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Ethnomedicine Study on Medicinal Plants Used by Communities in West Sumatera, Indonesia

Skunda Diliarosta, Monica Prima Sari, Rehani Ramadhani and Annisa Efendi

Abstract

Currently, the development of conventional medicine is getting more advanced, it cannot be denied that medicinal plants still occupy their main role as medicine for various human diseases, especially in developing countries. This is rooted in the knowledge of the local community about plants that can be used as medicine for various diseases. Ethnomedicine is a field of study that raises local knowledge of the community to maintain their health. From numerous studies on the field, 33 species of plants have been found which are believed by the natives to West Sumatra as medicine. Ethnomedicinal data were analyzed using Index of Cultural Significance (ICS) value. The results of the analysis showed that the species of plants that is voted most important for the community were soursop (*Annona muricata*) and red betel (*Piper sp*.). In general, the part of plant that is most often used as medicine is the leaf, and the way to consume it is by boiling it so that you can get the herbs from the plant extract.

Keywords: ethnomedicine, quantitative analysis, medicinal plants, local community, West Sumatera

1. Introduction

Indonesia has around 25,000-30,000 species of plants and is inhabited by around 300- 700 ethnicities. These ethnic groups use it for various purposes, one of which is for medicinal purposes. The use of plants as medicinal substances is mostly passed down orally, so they are prone to degradation. Ethnomedicine study is a method that can be used to document the use of plants by ethnic groups with scientifically acceptable research methods. This paper aims to explain the study of ethnomedicine especially in West Sumatra and its research methods.

One of the local wisdoms possessed by Indonesians is to utilize the natural biological resources in the vicinity. Every local community uses their vegetable resources to fulfill their daily needs, one of which is to maintain their health which is known as medicinal plants. Knowledge on the use of medicinal plants is generally passed down orally, so that knowledge is limited to certain groups of people and is susceptible to degradation due to cultural acculturation and modernization.

The use of plants to maintain health has long been carried out in Indonesia in line with the development of civilization. Indonesia has been formulating and using medicinal plants (traditional medicine) since the era of Hindu-Javanese kingdom. In West Sumatra itself, medicinal plants have been an alternative treatment since the time of our ancestors. One of the plants that is widely used in the experiment is the soursop plant (Latin name), betel plant (Latin name) and castor plant (Latin name). The part of the plant that is used as medicine is the leaves.

2. Ethnomedicine study on medicinal plants used by local communities in West Sumatera, Indonesia

2.1 Ethnomedicine

Ethnomedicine is a branch of medical anthropology which deals with the origin of disease, causes, and treatment according to certain groups of people. The ethnomedicine aspect is an aspect that appears along with the development of human culture. In the field of medical anthropology, ethnomedicine gives rise to various therminologies. This branch is often called folk medicine, primitive medicine, however ethnomedicine is considered more appropriate [1].

Ethnomedicine is a field of ethnobotany studies that reveals local knowledge of various ethnicities in maintaining their health. Empirically, it can be seen that traditional medicine uses both plants and animals. However, in terms of the number and frequency of use, plants are more widely used than animals. Eventually, this resulted in traditional medicine being identical to medicinal plants.

Currently, ethnomedicine research is aimed at finding new chemical compounds that are useful in the manufacture of modern drugs for dangerous diseases, such as cancer drugs. Up until now, most of the drugs used for cancer treatment are still extracted directly from plants because synthetic compounds cannot be made or their production costs are much more expensive than direct extraction from plants. In addition, treatment for diseases which are currently developing, the new purpose of ethnomedicine research is to find new compounds with fewer side effects, the emergence of resistant effects from existing drugs, and also to anticipate the emergence of new diseases. This has resulted in ethnomedicine research continuing to develop, especially in countries rich in biodiversity such as Indonesia.

The use of plants as herbs and medicine traditionally or often referred to as empirical is often associated with uses that have no scientific basis at all. Even though research is so advanced, it is very possible that in the past the use of traditional medicine was only based on lineage and undocumented experience and there was no scientific data. Now, there are numerous recent studies that support the practice of using plants for the treatment of various diseases. Exploration of Local Knowledge of Ethnomedicine and Community-Based Medicinal Plants in Indonesia, hereinafter referred to as Research on Medicinal Plants and Herbs (RISTOJA) has succeeded in collecting data related to the use of plants for medicinal purposes in almost every ethnicity in the territory of Indonesia (34 Provinces) [2].

