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Ethnopharmacological study of traditional plants with medicinal properties of kapehe pai (gout) in the Dayak Bakumpai tribe

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ABSTRACT

Introduction: Traditional medicine by the community has long been used for medicine and health maintenance and has been inherited from generation to generation. Indonesia is very rich in beneficial plants. This study aims to discover the types of plants and plant parts and how they are processed for kapehe pie.

Research Methodology: The method used in this study is descriptive and exploratory with a qualitative approach. Data was collected by asking questions with the help of interview guidelines. The informants of this research are tatamba craftsmen and the Dayak Tribe of Sampirang II Village. The number of respondents was 35, consisting of farmers and homemakers.

Result: There are five types of plants used for the treatment of kapehe pai (gout), namely bay leaf (syzgium polyanthum), lemongrass (Cymbopogon citratus), ginger (zingiber officinale), kersen (Muntingia calabura), and garlic (Allium sativum). The most widely used plant is bay leaf allergy (syzgium polyanthum). Leaves are the most frequently used plant organs, which is 57.14% of the total, followed by rhizomes (22.85%), stems (11.42%), and seeds (8.57%). The medicinal plants are processed in two ways, namely by boiling and grinding/pounding, with a percentage value of 91.42% for the boiling technique and 8.57% for the kneaded method. 91% of the therapeutic plants are sourced from the gardens around the house, and the remaining 9% come from market purchases

Conclusion: Traditional medicine passed down from generation to generation treats kapehe pai (gout). The most widely used part of the plant is the leaf (57.14%), followed by rhizomes, stems, and seeds. Most medicinal plants are obtained from the gardens around the house (91%), while the rest are purchased from the market. This shows the wealth of local knowledge and the utilization of natural resources in traditional medicine.

Keywords: ethnopharmacology, kapehe pai (Gout), traditional medicine.

INTRODUCTION

Indonesia is a country with many ethnicities, religions, and languages. Indonesia is home to around 1,300 ethnic groups, each with unique local wisdom often passed down from generation to generation. One of the local wisdom inherited is in the field of medicine; Knowledge of the medication of each tribe can help generate new treatments. In addition to ethnic differences and hereditary heritage that provide opportunities for drug development, Indonesia is also one of the countries with the most plant diversity. Indonesia is believed to have between 25,000 to 30,000 species of plants and more than 50 habitats. The diversity of plants in Indonesia is due to tropical forests, which are among the largest in the world, along with Brazil and Zaire. Gout, a type of inflammatory arthritis caused by elevated uric acid levels in the blood, often leads to severe joint pain and swelling, significantly impairing quality of life (Zhong *et al.*, 2023). Traditional communities have long relied on local flora for managing gout symptoms, utilizing plants with anti-inflammatory, diuretic, and uric acid-reducing properties (D. Liu *et al.*, 2023). The rich biodiversity and deep-rooted traditional knowledge in many regions make it imperative to explore these practices scientifically to validate their safety and efficacy (Guo *et al.*, 2024).

The Dayak Bakumpai tribe is an indigenous tribe that inhabits the Central Kalimantan region. One of the areas occupied by the Dayak Bakumpai tribe is Sampirang II Village, located in East Teweh District, Central Kalimantan. One of the traditions of the Dayak Bakumpai tribe is the use of plants in traditional medicine used to cure diseases. Local knowledge about the use of plants in healing in Sampirang II Village is still not recorded. This customary information is often passed down orally from generation to generation.

As time goes by, the new generation's interest in preserving local knowledge is decreasing, and the information will eventually become extinct. Based on a preliminary study conducted in Sampirang II Village, East Teweh District, the Dayak community recognizes the disease of kapehe pai with symptoms such as discomfort in the legs, painful joints, redness in the joints, and knee pain. The description of the symptoms is like gout in general. Kapehe Pai's disease (Gout) is a disorder that can cause severe pain, swelling, and burning in the joint area. Gout, often known as gout arthritis, is characterized by the formation of monosodium urate crystals in the body. Purines, one of the components of nucleic acids found in the body's cell nucleus, produce uric acid as its final metabolic product (Abdulhafiz *et al.*, 2023). Increased uric acid levels can cause problems in the human body, such as discomfort in the joints, often accompanied by significant pain for the sufferer (Elnour and Abdurahman, 2024). Gout is a substance resulting from purine metabolism in the body (Matosinhos *et al.*, 2022). Under normal circumstances, the kidneys usually eliminate these uric acid compounds through the urine. Gout is a disease caused by improper metabolism of purines (hyperuricemia). Using natural plants is one way to lower uric acid levels (Cai *et al.*, 2024).

