pain, Cough, Fatigue, Cholesterol, Hypertension, Stroke
10	Garlic	*Allium sativum* L.	Cholesterol, Sore throat, Heart, Anemia, Hypertension

Based on interviews with 90 respondents, 10 plant species were identified as primary ingredients in traditional medicine by the community of Kaloy Village in Tamiang Hulu Subdistrict. Each plant species has its own method of preparation, such as boiling, pounding, or being consumed as a drink. Some remedies involve a single plant species, while others are mixtures of several plants. The methods of application include drinking, topical application, or attaching the remedy to the body. Among these, boiling is the most commonly used method, while attaching to the body is the least commonly used (Wahyuningsih et al., 2022).

Index of Cultural Significance (ICS)

The Index of Cultural Significance (ICS) is used to measure the cultural value of each medicinal plant species based on its uses, community preferences, and frequency of use. (Albayudi et al., 2024). Table 4 below presents the ten medicinal plant species with the highest ICS values:

Table 4. ICS values of each medicinal plant species

No.	Common name	Latin name	ICS
1	Ginger	*Zingiber officinale*	132
2	Bay Leaf	*Syzygium polyanthum*	96
3	Betel Leaf	*Piper betle*	90
4	Soursop Leaf	*Annona muricata*	81
5	Tamarind	*Tamarindus indica*	75
6	Turmeric	*Curcuma longa*	60
7	Java Turmeric	*Curcuma xanthorrhiza*	57
8	Aromatic Ginger	*Kaempferia galanga*	54
9	Galangal	*Alpinia galanga*	51
10	Garlic	*Allium sativum* L.	48

The cultural significance value (Index of Cultural Significance/ICS) is useful for determining the importance level of a plant species within a community's daily life. This value is calculated based on the plant's uses, community preferences, and frequency of use (Albayudi et al., 2024). According to the analysis in Table 4, ginger *Zingiber officinale* has the highest ICS value, at 132. This indicates that plants with high ICS values are widely used in traditional medicine and are frequently utilized by local communities. The higher the ICS value of a plant, the greater its role in society in terms of usage frequency, benefits, and availability *(*Tarigan et al., 2022). The level of a plant's utilization depends largely on how much it is valued and preferred by the community in their daily lives (Mirawati & Yuniati, 2014).

Based on interviews with key informants, ginger (*Zingiber officinale*) is the most frequently used medicinal plant because it is easily found in the surrounding environment, either through home cultivation or purchase at local markets. In addition, ginger is well known for its various health benefits, such as warming the body, improving blood circulation, relieving colds, and reducing nausea. It is also commonly used as a component in traditional herbal mixtures alongside other medicinal plants, further strengthening its role in traditional healing practices. The rhizome of ginger is considered the most valuable part, as it contains a variety of bioactive compounds that provide therapeutic benefits. (Albayudi et al., 2024).

The ICS (Index of Cultural Significance) serves as an indicator of the importance of a plant species to the local community in the study area. The calculated ICS values reflect the degree of significance that each useful plant species holds for the community (Has et al., 2020). This data is crucial as a basis for identifying species with high cultural value and economic potential, which can contribute to improving local livelihoods and supporting conservation efforts (Rahayu et al., 2012). The ICS is used to interpret the importance of each plant species to a community in terms of the quality, intensity, and uniqueness of its use. (Ismail et al., 2023).

CONCLUSION

This study reveals that the community of Kaloy Village, Tamiang Hulu Subdistrict, Aceh Tamiang Regency continues to preserve traditional knowledge related to the use of medicinal plants, particularly for treating circulatory system disorders. A total of 10 medicinal plant species were identified and are traditionally used to treat conditions such as hypertension, high cholesterol, stroke, anemia, and diabetes. The most commonly utilized plant parts are leaves and rhizomes, with traditional preparation methods still widely practiced. The Cultural Significance Index (ICS) indicates that several species hold high cultural value within the community. Although trust and knowledge regarding medicinal plants remain high among the older age groups, there is a noticeable decline in interest among the younger generation. Therefore, documentation and preservation of ethnobotanical knowledge are essential efforts for conserving both cultural heritage and local biological resources that have economic and health value.

RECOMMENDATION

Future research should be conducted in different locations to broaden the ethnobotanical database of medicinal plants.

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