

PAPER • OPEN ACCESS

Etnochemistry Study of Medicine Plants for Liver Disease in The Community of Balane Village

To cite this article: Purnama Ningsih *et al* 2022 *IOP Conf. Ser.: Earth Environ. Sci.* **1075** 012014

View the [article online](#) for updates and enhancements.

You may also like

- [The scientification of jamu: a study of Indonesian's traditional medicine](#)
W Sumarni, S Sudarmin and S S Sumarti
- [Ethnobotanical study and identification of medicinal plants based on local knowledge](#)
A M Jaya, Y Musa, H Iswoyo et al.
- [Ethnobotany of medicinal plants in Asam Jawa Village, South Labuhanbatu, North Sumatra, Indonesia](#)
R Rambey and O Onrizal

Etnochemistry Study of Medicine Plants for Liver Disease in The Community of Balane Village

Purnama Ningsih*, Ijirana Ijirana, Sri Mulyani and Frischilia Febby Patanda

Chemistry Education, Department of Mathematics and Natural Science Education,
Faculty of Teacher Training and Education, Tadulako University

*purnamaningsih@yahoo.com

Abstract. Based on their ethnochemical expertise, the study intends to find the types, sections of plants, processing methods, and ways of use used to treat the liver ailment in the community of Balane village, Kinovaro District, Sigi Regency, Central Sulawesi. A qualitative research method was used, which included interview techniques. To treat liver disorders, the Balane community uses six distinct types of herbs. Cakar ayam (*Selaginella doederleinii Hieron*), daun sendok (*Plantago major L.*), jarong (*Stachytarpheta indica (L.) Vahl*), pegagan (*Centella asiatica (L.) Urban.*), sambiloto (*Andrographis paniculate (Burm. F) Wallich*), temulawak (*Curcuma zanthorrhiza Roxb.*). Plant parts that are used as medicine include herbs, leaves, rhizomes, and grains. Boiling is used to prepare the medicinal herbs, and the treatment is used for 1-3 months or until the patient notices a difference or recovers.

1. Introduction

Indonesia is an archipelagic country with the world's second most excellent tropical forest and biodiversity, and it is considered one of the world's second "mega biodiversity" countries after Brazil [1]. According to estimates, Indonesia's forests contain 30,000 species of medical plants, 940 of which have been designated as medicinal, and 78% of them are still obtained via direct extraction from the forest.

Sulawesi is one of Indonesia's largest and most important islands. It is part of the Wallacea biogeographic region, which is home to a diverse range of endemic flora and animals. On the other hand, the Sulawesi region is home to several ethnic or indigenous groups comprised of a diverse range of ecologists. Similarly, health awareness is a defining characteristic of each ethnic group in Indonesia.

Several villages in Central Sulawesi, including distant indigenous groups, were identified using data from the Central Statistics Agency [2]. This comprises the Balane people, as well as the tolare/da'a, rai, and ledo tribes. Small indigenous groups as a communal group follow a pattern of conduct that is closely tied to the customs passed down from generation to generation by their forefathers [3]. Several examples have chemical substances, despite the fact that the adopted lifestyle is still pure and regarded as 'outdated.' One example of their way of life is that they use the plants that grow around them as medicine to treat fevers, stomach-aches, and coughs.

Plants are still used as medicine by the communities of Balane Village. It stands apart from other civilizations because of its diverse user base. The people of Balane Village have remained steadfast in their management of plants as a medicine until now. Liver illness is one of the diseases that the residents of Balane Village still believe must be treated traditionally. In addition to the information disclosed



above, it is necessary to reveal the pattern of life behavior associated with ethnochemistry in the Balane community in terms of treatment. Thus, this study, will investigate which medicinal plants are used by the people of Balane Village to treat liver disease, which parts of the plant are used as medicine, and how medicinal plants are processed and used by the people of Balane Village to treat liver disease.