Ethno refers to grouping tribes and societies, while ethnopharmacology is a natural treatment that interacts with the body. Kapehe Pai disease, often called gout, is now increasing in Indonesia. According to Riskesdas 2018, the prevalence of Kapehe Pai disease or (Gout) based on the diagnosis of health workers in Indonesia is 11.9%, and based on symptoms, it is 24.7%. When viewed from the characteristics of age, the highest prevalence occurred at the age of >75 years (54.8%). Central Kalimantan has a frequency of gout disease of 7.61%, which includes acute and chronic cases. Based on data obtained from Sampirang II Village Health Workers from 2018 to 2022, Kapehe Pai (Gout) disease assessed and measured by health workers in Sampirang II Village is mainly known to the local community. Based on this description, the author is interested in learning about the types of medicinal plants, the parts of the plants used, and how to prepare them for Kapehe Pai (Gout) medicine in Sampirang II Village, East Teweh District, Central Kalimantan. The results of this research are expected to provide knowledge and information about the use of medicinal plants for community welfare and lead to the development of medicinal plants that were previously unknown. Traditional medicine by the community has

long been used for medicine and health maintenance and has been inherited from generation to generation. Indonesia is very rich in beneficial plants. This study aims to determine the types of plant parts and how they are processed for treating kapehe pai (gout) according to the Dayak Bakumpai Tribe of Sampirang II Village. The Dayak ethnicity, the majority and dominant in Central Kalimantan Province knows how to use medicinal plants.

RESEARCH METHODOLOGY

This study uses an exploratory, descriptive research method with a qualitative approach. This research was conducted in Sampirang II Village, East Teweh District, Central Kalimantan, in March-April 2024. The population used in this study is people in Sampirang II Village, East Teweh District, Central Kalimantan. The sample in this study is people who experience Kapehe Pai disease in Sampirang II Village and use medicinal plants to overcome Kapehe Pai disease. In addition to people who experience kapehe pii disease, researchers also take Shamans or Tetamba Builders as samples and have extensive knowledge in using traditional plants to treat kapehe pii. This sample can provide the data necessary for the research.

The instruments of this research are the researchers themselves with the help of tools: interview guidelines, recordings, and researcher notes. The data collection consists of a preliminary study, observation stage, plant documentation, and plant identification. The main criteria for qualitative research results are validity, realism, and objective of the data. For this purpose, data validity tests are carried out, including credibility (Internal Validity), transferability (External validity), dependability (reliability), and confirmability (objectivity). In this study, the author conducted a data validity test, namely a credibility test or internal validation with the triagandization method. Data triplicity is checking data from various sources in various ways and at multiple times. Triangulation is a technique to check data validity by comparing the results of interviews with research objects.

Research data processing techniques are carried out through data processing and analysis. In research, this is an important activity that requires researchers to show precision and critical thinking. Sequential steps involved in the process and analysis of data during fieldwork, along with data collection by processing transcripts, data reduction, data analysis, and conclusions. This research has received information from the ethics commission: 063/UMB/KE/II/2024.

RESULT

People often feel pain in the foot area, such as cramps in the joints of the feet, pain in the knees to heels of the feet, tingling and swelling in the toe area, which they often refer to as Kapehe pie, and in medicine it is called gout.

Table 1 Description of Kapehe Pie (Gout)

No.	Symptom	Frequency	Percentage	Lit.
1.	Foot pain, cramps in the toes, tingling, pain in the joints of the feet	17	48,57%	Gout symptoms are often characterized by aches, pains, and tingling in the joints.
2.	Painful joints, leg pain, swollen fingers	11	31,42%	describes the symptoms of gout in the form of acute joint pain, difficulty walking, swelling, burning sensation, and reddish skin color of the joints.
3.	Knee pain, sore joints, finger cramps, pain in heels	7	20%	Attacks on the joints characterize gout symptoms but can also occur in other places such as the ankles, instep, knees, and heels.

Based on the Table. 1. The symptoms of kapehe pai (gout) often felt by the community are painful feet, cramping in the toes, tingling, and pain in the joints of the feet, with a percentage of 48.57%.

From the interview data, there are five plant names for kapehe pai: Salam Leaf, Lemongrass, Ginger, Kersen Leaf, and Garlic. Of the 35 respondents, 16 chose the Salam plant, which is one example of an interview with the respondents.

