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Original Article

Application of Ethnopharmacology in Medicine, Laonti Subdistrict, South Konawe District, Southeast Sulawesi Province

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Abstract

Hypertension is one of the diseases that frequently affects the people of Laonti Subdistrict. Locals widely employ herbal medicine as part of their community culture to address health problems. The aim of this research is to identify the types of plants used as traditional medicine for hypertension, determine the parts of the plants used, and understand how these medicinal plants are processed and utilized for treating hypertension. This study is descriptive in nature, using qualitative data analysis with purposive sampling techniques. Data on medicinal plants was collected through direct questionnaire interviews with 79 respondents. The information obtained includes the names of medicinal plants, the parts of the plants used, and the methods of preparation and use. According to the research, 17 different types of plants were found in the Laonti Subdistrict*. Annona muricata, Allium sativum, and Morinda citrifolia* were the most popular. The most commonly used parts of these plants are the leaves, followed by the fruit and roots. The majority of people use plants in their fresh form. Consumption patterns include occasional use, as well as daily doses of once, twice, or three times per day. All respondents agreed that herbal medicines were more affordable than chemical drugs. Also, 98.9% of those who answered thought that herbal medicines worked about the same way chemical medicines did. About 40.5% saw herbal medicine as an alternative to chemical drugs, and 16.5% thought it was safe to use herbal medicines.

Keywords*: Coastal Communities; Ethnopharmacology, Herbal Medicine, Hypertension*

Introduction

Hypertension is one of the major health problems faced by many countries around the world, including coastal communities with limited access to modern health facilities. According to the World Health Organization (WHO) in 2023, approximately 1.28 billion people worldwide suffer from hypertension, meaning 1 in every 5 people globally is diagnosed with the condition. The number of people with high blood pressure keeps going up every year. By 2025, there will be about 1.5 billion people with hypertension, and complications from it are thought to cause 10.44 million deaths each year (Wajngarten & Silva, 2019). High blood pressure raises the risk of heart disease and other metabolic problems. This puts a lot of stress on the health systems of many countries, including Indonesia.

According to the 2018 Basic Health Research, the prevalence of hypertension in Indonesia shows an increase from 25.8% to 34.1% (Nurjanah, Sriagustini & Hidayani, 2023). The increase highlights the importance of hypertension management and awareness, not only in urban areas but also in coastal regions. Coastal areas often have problems that aren't found in other places, like limited access to health care facilities, different eating habits, and different social and economic situations. Changing your lifestyle, losing weight, and checking your blood pressure at home are all new ways to treat high blood

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pressure (Valenzuela *et al.,* 2021). Even though antihypertensive drugs don't always cause other health problems, using them for a long time can, especially in older people (Cho *et al.,* 2021). Instead of prescription drugs, herbal medicines are becoming more popular as a possible way to treat high blood pressure. People in Laonti Subdistrict traditionally treat high blood pressure with herbal plants. They do this by boiling parts of the plant and drinking the water that comes from it every day.

Coastal communities have developed their own unique ethnopharmacological practices over time because of where they live and the natural resources they have access to. These practices are often rooted in centuries-old knowledge passed down through generations and rely on various local flora and fauna, reflecting the community's adaptation to their environment (Ahmad *et al.*, 2021). The study of how traditional societies use natural substances to treat different illnesses, such as high blood pressure, is called ethnopharmacology (Alves & Rosa, 2007). High blood pressure, or hypertension, is a serious heart disease that can cause a lot of health problems around the world, like stroke, heart disease, and kidney failure (Wajngarten & Silva, 2019). Hypertension is becoming more common in developing countries, which is made worse by lifestyle choices and limited access to health care.