The liver is a vital organ for humans, according to [4]. This organ is located just below the diaphragm in the right abdominal cavity. The liver performs various functions, including acting as an antidote to and neutralizer of toxins, regulating hormone circulation, and controlling the composition of blood, which contains fat, sugar, protein, and other substances. Additionally, the liver produces bile, a substance that aids in fat digestion. Liver disease is a malfunction of any of the liver's functions. The liver is responsible for critical roles in the body, and their loss can result in significant damage. Although the liver is the only organ in the body capable of quickly replacing damaged cells, if these cells are lost, the liver may not meet the body's requirements. Because the liver disease may be asymptomatic, it is frequently referred to as a silent killer. According to [5], liver disease is a leading cause of death worldwide, increasing the mortality rate from time to time. Globally, estimates place the number of patients with chronic liver disease (not all types of liver disease) at 884 million, with an average annual death rate of 2 million.

2. Methods

This research uses ethnographic methodologies to conduct a descriptive qualitative investigation. The goal of descriptive qualitative research is to describe or gather knowledge from a large, broad, and in-depth set of study data of traditional medicine for liver disease in the people of Balane Village in the Sigi area of Central Sulawesi. Interview guidelines are developed to confirm the findings acquired both in theory and in the field. Documentation procedures are employed to record the plants used as medicine, and interviews with informants are among the research instruments used.

3. Result and Discussion

Patients with liver problems in the area provided data for the study, as did sandro (shaman). In Balane village (Figure 1), there are six different types of herbs that are utilized to treat liver illness. Table 1 shows the sorts of plants utilized by the people in Balane village, Kinovaro sub-district, Sigi district, Central Sulawesi, to treat liver illness.

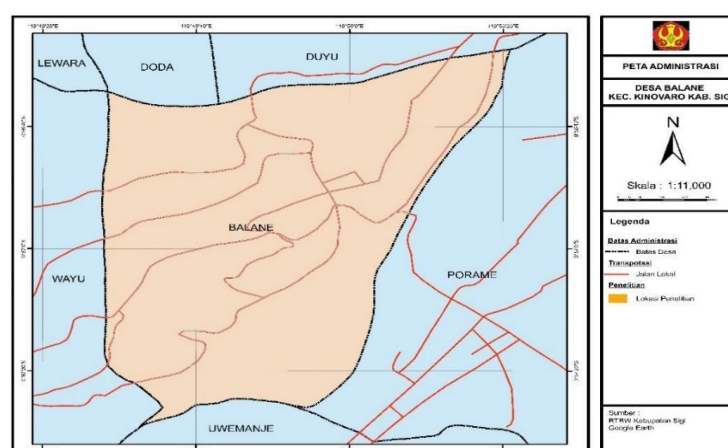


Figure 1. Balane Village Map (Geospatial, 2019)

Table 1. Medicinal plants for liver disease

No	Name of Plants	Family	Species
1	Cakar Ayam	Selaginellaceae	<i>Selaginella doederleinii</i> Hieron.
2	Daun Sendok	Plantaginaceae	<i>Plantago major</i> L.
3	Jarong	Verbenaceae	<i>Stachytarpheta indica</i> (L.) Vahl.
4	Pegagan	Mackinlayaceae	<i>Centella asiatica</i> (L.) Urban.
5	Sambiloto	Acanthaceae	<i>Andrographis paniculate</i> (Burm. F) Wallich
6	Temulawak	Zingiberaceae	<i>Curcuma zanthorrhiza</i> Roxb.

The grains, leaves, stems, roots, and rhizomes are the plant parts used as therapeutic substances. With a ratio of 42.9 percent, the leaves are the most commonly utilized as a treatment to treat liver illness. This is due to the fact that the leaf is an important part of the plant, and most plants have several leaves. The leaves are also quite easy to find and always available, and retrieving them is less difficult than retrieving other plant parts. The leaves are usually thin, broad, and high in chlorophyll, a green chemical [6].

Boiling is the method employed in the Balane village community to manage plants used as therapeutic components. By drinking the boiled water from the stew, internal diseases such as liver disease may usually be treated [7].