"Hituh Tumbuhan ji hanggap ku will natamba kapehe pai nh dawen salam te (here the plant I use to treat gout is bay leaves)."

Of the 35 respondents, 8 chose ginger as a medicine, and there was an example of an interview with the respondents.

"Ji katawangku kia makaku marandam maluntuh lai will manatamba e (what I know is boiling ginger as a treatment for gout)."

Of the 35 respondents, 4 chose lemongrass as a medicine, and there was one example of an interview with the respondent.

"hituh yaku Mix your greetings with sarai will manatamba e ite nah only yaku maluntuh e (here I mix greetings and lemongrass to boil)."

Of the 35 respondents, 4 chose the kersen plant as a medicine, and there was one example of an interview with the respondent.

"I think that the plant will help me to heal my wounds and make me sick (the plant that I often use to treat it is the cherry leaf)."

Of the 35 respondents, three people chose garlic plants. One example of an interview with a respondent is.

"If the garlic is crushed, it will be crushed and then crushed (I just use crushed or pounded garlic to reduce the discomfort felt)."

Based on the results of research that has been conducted from 35 respondents, 16 people chose the Salam plant, eight people chose the Ginger plant, four people chose the lemongrass plant, four people chose the Kersen plant, and three people chose the Garlic plant. Five plant names are often used when kapehe pie occurs, and then it is treated with the plant.

DISCUSSION

The researcher's findings were that 16 people chose bay plants, eight chose ginger plants, 4 chose lemongrass plants, 4 chose kersen plants, and 3 chose garlic plants. Five plant names are often used when kapehe pie occurs; then, it is treated with the plant. The people of Sampirang II Village are very familiar with the traditional medicine of kapehe pai (gout), which uses natural plants that are planted or grow wild in the plantations of their yards. Therefore, the Dayak tribe maintains their belief in traditional medicine practices. The different plant species used in conventional medicine show different applications and methods of preparation. Symptoms experienced by the community include pain in the feet, cramping in the joints of the feet, pain in the knees of the feet, and swelling in the toe area. They are often referred to as Kapehe pie, and it is called Gout in medicine (Daroueche *et al.*, 2024).

Gout is a condition characterized by discomfort in the joints, swelling, and a feeling of heat in the joints. Gout is an inflammatory condition of the joints caused by the buildup of uric acid crystals (Leonti *et al.*, 2024). The disease usually affects many joints, including the toes, wrists, knees, and big toes. These medicinal plants include Salam, Ginger, Lemongrass, Kersen, and Garlic. The plant that is most used by the community is the Bay Leaf (Tu *et al.*, 2023). Salam (Syzygium Polyanthum) is a lush-headed plant with a rounded stem and single leaf, facing down and long-stemmed. The bay plant can be used as a traditional medicinal herb, and this compound has a pharmacological effect (Chaudhary *et al.*, 2024). This natural plant is native to Indonesia, and its leaves are widely used in various preparations and traditional medicines. This plant can be a blood thinner, gout, pain reliever, and antibacterial. Several studies show that bay leaves contain

secondary metabolites such as flavonoid compounds, saponins, alkaloids, essential oils, and tannins (Fatima *et al.*, 2023).

Consuming bay leaf boiled water lowered uric acid levels from 8,317 mg/dl to 6,825 mg/dl. The average uric acid level before the administration of bay leaf decoction water for gout arthritis patients was 7.16 mg/dl, and after the administration of bay leaf decoction water for patients with gout arthritis was 5.76 mg/dl, a difference of 1.4 mg/dL. The decrease in the level of uric acid is influenced by the secondary metabolites of flavonoids in bay leaves, which have antioxidant properties that can inhibit the formation of the enzyme xanthine oxidase, which is an enzyme that forms uric acid so that the formation of uric acid can be inhibited (Wu *et al.*, 2024). Bay leaves also have a diuretic effect, so they can increase urine production, which lowers uric acid levels. In addition to treating gout, bay leaf decoction is also efficacious in treating hypercholesterolemia. Consume bay leaves by boiling and drinking, then drinking water twice daily (Tan *et al.*, 2024). Taking bay leaf extract twice daily for 7 days lowered the average uric acid level from 8.317 mg/dL to 1.491 mg/dL. It turns out that bay leaves can treat gout. Gout patients who were given bay leaf decoction (Syzygium polyantum) reported decreased uric acid levels. Before being given bay leaf boiled water, 15 participants had an average blood uric acid level of 8.8 mg/dL (Li *et al.*, 2024).