People who live near the coast know a lot about how to treat high blood pressure with herbal medicines made from local plants. Generations have passed down various traditional medicine preparations as part of this knowledge. In these places, plants are turned into medicinal herbs that people regularly eat to lower their blood pressure and make their bodies stronger against getting sick. This method shows how important local knowledge is for managing health and using natural resources. This knowledge could also help in the creation of new drugs (Abdelmola *et al.,* 2021).
This research is important for several reasons. Firstly, these communities often possess unique knowledge about the use of plants and natural materials for treatment, which has not received widespread documentation. Second, using traditional knowledge in modern health care can help protect biodiversity and cultural knowledge while giving coastal communities better access to treatments that work and don't cost a lot of money.
Therefore, the goal of this study is to investigate and record the ethno-pharmacological knowledge that coastal communities possess regarding the treatment of hypertension. We expect the findings of this study to offer fresh perspectives on innovative and sustainable hypertension treatment strategies that blend traditional knowledge with modern science.

Material and Method

Study Design

The goal of this research was to understand the traditional medicinal practices of coastal communities in Laonti Subdistrict, Southeast Sulawesi, Indonesia, using a qualitative ethnographic design. The method used was ethnography because it lets us look deeply into community-based knowledge systems, especially those that have to do with local ways of healing and how people in that culture think about treating high blood pressure.

Study Duration and Setting

The fieldwork took place in the coastal villages of Laonti Subdistrict for eight months, from March to October 2023. We selected the region for its rich biodiversity and its known reliance on traditional healing practices for managing non-communicable diseases like hypertension.

Participants and Sampling

Participants included residents aged 25 years and above, officially diagnosed with hypertension by the local health center. A total population of 363 hypertensive individuals was identified. A sample size of 79 people was chosen using the Slovin formula (Nurlila & La Fua, 2023) for purposeful sampling. To be included, participants had to live in the subdistrict permanently, have experience with traditional medicine, and be willing to give answers based on their knowledge.

Data Collection Techniques

Primary data were gathered through structured questionnaires distributed to hypertensive individuals, specifically those aged 35 years and older from West Coast Village. The questionnaires were mostly about the kinds of medicinal plants used, the parts used, how they were prepared, how often they were used, and how effective and safe people thought they were.

Key informants, such as traditional healers (shamans), community elders, and other indigenous residents who knew a lot about herbal practices in the area, were also interviewed in depth. These interviews aimed to supplement the structured data with rich qualitative insights.

Secondary Data Sources

Secondary data were obtained from the Laonti Subdistrict Community Health Center to validate and support the findings. The information included records of hypertension cases, community health profiles, and previously reported use of herbal treatments.

Observational participation, interviews, questionnaires, and institutional health records were all used together to make sure that the data was collected from three different sources. This made the research results more reliable and culturally relevant.

Results

This study involved 79 respondents from the coastal communities of Laonti Subdistrict, with 72.8% being female and 27.8% male. Most participants (40.5%) were aged between 36 and 45 years. Educational attainment varied, with 55.7% having completed elementary school.

Table 1 presents the detailed preferences for the 17 medicinal plants used by coastal communities for hypertension treatment. It includes plant names, the percentage of users for each, and reflects the strong preference for plants such as *Annona muricata*, *Allium sativum*, and *Morinda citrifolia*.

Table 1: Preferences for Using Plants to Treat Hypertension in Coastal Communities in Laonti Subdistrict, Indonesia

No	Types of Plants	Respondents		Plant parts used					Dosage Forms	
		User	%	Rhizome	Root	Leaf	Fruit	Tuber	Fresh	Dry
1	Annona muricata	74	24.3 %	-	-	√	-	-	√	√
2	Averrhoa bilimbi	6	2.0 %	-	-	√	-	-	√	-
3	Morinda citrifolia	50	16.4 %	-	-	-	√	-	√	-
4	Syzygium polyanthum	2	0.7 %	-	-	√	-	-	√	-
5	Persea americana	20	6.6 %	-	-	√	-	-	√	-
6	Tinospora cordifolia	43	14.1 %	-	√	√	-	-	√	√
7	Artocarpus altilis	6	2.0 %	-	-	√	-	-	√	-
8	Allium sativum	51	16.7 %	-	-	-	-	√	√	-
9	Carica papaya	7	2.3 %	-	-	√	√	-	√	-
10	Artocarpus heterophyllus	6	2.0 %	-	-	√	-	-	√	-
11	Orthosiphon aristatus	5	1.6 %	-	-	√	-	-	√	√
12	Andrographis paniculata	2	0.7 %	-	-	√	-	-	√	√
13	Cucumis sativus L.	14	4.6 %	-	-	-	√	-	√	-
14	Muntingia calabura	12	3.9 %	-	-	√	-	-	√	-
15	Phyllanthus urinaria	5	1.7 %	-	-	√	-	-	√	-
16	Zingiber officinale	1	0.3 %	√	-	-	-	-	√	-
17	Peperomia pellucida	1	0.3 %	-	-	√	-	-	√	-
	Total			1	1	13	3	1	17	3