3.1. Cakar Ayam (*Selaginella doederleinii* Hieron)

Selaginella doederleinii Hieron (Figure 2) is a fern that grows in the wild along river banks and on moist rocks. The components in *Selaginella doederleinii*, especially biflavanone, tetrahydro robustaflavone, and trimethyl ether, are cytotoxic elements that can attack cancer cells in humans, according to [8]. Alkaloids, saponins, phytosterols, and flavonoid glycosides are also found in the *Selaginella doederleinii* Hieron plant. Alkaloids and flavonoid glycosides, according to [9], act as hepatoprotectors [10]. One of the active compounds in the *Selaginella doederleinii* Hieron plant is flavonoid, which acts as an antioxidant in the lipid peroxidation process. Saponins have a direct influence on mending impaired liver function in their work. Similar to alkaloids, if the concentration is high and the administration duration is extended, fat buildup will promote cell expansion.



Figure 2. *Selaginella doederleinii* Hieron

3.2. Daun Sendok (*Plantago major* L)

Plantago major L (Figure 3) leaves contain a variety of active chemicals that are known to have hepatoprotective properties. The leaves have anti-inflammatory, antiproliferative, anti-apoptotic, and antioxidant properties in addition to hepatoprotective properties [11-12]. Ursolic acid, apigenin, luteolin, baicalein, aucubin, and scutellarin are some of the active chemicals found in *Plantago major* L leaves [11]. Compounds in the leaves with antioxidant properties will protect liver cells from ciprofibrate-induced oxidative stress reactions and enhance the number of antioxidants inhibited by

omeprazole, allowing the liver to repair damaged tissues. The anti-inflammatory impact of the ethanol extract of *Plantago major L* leaves can limit the inflammatory reaction created by omeprazole, while the antiproliferative effect inhibits hepatocyte cell hyperproliferation caused by ciprofibrate induction, preventing liver mass and volume gain. Similarly, ethanol extract of *Plantago major L* leaves can repair damage to hepatocyte cells, enhancing the histological image of the liver. Compound's hispidulin, baicalein, oleanic acid, and luteolin have a major role in the antioxidant effect of ethanol extract of spoon leaves, which is useful in preventing liver cell damage caused by oxidative stress reactions. Luteolin aids in the production of antioxidants such as vitamin A, vitamin C, and beta-carotene [13]. Baicalein and hispidulin have the effect of reducing glutathione depletion [14] and inhibiting iNOS gene expression and inducing metalloproteins that act like glutathione in protecting the body from toxic substances [15].

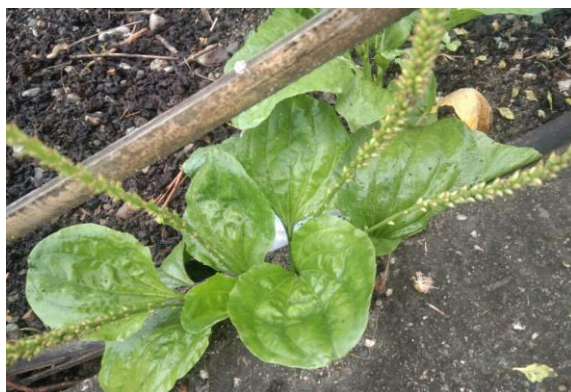


Figure 3. *Plantago major L*

3.3. Jarong (*S. indica (L.) Vahl*.)

Chemical substances including as terpenoids, flavonoids, glycosides, and tannins are found in *S. indica (L.) Vahl* (Figure 4). Almost all plants contain flavonoid chemicals, including the *S. indica (L.) Vahl* [16]. This plant can be found in abundance in Indonesia. [17] discovered that employing the leaf soxhletation method, 95 % ethanol extract had a hepatoprotective effect.