2.2 West Sumatera

West Sumatra is one of the provinces in Indonesia located on the west coast in the central part of Sumatra island which consists of lowlands on the west coast and volcanic plateaus formed by the Bukit Barisan on the eastern side. This province has a land area of 42,297.30 km^2 which is equivalent to 2.17% of Indonesia's area. More than 45.17% of this area is still covered by protected forest. The coastline of this

province is entirely in contact with the Indian Ocean along 2,420,357 km with a sea area of 186,580 km^2. Mentawai Islands, which are located in the Indian Ocean, are included in this province (**Figure 1**).

Astronomically, West Sumatra is located between 00.54 'North Latitude and 30.30' South Latitude and between 98.36' − 101.53 'East Longitude and is traversed by the equator or the equator. Based on its geographical position, West Sumatra Province has the following boundaries: North - North Sumatra and Riau Provinces; South - Indian Ocean; West - Indian Ocean; East - Jambi and Bengkulu Provinces. Located on the west coast of the central part of the island of Sumatra with an area of approximately 42.2 thousand square kilometers.

Like other regions in Indonesia, the climate of West Sumatra is generally tropical with temperatures quite high, between 22.6 ° C to 31.5 ° C. This province is also traversed by the equator, precisely in Bonjol city, Pasaman district. There is a number of large rivers flow from this province into the east coast of Sumatra, such as Batang Hari, Siak, Inderagiri (referred to as Batang Kuantan in the upper part), and Kampar. Meanwhile, the rivers that flow into the west coast are Batang Anai, Batang Arau, and Batang Tarusan.

2.3 Study area

This research was conducted to identify plants used by the people of West Sumatra as medicinal plants. This research was conducted in several areas in West Sumatra, namely Padang city, Padang Pariaman district, Pariaman city, Padang Panjang city, Bukittinggi city, and Payakumbuh city.

2.4 Data collection

Field observations were carried out in January-April 2020. Using the purposive sampling method, ethnomedicine data were collected through semi-structural interviews and discussions from 18 informants. Information regarding local medicinal plants, parts used, method of application and preparation is recorded. Data on the gender, age and educational status of informants were also collected. Plant specimens were also collected to help identify the medicinal plant species obtained.
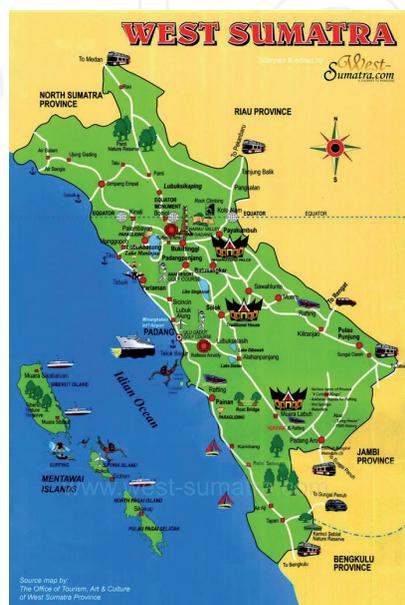

Figure 1.
Map of West Sumatra. Source: perpustakaan.menlhk.go.id.

2.5 Demographic data of informants

In this study, 18 informants were involved, consisting of 12 men and 6 women. 4 informants came from Padang city, 3 from Padang Pariaman district, 3 from Pariaman city, 5 from Padang Panjang city, 2 from Bukittinggi city and 1 from Payakumbuh city. The highest number of informants is over 50 years old (**Table 1**).

From this research, it can be seen that older informants have more knowledge about medicinal plants than younger informants. This may be due to the lifestyle of the younger group which is more modern, they are not too interested in natural medicinal plants and prefer modern medicines obtained from doctors [3, 4].

Knowledge about the use of medicinal plants is largely derived orally (75%) from their ancestors, this type of inheritance method is common for traditional healers [5]. Thus seldom is there documentation for their practice and therefore there is an urgent need to document all information about the traditional practice of using medicinal plants especially for the treatment of growth determinants.

2.6 Plant inventory

There are 33 medicinal plants (**Figure 2**) that are believed by the local community as medicinal plants that can cure various diseases, a complete list of plants is presented in the **Table 2**. Local names, taxonomic names, parts used and method of preparation are also given.