Table 2 illustrates the various methods of processing medicinal plants and their frequency of consumption. Boiling was predominant, and plants were consumed either occasionally or up to three times per day, reflecting individualized usage patterns based on belief in efficacy and availability.

Table 2: Processing Method and Frequency of Consumption of Medicinal Plants in Treating Hypertension in Coastal Communities

No	Types of Plants	Method of Processing			Consumption Frequency/Day			
		Drink directly	Boiled	Brewed	1-times	2-times	3- times	Sometimes
1	Annona muricata	-	√	-	√	√	-	√
2	Averrhoa bilimbi	-	√	-	√	√	-	√
3	Morinda citrifolia	√	√	√	√	√	-	√
4	Syzygium polyanthum	-	√	-	-	√	-	-
5	Persea americana	-	√	-	√	√	√	√
6	Tinospora cordifolia	-	√	-	√	√	-	√
7	Artocarpus altilis	-	√	-	√	√	-	√
8	Allium sativum	√	√	√	√	√	√	√
9	Carica papaya	-	√	-	√	√	-	√
10	Artocarpus heterophyllus	-	√	-	√	√	-	-
11	Orthosiphon aristatus	-	√	-	√	√	-	√
12	Andrographis paniculata	-	√	-	-	√	-	-
13	Cucumis sativus L.	√	-	-	-	√	√	√
14	Muntingia calabura	-	√	-	√	√	-	-
15	Phyllanthus urinaria	-	√	-	√	√	-	-
16	Zingiber officinale	-	√	-	√	-	-	-
17	Peperomia pellucida	-	√	-	√	-	-	-
	Total	3	16	2	14	15	3	10

Table 3 outlines the respondents' reasons for using herbal medicines. Cost-effectiveness, ease of availability, and simplicity of preparation were universally agreed upon, while concerns remained about safety and side effects.

Table 3: Reasons for Coastal Communities to Use Herbal Medicine for Hypertension Treatment

No	Statements	Answer Choices	
		Agree	No Agree
1	Herbal medicines generally have a lower price compared to chemical medicines.	100 %	-
2	Herbal remedies can be easily obtained or even grown at home.	100 %	-
3	Herbal remedies can be easily prepared or compounded for use.	100 %	-
4	The efficacy of herbal medicines is considered equivalent to the effects provided by chemical drugs.	98.9 %	1,1 %
5	Herbal medicines contain a variety of active compounds that have health benefits.	83.5 %	16,5 %
6	Compared to chemical drugs, herbal medicines are considered to have no adverse side effects.	2.5 %	97,5 %
7	Herbal medicine can be an alternative option after treatment with chemical drugs has been unsuccessful.	40.5 %	59,5 %
8	Herbal medicines are considered safe to consume at any time.	16.5 %	83,5 %

These findings highlight a strong cultural reliance on herbal remedies for hypertension treatment in Laonti's coastal communities. The regular use of specific plant species, preferred preparation methods, and specific consumption patterns reflect an innate traditional knowledge system that is both adaptive and informed.