Figure 4. *Stachytarpheta indica (L.) Vahl*

3.4. Pegagan (*Centella asiatica* (L.) Urban.)

Several bioactive components in *Centella asiatica* (L.) Urban (Figure 5) plant include asiaticoside, tankunicide, isotankunicide, madecasoside, brahmoside, brahminoside, brahmic acid, madasiatic acid, meso-inositol, senteloside, carotenoids, hydrocotyledon, vellarin, tannins and mineral salts such as potassium, sodium, magnesium, calcium, and iron [18]. *Centella asiatica* (L.) Urban plant, which has asiaticoside in the form of glycosides and is frequently employed in traditional medicinal herbs or herbal medicine, also contains asiaticoside in the form of glycosides. The triterpenoid group includes asiaticoside, asiatic acid, madekasida, and madecasoside, whereas the steroid group includes sitosterol and stigmasterol, and the saponin group includes vallerin brahmoside.

Centella asiatica (L.) Urban. has a variety of active compounds, including 1) triterpenoid saponins, 2) triterpenoid genin, 3) essential oils, 4) flavonoids, 5) phytosterols, and other active components, according to [19]. Triterpenoids and saponins, which comprise 1) asiaticoside, 2) senteloside, 3) madecoside, and 4) asiatic acid, as well as volatile oils, flavonoids, tannins, phytosterols, amino acids, and carbohydrates, are the most important active constituents. The entire bioactive content of the gotu kola plant is an antioxidant that helps the human body's immune system function better.

Many factors determine the active ingredient in *Centella asiatica* (L.) Urban. The content of chemicals generated in plants is influenced by the type of soil or growing environment, according to [20]. The most important chemicals in the *Centella asiatica* (L.) Urban plant are triterpenoids. Triterpenoids have a soothing impact and help to improve brain function. This molecule can also help to rejuvenate blood arteries, allowing for better blood flow to the brain. Asiaticoside is a triterpenoid that strengthens and increases the regeneration of skin cells, stimulates blood cells and the immune system, and serves as a natural antibacterial. Brahmoside is a molecule that helps blood flow through the brain and is a vital protein for brain cells.



Figure 5. *Centella asiatica* (L.)

3.5. Sambiloto (*Andrographis paniculate* (Burm. F) Wallich)

Deoxyandrographolide, andrographolide, neodrographolide, dehydroandrographolide, and homoandrographolide are some of the active lactone compounds found in *Andrographis paniculate* (Burm. F) Wallich [21]. Flavonoids, alkanes, ketones, aldehydes, minerals, and resins are among the chemical substances found in it. Andrographolide compounds act as hepatoprotectors or liver protectors, with the mechanism of action of these compounds being able to reduce lipids, boost glutathione levels, and increase antioxidant enzyme activity [22].



Figure 6. *Andrographis paniculate* (Burm. F) Wallich

3.6. Temulawak (*Curcuma zanthorrhiza* Roxb.)

Curcuma zanthorrhiza Roxb (Figure 7) is a kind of curcuma. Curcumin, demethoxycurcumin, and bisdemethoxycurcumin are all found in Roxb. Curcumin has a component in the antioxidant process that has activity as an antioxidant that counteracts free radicals. Curcumin has a phenolic hydroxy group and a diketone group in its structure. In the first phase of the antioxidant mechanism, the phenolic hydroxy group acts as a free radical scavenger. The phenolic hydroxy group acts as an oxidant, and by a hydrogen transfer mechanism, the radical is transformed into a stable state. The reactive group on DPPH (1,1-diphenyl-picrylhydrazyl) is a nitrogen group that will pair with a hydrogen atom on the antioxidant to generate a stable DPPH radical (1,1-diphenyl-2picrylhydrazine), which will inhibit the increase in peroxidation by preventing free radicals from forming. the liver's lipids [23].