2.7 Plant parts being used and preparation

From the PPV (**Figure 3**) it was revealed that the leaves were the most widely used part, namely 58% followed by fructus 11%. The findings of this study are similar to those of other ethnomedicine studies [6–8], and most traditional healers use the leaves perhaps because it is relatively abundant and also to preserve and preserve medicinal plant species. Herb, direct eating (raw parts or juice) and direct use (crushed plant parts topically) are various methods used in traditional healing

Category	Group	n
Gender	Men	12
	Girl	8
Age	20-40 years	5
	41-50 years	6
	51-60 years	7
	More than 60 years	2
District/City	Padang	4
	PadangPariaman	3
	Pariaman	3
	Padang Panjang	5
	Bukittinggi	3
	Payakumbuh	2

Table 1.
Informant demographic data (n =).
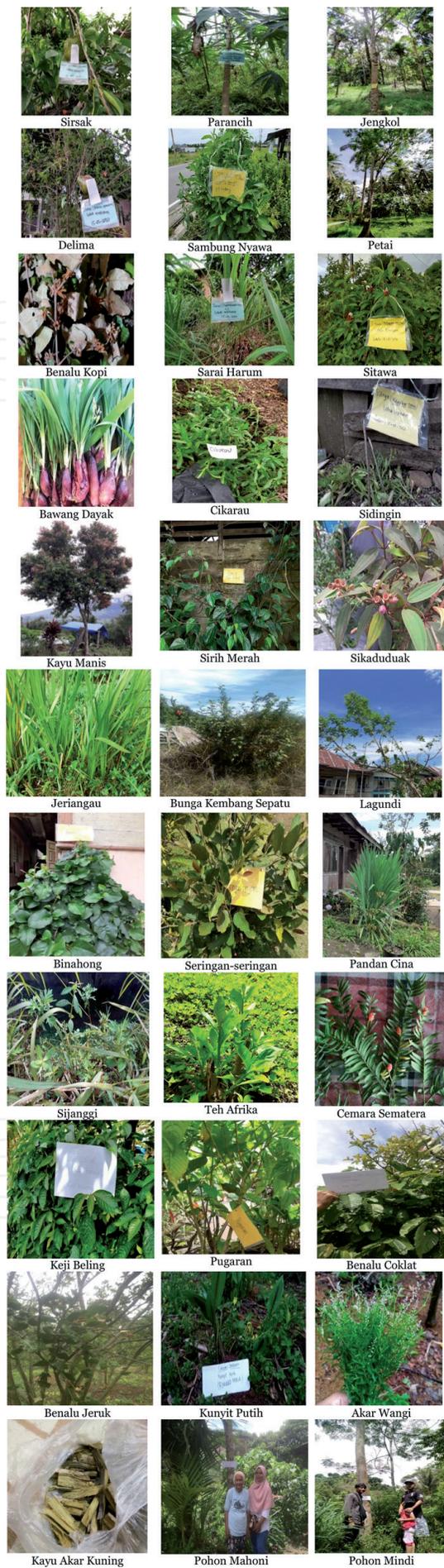
Figure 2.
Plant specimens.

Determinants	Local name	Taxonomic name	Method of preparation	The part used
Cancer	Sirsak	*Annona muricata*	Dec	Jui
Natural betadine	Parancih Betadin	*Jatropha multifida Linn*	Du	Jui
Cancer	Jengkol	*Archidendron pauciflorum*	De	Fru
Cancer, Antioxidants	Dalimo	*Punica granatum*	De	Fru
Maintain body temperature stability	Petai	*Parkia speciosa Hassk*	De	Fru
Cancer	Benalu Kopi	*Scurrula ferruginea (Jack) dancer*	Dec	Jui
Diabetes	Sambung Nyawa	*Gynura procumbens*	Dec	Jui
Internal Medicine	Sitawa	*Andrographis paniculata*	Du	Rhi
Cancer	Bawang Dayak	*Eleutherine palmifolia*	Dec	Tub
Hemorrhoids, fever	Sidingin	*Kalanchoe pinnata*	Du	Jui
Antimicrobial	Cikarau	*Enhydra fluctuans Lour*	Dec	Jui
Lowering blood pressure and blood sugar levels	Sarai Harum	*Cymbopogon nardus (L.) Rendl.*	Dec	Cau
Colds and diarrhea	Kayu Manis	*Cinnamomum sp*	Dec	Cau
Cancer	Sirih Merah	*Piper sp*	Dec	Jui
Indigestion	Daun Sikaduduak	*Melastoma candidum*	Dec	Jui, Rad, Fru, Sem
Diarrhea, dysentery, colds	Jeriangau	*Acorus calamus*	Dec	Rhi
Antioxidants	Bunga Kembang Sepatu	*Hibiscus rosasinensis*	Dec	Jui
Antioxidants	Lagundi	*Vitex trifolia*	Dec	Jui
Reducing fever	Binahong	*Anifere cordifolia*	Dec	Jui
Relieve rheumatism, tuberculosis	Seringan-seringan	*Flemingia strobilifera*	Dec, Du	Jui
Diabetes, rheumatism, cancer	Pandan cina	*Pandanus odorus*	Dec	Jui
Lower uric acid levels	Sijanggi	*Cosmos caudatus*	Dec, Du	Jui
Diabetes mellitus, cholesterol	Teh Afrika	*Nernobia amygdaliris*	Dec	Jui
Itchy	Pugaran	-	Du	Jui
Kidney Damage	Benalu Jeruk	*Dendrophthoe Glabresseris*	Dec	Jui
Cancer	Cemara Sumatera	*Taxus sumaterana*	Dec	Jui, Cor
Diabetes	Keji Beling	*Strobilanthes crispa*	Dec	Jui
Ulcer, low blood pressure, cancer	Benalu Coklat	*D. Pentandra*	Dec	Jui
Skin inflammation, indigestion	Kunyit Putih	*Curcuma Zedoaria*	Dec	Rhi