Discussion

Local Knowledge and Plant Preferences

The study reveals the central role of traditional knowledge in hypertension management among Laonti's coastal community. Residents depend on herbal remedies like *Annona muricata*, *Allium sativum*, and *Morinda citrifolia*, supported by both empirical use and pharmacological evidence (Alatas *et al.*, 2020; Sari, 2015). The preference for these plants reflects not only their availability but also the community's

inherited trust in their effectiveness. These findings emphasize the significance of ethnopharmacology as both a cultural practice and a public health resource.

Preparation Methods and Dosage Practices

As shown in Table 1, 17 medicinal plant species were traditionally used by coastal communities to manage hypertension. The most frequently cited plants were *Annona muricata* (soursop), *Allium sativum* (garlic), and *Morinda citrifolia* (noni), used by 100%, 68.91%, and 67.56% of respondents, respectively. Leaves were the most commonly utilized plant part, followed by fruits and roots, with a strong preference for using the plants in fresh form (Kamyab *et al.*, 2020; Mbuni *et al.*, 2020).

Soursop (*Annona muricata*), used by all respondents, stands out as a key treatment, likely due to its perceived effectiveness and availability in coastal regions. Its medicinal reputation is supported by studies highlighting its antioxidant content and bioactive compounds with antihypertensive potential (Alatas *et al.*, 2020; Balderrama-Carmona *et al*., 2020). Similarly, garlic and noni were widely used, with research affirming their therapeutic roles, including antibacterial properties and traditional applications in disease management (Mbuni *et al.*, 2020; Bussmann & Sharon, 2006; Sari, 2015).

Further ethnopharmacological insights revealed that 24.5% of respondents used Annona muricata leaves, favored for their accessibility and generational use. These leaves contain flavonoids with proven antihypertensive properties (Jannah, 2010). In comparison, 2.0% of respondents used Averrhoa bilimbi, supported by findings from Kumar *et al.* (2013).

About 16.4% of participants reported using *Morinda citrifolia,* which contains scopoletin, a compound known for its vasodilatory effects that help reduce blood pressure (Sari, 2015). *Syzygium polyanthum* leaves, used by 7% of respondents, were found to reduce vascular resistance and inhibit the angiotensin-converting enzyme (Tika, 2021). Persea americana leaves, chosen by 6.6%, contain alkaloids with diuretic properties beneficial for managing blood pressure (Naomiyah, Sustrami & Kirana, 2019).

Around 14.1% used *Tinospora cordifolia*, known to combat atherosclerosis by lowering lipid levels and providing antioxidant support for cardiovascular health. Artocarpus altilis, used by 2.0%, contains quercetin and potassium, which aid in managing hypertension and related conditions (Koswara, 2006).

Garlic (Allium sativum), used by 16.7%, contains allicin, ajoene, and sulfur-rich volatile oils that enhance blood circulation and thin the blood, thereby regulating blood pressure (Kuswardhani, 2016). Likewise, 2.3% used Carica papaya leaves, rich in flavonoids, alkaloids, and minerals like potassium, which help lower blood pressure (Subenthiran *et al.*, 2013).

Artocarpus heterophyllus leaves were used by 2% of respondents. Their flavonoid and saponin content contribute to blood pressure reduction by acting as diuretics and reducing cardiac output (Moke *et al.*, 2017). *Orthosiphon aristatus* (cat's whiskers) was used by 1.6% for its diuretic properties and 3% used *Curcuma longa* (turmeric), which contains curcumin, known to prevent vascular plaque buildup and stabilize blood pressure (Muti, 2017).

An infusion of *Vernonia amygdalina* (bitter leaf), used by 1.1%, is another low-cost option with no reported side effects (Sari, 2015). Additionally, 4.3% relied on Cucumis sativus (cucumber), which contains potassium and other minerals essential for blood pressure control. Meanwhile, 1.7% used cherry leaves, known for anti-inflammatory and antioxidant properties, and another 1.7% used *Phyllanthus urinaria* (meniran), traditionally employed in managing hypertension and kidney disorders (Angelina *et al.*, 2015).

Boiling was the most common preparation method, used for 16 of the 17 plants, followed by juicing and brewing (Judith *et al.*, 2016; Rodino & Butu, 2019). In terms of dosage, 14 plant species were taken once daily, 15 were consumed twice a day, three were used three times daily, and ten were taken occasionally (Alfaqih & Kurniati, 2021).