Figure 7. *Curcuma zanthorrhiza* Roxb

Alkaloids, flavonoids, glycosides, saponins, hispidulin, baicalein, oleanic acid, luteolin, triterpenoids, asiaticoside, brahmoside, andrographolide, and curcumin are some of the chemical components used in traditional medicine to treat liver illness. Alkaloids and flavonoid glycosides that function as hepatoprotectors [9] are the most important chemical compounds in the healing process of liver disease, hepatoprotectors are compounds or substances that are effective in protecting cells while repairing liver tissue damaged by toxic substances. Saponins also have a direct effect on repairing damaged liver function [24] with the mechanism of action as antioxidants to protect the liver by inhibiting the activity of cytochrome P450 inhibitors in the liver and inhibiting the increase in AST (Aspartate Transaminase) and ALT (Aspartate Transaminase/Aspartate Transaminase/Aspartate Transaminase (Alanine Transaminase) [25].

4. Conclusion

1. People in Balane Village, Kinovaro Subdistrict, Sigi Regency, Central Sulawesi, use six different plants that can be used as medications to treat liver illness, including cakar ayam (*Selaginella doederleinii* Hieron), daun sendok (*Plantago major* L.), jarong (*Stachytarpheta indica* (L.) Vahl), pegagan (*Centella asiatica* (L.) Urban.), sambiloto (*Andrographis paniculate* (Burm. F) Wallich), and temulawak (*Curcuma zanthorrhiza* Roxb.).
2. The people of Balane Village, Kinovaro Subdistrict, Sigi Regency, Central Sulawesi, use the rhizome, grain, herbs, and leaves of therapeutic plants. The leaves are the most commonly employed plant portion for the treatment of liver illness, accounting for 42.9% of all use.
3. People in Balane Village, Kinovaro Subdistrict, Sigi Regency, Central Sulawesi, grow medicinal herbs for liver sickness, which they process directly by boiling and then consume.

Acknowledgments

The authors acknowledge Balane village community who were involved in this study.

References

- [1] Ersam, T. 2004. Keunggulan Biodiversitas Hutan Tropika Indonesia Kimia VI. <http://www.its.ac.id/personal/files/pub/764-beckers-chem-Kimia%20ITS%20TE%2004.pdf>. [09 Sep 2019].
- [2] Statistik B P 2020 Badan Pusat Statistik Diambil Dari <https://www.bps.go.id>
- [3] Permana S 2016 Antropologi Perdesaan Dan Pembangunan Berkelanjutan Deepublish
- [4] Pusporoni. E. Dkk (2019). Klasifikasi Pasien Penderita Penyakit Liver dengan Pendekatan Machine Learning. INFERENSI. Institut Teknologi Sepuluh September. Surabaya. Hlm. 25-32. Vol. 2(1).
- [5] Widodo, Harto, Abdul Rohman, and Sismindari Sismindari. "Pemanfaatan Tumbuhan Famili Fabaceae Untuk Pengobatan Penyakit Liver Oleh Pengobat Tradisional Berbagai Etnis Di Indonesia." Media Penelitian Dan Pengembangan Kesehatan 29, no. 1 (2019): 65-88. doi:10.22435/mpk.v29i1.538.
- [6] Tjitrosoepomo, G. 2001. Morfologi Tumbuhan, Cetakan 13, Gadjah Mada University Press, Yogyakarta
- [7] Amrul, I. (2015). Pemanfaatan Tumbuhan Obat Pada Masyarakat Ternate, Maluku Utara, Fakultas Kehutanan, Institut Pertanian Bogor, Bogor.
- [8] Lee. N.Y. 2008. Identification of a new cytotoxic biflavanone from *Selaginella doederleinii*. Chem Pharm Bull: 56(9): 1360-61.
- [9] Prastiwi. R. 2011. Efek Hepatoprotektor Brotowali (*Tinospora Cordifolia* Miers) Terhadap Virus Hepatitis B [Skripsi]. UGM: Yogyakarta
- [10] Achmadi S.S., Iskandriati D., Amzu, A.A., Batubara, I. (2003). Kajian Aktivitas Hepatoprotektor Saponin Dan Segi Budaya Akar Kuning (*Arcangelisia Floava* (L) Merr) [Skripsi]. UGM: Yogyakarta.