Determinants	Local name	Taxonomic name	Method of preparation	The part used
Cough, asthma, bronchitis	Akar Wangi	*Polygala paniculata*	Due	Jui
Antimicrobial	Akar kuning	*Arcangelisia flava Merr.*	Due	Cau
Hypertension	Pohon Mindi	*Melia azedarach*	Due	Rad
Blood circulation	Pohon Mahoni	*Swietenia mahagoni*	De	Fru

*Abbreviation: **ICS**: Index of Cultural Significance; **PPV**: Plant Part Value; **Fru**: Fructus (Fruit); **Sem**: Semen (Seed); **Tub**: Tuber; **Rhi**: Rhizome; **Cor**: Cortex; **Jui**: Juice; **Rad**: Radix (Root); **Cau**: Caulis; **Dec**: Decoction; **De**: Direct eat (raw part or the juice); **Du**: Direct use (topical).*

Table 2.
Medicinal plants.
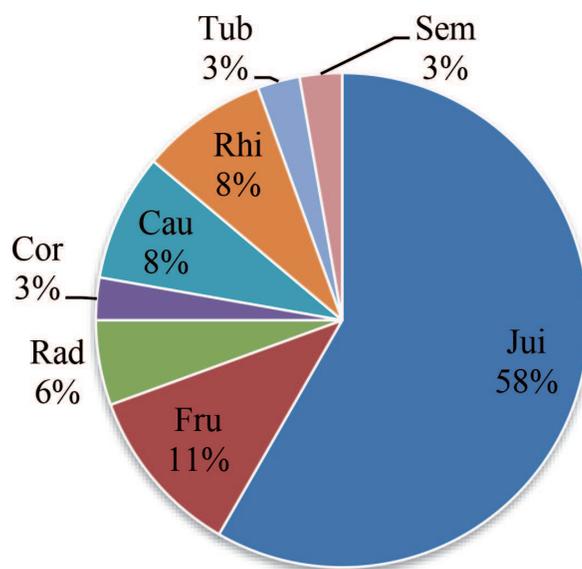
Figure 3.
The percentage value of the plant part.

for medicinal plants. Decoction of plant parts is the most commonly used method followed by direct consumption of plants (raw or juice parts).

This study aims to document and quantify medicinal plants used by communities in West Sumatra, Indonesia. The plant species collected from this study are mostly common medicinal plants used by traditional healers and are frequently documented in ethnobotany studies in Indonesia [9–13].

2.8 Quantitative analysis of ethnomedicine data

2.8.1 Cultural significance index

The significance value of plant species in the study area is calculated using the following formula:

$$ICS \sum_{i}^{n} = 1 \left(q \times i \times e \right) ui$$

Where q is the quality value for each species (1-5), I refer to the intensity value and e is the exclusivity value. The results obtained from the ICS calculations are then categorized based on the value proposed by Turner [14] shown in **Table 3**.

ICS value	Category
100 and more	Significance is very high
55-99	High significance
20-49	Medium significance
5-19	Low significance
1-4	Significance is very low
0	Can be ignored

Table 3.
The ICS value was proposed by Turner [14].