The predominance of leaves and the preference for boiling reflect broader ethnomedicinal patterns worldwide (Abubakar & Haque, 2020). Boiling is an accessible and effective method for extracting active compounds. The variation in consumption frequency—from occasional use to three times daily—highlights the community's adaptive understanding of balancing treatment efficacy with safety (Azizah *et al.*, 2021), tailoring dosages to personal or observed needs.

Community Perceptions and Rational Use

Table 2 presents an overview of how coastal communities process and consume medicinal plants for managing hypertension, reflecting traditional healthcare practices and consumption habits. The predominant method of preparation is boiling the plants in a water ratio of 1:4 within a closed container for 15 minutes to produce an infusion (Rodino & Butu, 2019). This technique is widely preferred due to its simplicity and effectiveness in extracting active plant compounds. Boiling not only facilitates compound release by breaking down plant cell walls but also makes the remedy more palatable (Abubakar & Haque, 2020; Judith *et al.*, 2016).

This method is not unique to coastal communities; it is also commonly practiced in countries such as Nigeria, Turkey, and China, indicating its global relevance in traditional medicine (Judith *et al.*, 2016; Eruçar, Tan and Miski., 2023; Coyle *et al.*, 2020). In a few cases, however, some plants are consumed directly (three species) or prepared by brewing (two species), though these methods are less frequent. Direct consumption is typically reserved for plants known to be safe without thermal processing, while brewing is chosen when mild heat is sufficient to release bioactive compounds.

As shown in Table 2, the frequency of medicinal plant consumption varies, typically ranging from occasional use to three times daily. This variation likely reflects local beliefs about optimal dosages for therapeutic benefit and reveals the community's experiential knowledge of safe and effective use (Abdelmola *et al.*, 2021). Fourteen plant species are consumed once a day, suggesting a routine approach intended to maintain healthy balance and minimize potential adverse effects. Meanwhile, 15 plant types are taken twice daily, indicating that this frequency is considered effective for managing hypertension (Alfaqih & Kurniati, 2021).

Concerns about safety and side effects influence dosage decisions. According to Azizah *et al.* (2021), traditional users are cautious about excessive intake, preferring controlled usage to prevent negative outcomes. Three plant species are consumed three times daily, likely reflecting their perceived higher efficacy or suitability for more acute conditions. Additionally, ten plant species are consumed occasionally, suggesting a flexible, symptom-based approach, where treatment is initiated based on need or symptom recurrence (Alfaqih & Kurniati, 2021).

The widespread use of herbal medicine in coastal areas is deeply rooted in tradition and supported by favorable environmental conditions that provide access to diverse medicinal plants. This natural abundance has fostered a rich understanding of plant-based remedies, which are an integral part of managing conditions like hypertension.

Table 3 highlights the motivations behind herbal medicine use in these communities. While there is strong confidence in the effectiveness of herbal remedies, respondents acknowledged the potential for side effects, indicating a nuanced understanding of both benefits and risks. Importantly, many community members view herbal medicine not as a complete replacement for pharmaceutical drugs, but as a complementary or alternative option, depending on context and perceived need (Leonti & Casu, 2013). This reflects a balanced and integrative health perspective, where traditional and modern practices coexist to support well-being.

Implications for Public Health and Future Integration

In coastal communities, herbal medicine is a vital component of the local healthcare system. Rooted in a close relationship with the natural environment, these communities have developed extensive knowledge of natural resources used for health purposes. According to Atayoglu *et al.* (2023), the community's reliance on herbal medicine is primarily driven by three factors: economic advantages,

local availability of resources, and ease of use. Together, these factors not only reflect traditional wisdom but also a practical approach to managing health conditions.

As shown in Table 3, all respondents (100%) cited affordability as the primary reason for choosing herbal medicine. The ability to easily obtain or cultivate medicinal plants, coupled with simple preparation methods, reinforces this preference. This reflects both a dependence on and a sustainable use of local resources, allowing the community to meet health needs without financial strain (Nurdayati, Sabty & Hasan, 2022).