Meanwhile, after being given bay leaf boiled water, the average blood uric acid level dropped to 7.5 mg/dl. Regarding the role of bay leaf boiled water (Syzygium polyantum) in lowering uric acid levels, uric acid levels ranged from 6 to 11.2 mg/dL (Taibi *et al.*, 2024). Many still have high uric acid levels because they regularly consume purine-rich foods. In this case, there may be increased uric acid production, impaired kidney function resulting in decreased uric acid excretion, or a combination of both. Normal uric acid levels in the blood range from 2 to 6.5 mg/dl for adult women and 2 to 7.5 mg/dl for adult men. Meanwhile, the older women aged 2-8 mg/dl and older males aged 2-5.8 mg/dl. After getting a decoction of bay leaves (Syzygium polyanthus), gout patients' average uric acid level was 4.9 mg/dl (Saeed *et al.*, 2024).

Patients with gout experienced a decrease in blood uric acid levels after being given 200 ml of bay leaf boiled water, drunk 2 times a day in the morning and evening for 4 days of administration. This decrease in blood uric acid levels occurred because respondents routinely and obediently drank bay leaf boiled water twice daily in the morning and evening for 4 days (Yu *et al.*, 2023). This is also due to beneficial chemical compounds in bay leaves, such as essential substances, tannins, and flavonoids that function as diuretics, reduce pain, and lower uric acid levels. Ten bay leaves boiled with 600 ml of water until 200 ml are left can reduce uric acid levels. The presentation of 100ml of bay leaf decoction made by boiling 5-7 bay leaves with 1000 ml of water to become 100 ml and given to respondents twice a day for 7 days was proven to reduce uric acid levels in gout patients. Consuming bay leaf decoction regularly and by the recommended dosage of 200 ml or drinking one glass of decoction water once a day can reduce uric acid levels in people with gout(Murwani *et al.*, 2022) .

Processing using the boiling process aims to obtain polar active substances that can be extracted optimally. The active substances in question include polyphenols and flavonoids that act as antioxidants so that extraction can be done with hot water or boiling (P. Liu *et al.*, 2023). The most common way to process medicinal plants is by boiling. For external treatment, people choose the method of pounding (applying it to the diseased part). For internal treatment, the people of Sampirang II use a boiling technique and then drink the water. The community uses medicinal plants; they are only sourced from the experiences and information of previous parents. The exact dosage is also unknown, but the most important thing is to process the plant so that it can be used for treatment. Healing can be achieved in three ways (Wang *et al.*, 2024).

First, the soul that causes the disease may withdraw the poison released when apologizing, but this is only done if the cause of the patient's actions is known. Second, natural energy can neutralize these disturbances (Bo, Zhang and Dan, 2024). Certain medicinal plants (plunger) are

believed to have energy that can neutralize disorders. The recovery process of a disease can varies between ethnic groups, culminating in different medical systems. Indonesia, an archipelagic country of over a thousand ethnicities, requires extensive ethnomedical research. An essential aspect of the study is the etiology of the disease, which plays a vital role in understanding the concepts of prevention, therapy, and treatment developed by the ethnic group. An adequate understanding of the etiology of diseases will facilitate the formulation of a potent and superior traditional medicine system and provide practical benefits to help local community health efforts (Xie *et al.*, 2023). In the Dayak Bakumpai tribe, the traditional medicine is made by drinking, applying, or pasting. The medicine is drunk by soaking it in a cup of water or boiling it with cold water until it boils and then drinking the water. Some leaves are ground and then pasted. The boiling technique by the Sampirang II Village Community is used as a sensor water, which is healing through the inside by drinking. As for the technique, it is plucked by the people of Sampirang II Village, using a cook; some leaves are taken and then pounded/plucked and pasted to the desired area.

CONCLUSION

Using traditional medicine passed down from generation to generation to treat kapehe pai (gout). The most widely used part of the plant is the leaf (57.14%), followed by rhizomes, stems, and seeds. Most medicinal plants are obtained from the gardens around the house (91%), while the rest are purchased from the market. This shows the wealth of local knowledge and the utilization of natural resources in traditional medicine. Leaves are the most used part of the plant, and the boiling technique is the most used processing method. Most conventional medicinal ingredients are obtained from the gardens around the house, demonstrating the sustainability of using local plants in traditional medicine. Documenting and promoting these practices can preserve traditional knowledge while supporting broader applications in natural medicine and sustainable healthcare solutions. Further research is recommended to validate the therapeutic efficacy of these plants scientifically.

Conflict of Interest

The authors declare that they have no competing interests.

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