No.	Local name	Taxonomy Name	ICS	ICS category
1	Sirsak	*Annona muricata*	30	Medium significance
2	Parancih Betadin	*Jatropha multifida Linn*	9	Low significance
3	Jengkol	*Archidendron pauciflorum*	12	Low significance
4	Dalimo	*Punica granatum*	9	Low significance
5	Petai	*Parkia speciosa Hassk*	12	Low significance
6	Benalu Kopi	*Scurrula ferruginea (Jack) dancer*	12	Low significance
7	Sambung Nyawa	*Gynura procumbens*	9	Low significance
8	Sitawa	*Andrographis paniculata*	12	Low significance
9	Bawang Dayak	*Eleutherine palmifolia*	9	Low significance
10	Sidingin	*Kalanchoe pinnata*	12	Low significance
11	Cikarau	*Enhydra fluctuans Lour*	9	Low significance
12	Sarai Harum	*Cymbopogon nardus (L.) Rendl.*	9	Low significance
13	Kayu Manis	*Cinnamomum sp*	9	Low significance
14	Sirih Merah	*Piper sp*	30	Medium significance
15	Daun Sikaduduak	*Melastoma candidum*	9	Low significance
16	Jeriangau	*Acorus calamus*	9	Low significance
17	Bunga Kembang Sepatu	*Hibiscus rosasinensis*	9	Low significance
18	Lagundi	*Vitex trifolia*	9	Low significance
19	Binahong	*Anifere cordifolia*	9	Low significance
20	Seringan-seringan	*Flemingia strobilifera*	9	Low significance
21	Pandan cina	*Pandanus odorus*	9	Low significance
22	Sijanggi	*Cosmos caudatus*	9	Low significance
23	Teh Afrika	*Nernobia amygdaliris*	9	Low significance
24	Pugaran	-	9	Low significance
25	Benalu Jeruk	*Dendrophthoe glabresseris*	12	Low significance
26	Cemara Sumatera	*Taxus sumaterana*	12	Low significance
27	Keji Beling	*Strobilanthes crispa*	9	Low significance
28	Benalu Coklat	*D. Pentandra*	9	Low significance
29	Kunyit Putih	*Curcuma zedoaria*	9	Low significance
30	Akar Wangi	*Polygala paniculata*	9	Low significance

No.	Local name	Taxonomy Name	ICS	ICS category
31	Akar kuning	*Arcangelisia flava Merr.*	12	Low significance
32	Pohon Mindi	*Melia azedarach*	9	Low significance
33	Pohon Mahoni	*Swietenia mahagoni*	9	Low significance

Table 4.
ICS for each plant.

2.8.2 Index of cultural significance (ICS)

The index of cultural significance (ICS) is a reference used to calculate and predict the level of importance of a plant species in a certain area [14, 15], its value can be seen in **Table 4**. ICS analysis is usually carried out to calculate the usefulness of complete plants (food, medicine, rituals, construction, etc.) [14, 16], but because this study focuses more on medicinal plants that are trusted by the local community or known as ethnomedicine so for this study the only use calculated for medicinal purposes only.

Turner calculates the ICS value using the researcher's subjective allocation approach. Turner only uses three variables to calculate the ICS value, namely quality of use, intensity of use, and exclusivity of use [14]. The ICS value is obtained from the result of the multiplication of three variables when the calculation can also occur the addition of the product, this is done if a plant species has more than one use. Turner allocated 5 weight scales for the variables of use quality and intensity of use, namely 5, 4, 3, 2, 1 and allocated 3 scales for the use exclusivity variable, namely 0.5, 1, and 2.

From the research conducted and based on the mathematical calculation of the ICS value, it was seen that only two plant species had moderate significance (ICS = 30). The two plants that have ICS of moderate significance are red betel and soursop. These two plants are trusted by the public to prevent and treat cancer, so these plants are very popular and are considered important by the local community. As for the other plants, it is categorized as low significance. From the ICS calculation data, a plant for the local community can be used as raw material for medicine or herbal plants [17]. Although Turner's ICS ranks plant species used for food, especially staple foods, as the type of quality that has the highest score in determining cultural importance (CS).

3. Conclusion

From the ethnomedicine research conducted, it is known that there are 33 plants that are used as medicinal plants by people in West Sumatra, Indonesia. Mostly, the plant leaves are used as raw material for medicine through direct consumption (juice of the plant parts) or by boiling, which is the most common way of preparation. Quantitative ethnomedicine data can be analyzed using the Index of Cultural Significance (ICS). To determine ICS, three variables are needed, namelyquality of use, intensity of use, and exclusivity of use.

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Conflict of interest statement

The author states that there is no conflict of interest regarding the publication of this paper.

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