Furthermore, nearly all respondents (98.9%) believed that herbal remedies can be as effective as pharmaceutical drugs, indicating strong trust in their therapeutic value. However, this trust is balanced by a critical awareness of safety, with 97.5% disagreeing with the notion that herbal medicine is completely free of side effects. This shows that while herbal remedies are favored for their benefits, the community remains cautious about their potential risks.

Notably, 40.5% of respondents view herbal medicine as an alternative when chemical treatments are ineffective. However, only 16.5% believe it is safe to consume herbal remedies without considering timing or conditions. These findings align with research by Eruçar, Tan and MİSKİ, (2023), which underscores the importance of understanding the effects and interactions of herbal medicines with other drugs. The fact that a significant portion of the community uses herbal medicine as a fallback option—and that only a minority considers it universally safe—illustrates a thoughtful, context-driven approach to treatment choices (Leonti & Casu, 2013).

The traditional knowledge found in coastal communities like Laonti holds significant value not only for local healthcare practices but also for public health innovation. Proper documentation and scientific validation of these practices could contribute to sustainable and accessible hypertension management strategies. Integrating ethnopharmacological wisdom with modern scientific approaches can support healthcare delivery, particularly in areas with limited access to conventional medical infrastructure.

The practices observed in the Laonti Subdistrict highlight a rich blend of cultural insight and practical healthcare behavior. From the selection of plants to methods of preparation, dosage routines, and perceptions of efficacy and safety, the community's approach reflects a holistic, adaptive healthcare model. Acknowledging and supporting such models can help shape culturally relevant, cost-effective strategies for managing chronic illnesses like hypertension in similar regions.

Conclusion

This study provides substantial information into the ethnopharmacological practices of coastal communities in Laonti Subdistrict in managing hypertension. Seventeen plant species were identified, with *Annona muricata*, *Allium sativum*, and *Morinda citrifolia* being the most widely used. Leaves were the most commonly utilized plant part, and boiling was the predominant method of preparation. Usage patterns ranged from occasional to thrice daily, indicating varying perceptions of effectiveness and dosage.

The findings reflect a high level of community reliance in the efficacy, affordability, and accessibility of herbal medicines. While most respondents viewed herbal remedies as effective and economically viable alternatives to chemical drugs, they also demonstrated a nuanced understanding of their limitations and potential side effects. The traditional medicinal knowledge of Laonti’s coastal communities offers a valuable framework for developing sustainable, culturally rooted, and affordable strategies for hypertension management.

Implications

The community’s reliance on traditional medicine highlights the urgent need to preserve indigenous knowledge systems. Integrating such ethnopharmacological practices into national health policies could enhance primary healthcare delivery, especially in remote and underserved areas.

Recommendations

The ethnopharmacological findings from this study can inform the development of community-based, culturally appropriate hypertension interventions. Policymakers are encouraged to integrate validated herbal practices into local health systems to improve accessibility and cultural resonance of treatment options. Collaboration between health practitioners and traditional healers should be strengthened to ensure safe and informed use of herbal remedies. Additionally, researchers should focus on pharmacological testing and clinical integration to advance the use of indigenous knowledge into scalable, evidence-based health solutions.

Limitations

Although the study presents valuable ethnopharmacological insights there are certain limitations. The research was geographically limited to a single subdistrict, which may not fully represent practices in other coastal or rural communities. Moreover, the study lacked laboratory validation of the pharmacological properties of the plants reported, which limits clinical relevance.

Future studies should aim to expand geographically to include other coastal regions for comparative analysis. Additionally, interdisciplinary research incorporating phytochemical screening and clinical trials is essential to scientifically validate the therapeutic claims of the identified plants. Longitudinal studies assessing the impact of integrated traditional and modern treatment approaches on hypertension outcomes would also be beneficial.

Conflict of Interest

The authors declare that they have no competing interests.

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