- [11] Ozbek, H., Erten, R., Oner, A., Cengiz, N., Yilmaz, O., & Turel, I. (2009). Hepatoprotective and anti-inflammatory activities of *Plantago major* L. *Indian Journal of Pharmacology*, 41(3), 120. doi:10.4103/0253-7613.55211.
- [12] Mao-ye, W., An, Li-guo. 2011. Effects of *Plantago Major* L. Sedds Extract On Endurance Exercise Capacity In Mice. *J Medical Plants Res.*, 5(9):1659-63.
- [13] Seelinger, G., Merfort, I., & Schempp, C. (2008). Anti-Oxidant, Anti-Inflammatory and Anti-Allergic Activities of Luteolin. *Planta Medica*, 74(14), 1667-1677. doi:10.1055/s-0028-1088314
- [14] Lu, J., Wu, D., Zheng, Y., Hu, B., Zhang, Z., Ye, Q., Wang, Y. (2010). Ursolic Acid Attenuates D-Galactose-Induced Inflammatory Response in Mouse Prefrontal Cortex through Inhibiting AGEs/RAGE/NF- κ B Pathway Activation. *Cerebral Cortex*, 20(11), 2540-2548. doi:10.1093/cercor/bhq002
- [15] Chang, W., Chen, C., & Lu, F. (2002). Different Effects of Baicalein, Baicalin and Wogonin on Mitochondrial Function, Glutathione Content and Cell Cycle Progression in Human Hepatoma Cell Lines. *Planta Medica*, 68(2), 128-132. doi:10.1055/s-2002-20246.
- [16] Chowdhury, R., Rashid, M., Khan, O., & Hasan, C. (2003). Ipolamiide and α -spinasterol from *Stachytarpheta urticaefolia*. *Biochemical Systematics and Ecology*, 31(10), 1209-1211. doi:10.1016/s0305-1978(03)00073-5
- [17] Gayatri., Remesh., Sumalatha., Venkates, W., Vidyadhara. (2011). Hepatoprotective Activity Of Ethanolic Extract Of *Stachytarpheta Indica* On Wistar Rats. *Pharmacy Globale*.(2), 26.
- [18] Dalimartha, S., 2006. Atlas Tumbuhan Obat Indonesia. Trubus Agriwidya, Jakarta.
- [19] Winarto, W.R. dan M. Surbakti. 2003. Khasiat dan Manfaat Pegagan. Agromedia Pustaka, Jakarta.
- [20] Bermawie, N., S. Purwiyanti, dan Mardiana. (2008). *Keragaan sifat morfologi, hasil, dan mutu plasma nutfah pegagan (Centella asiatica (L.) Urban)*. Bul. Penel. Tan. Rempah dan Obat XIX (1): 118.
- [21] Prapanja EP, Adi ML. (2003). Khasiat Dan Manfaat Sambiloto Raja Pahit Penakluk Aneka Penyakit, Agromedia, Jakarta.
- [22] Sagita, A. (2006). Pengaruh Ekstrak *Andrographis Paniculate* (sambiloto) Terhadap Kadar Serum Oksaloasetat Transaminase Pada Tikus Wistar Yang Diberi Paracetamol. Universitas Diponegoro, Semarang.
- [23] Rosiyani, L. (2010). Evaluasi Perubahan Metabolit Pada Temulawak Dengan Waktu Tanam Berbeda.. Institut Pertanian Bogor. Bogor.
- [24] Achmadi S.S., Iskandriati D., Amzu, A.A., Batubara, I. (2003). Kajian Aktivitas Hepatoprotektor Saponin Dan Segi Budaya Akar Kuning (*Arcangelisia Floava* (L) Merr) [Skripsi]. UGM: Yogyakarta.
- [25] Suminar, B., Iramanida, L., Yulin. 2006. Promoting Selected Non-Timber Forest Products Based On Community Participation Approach To Support Sustainable Forest Management In East Kalimantan, Biopharmaca Research Center, Institut Pertanian Bogor. Bogor