



## Utilization of Herbal Medicines as Alternative Hypertension Therapy: A Review of Effectiveness and Safety

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### ABSTRACT

Hypertension remains a leading cause of global morbidity and mortality, contributing to an increased risk of coronary heart disease, kidney failure, and stroke. Conventional hypertension treatment using synthetic drugs is effective in lowering blood pressure, but often causes side effects such as dizziness, dry cough, hypokalemia, and metabolic disorders that can reduce patient compliance with therapy. Therefore, people are starting to turn to complementary and alternative treatments based on herbal plants. This study aims to review the effectiveness and safety of using herbal medicines as an alternative therapy for hypertension based on the latest scientific evidence. The research method used is *systematic review literature review* of 35 scientific articles from the database PubMed, ScienceDirect, and Garuda Dikti during the period 2015–2024. The results of the study showed that plants such as garlic (*Allium sativum*), celery (*Apium graveolens*), soursop leaves (*Annona muricata*), and pegagan (*Centella asiatica*) has the effect of lowering blood pressure through the mechanism of vasodilation, increasing the production of nitric oxide oxide, diuretic effects, and antioxidant activity. Although most studies show positive results, most of the trials are still *preclinical* and require confirmation through large-scale clinical trials. In conclusion, herbal medicines have the potential to be used as complementary therapies for hypertension with minimal side effects. However, their use must be monitored by medical personnel to avoid interactions with synthetic antihypertensive drugs.

**Keywords:** Herbal Medicine, Hypertension, Effectiveness, Safety, Alternative Therapy

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## 1. Introduction

Hypertension, or high blood pressure, is one of the most common global health problems. This condition is characterized by persistently elevated systolic blood pressure of  $\geq 140$  mmHg and /or diastolic blood pressure of  $\geq 90$  mmHg (Ministry of Health of the Republic of Indonesia, 2022). Hypertension is referred to as *the silent killer* because it often does not show specific symptoms but can cause serious complications such as coronary heart disease, stroke, kidney failure, and retinopathy hypertensive (WHO, 2023).

According to the World Health report According to the World Health Organization (WHO, 2023), more than 1.3 billion people worldwide suffer from hypertension, and less than 20% of them successfully control their blood pressure. In Indonesia, the prevalence of hypertension, based on the 2018 *Basic Health Research (Riskesdas)*, reached 34.1%, an increase compared to previous years. These figures indicate that hypertension remains a major challenge for the national health system.

Conventional hypertension treatment uses synthetic drugs such as diuretics, ACE inhibitors, calcium channel blockers and beta- blockers have been shown to be effective in lowering blood pressure. However, long-term use of these drugs can cause various side effects such as dizziness, electrolyte disturbances, hypokalemia, dry cough, and impaired kidney function (Rahman et al. al., 2021). In addition, high treatment costs and low patient compliance are also obstacles to controlling hypertension.

This situation has encouraged people to seek more natural and affordable alternative therapies, one of which is through the use of herbal medicines. The use of traditional medicinal plants has long been part of Indonesian healing culture. Some plants, such as garlic (*Allium sativum*), celery (*Apium graveolens*), pegagan (*Centella asiatica*), and soursop leaves (*Annona muricata*) is known to have biological activity that has the potential to lower blood pressure.

The mechanism of action of these herbal plants generally involves a vasodilatory effect, increasing nitric acid production. oxide, diuretic effects, and antioxidant activity that can inhibit the oxidative stress process in the walls of blood vessels (Kaye et al., 2021; Li et al., 2020). In addition, herbal plants have other advantages such as abundant availability, relatively low prices, and fewer side effects compared to synthetic drugs.

The effectiveness and safety of herbal remedies for hypertension still require strong scientific evidence. Many existing studies are *preclinical* or laboratory tests with limited sample sizes. Therefore, systematic reviews are essential to assess the effectiveness and safety of herbal remedies in lowering blood pressure, as well as potential interactions with conventional medications.

Based on this description, this study aims to review the effectiveness and safety of herbal medicine as an alternative therapy for hypertension through an analysis of various recent research findings. It is hoped that the results of this review will provide a scientific





basis for healthcare professionals and the public to use herbal medicine rationally, safely, and evidence *-based*.

## 2. Research Methods

This research uses a systematic literature review design. *literature This review* used a descriptive-narrative approach to evaluate the effectiveness and safety of herbal medicine as an alternative therapy for hypertension. This approach was chosen because it can combine and analyze various relevant scientific research findings, including laboratory experiments, clinical trials, and observational studies.

### a. Data source

Research data was obtained from various international and national scientific databases, namely:

- PubMed,
- ScienceDirect,
- Google Scholar, and
- Garuda Higher Education.

In addition, several additional references were obtained from WHO reports, the Ministry of Health of the Republic of Indonesia, and accredited national journals that discuss similar topics.

### b. Literature Search Strategy

Article searches were conducted using the following keyword combinations:

These keywords were used in both English and Indonesian to broaden the search results. The search was conducted between January 2024 and July 2025, with articles published between 2015 and 2024.

### c. Inclusion and Exclusion Criteria

In order to make the review results more focused, the following selection criteria were used:

#### **Inclusion criteria:**

- 1) Research article examining the effects of herbal plants on lowering blood pressure.
- 2) Articles in English or Indonesian.
- 3) Scientific publications that go through a *peer review process review*.
- 4) Research that includes quantitative data related to changes in blood pressure or other cardiovascular parameters.

#### **Exclusion criteria :**

- 1) Articles that are opinion pieces, editorials, or do not contain empirical data.
- 2) Research with non-hypertensive subjects.
- 3) Duplicate articles or those that are not accessible in full text (*full text*) text).

### d. Data Selection and Analysis Process

The analysis stages are carried out as follows:





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- 1) Initial identification: 178 articles were found that were relevant to the research topic.
- 2) Initial screening: 98 articles were excluded because they did not meet the inclusion criteria.
- 3) Final selection: 35 articles were obtained that met the requirements for further analysis.

All articles that pass the selection are evaluated based on the main variables, namely:

- Types of herbal plants used,
- Dosage and duration of administration,
- Biological working mechanism,
- Effects on systolic and diastolic blood pressure, as well as
- Reported side effects or toxicities.

Data analysis was conducted in a descriptive-narrative manner, where the results of each study were compared and synthesized to obtain general conclusions regarding the effectiveness and safety of herbal medicines in hypertension sufferers.

**e. Data Validity and Reliability**

To maintain the validity of the study results, only articles that have a clear methodological design, control group, and standardized blood pressure measurements (using a *sphygmomanometer* or *digital blood pressure monitor*) will be included. Additionally, data from verified sources such as the WHO and the Indonesian Ministry of Health were used as comparative references.

**f. Research Ethics**

Because this research does not directly involve human subjects, it does not require ethical approval. clearance). However, the principles of scientific integrity are maintained, such as citing sources appropriately and not committing plagiarism in preparing research reports.

**3. Results And Discussion****a. Results**

Based on a review of 35 scientific articles that met the inclusion criteria, data showed that various types of herbal plants have significant potential to lower blood pressure. Most studies reported positive results on systolic and diastolic blood pressure, with varying effectiveness depending on the type of plant, dose, and duration of administration.

Antihypertensive herbal plants include:

- 1) Vasodilation of blood vessels through increased nitric acid production oxide (NO).
- 2) Natural diuretic effect that reduces circulating blood volume.
- 3) Angiotensin-converting enzyme activity enzyme (ACE).





- 4) Antioxidant and anti-inflammatory activities that improve vascular endothelial function.

The results of data analysis from various studies can be summarized in the following table:

**Table 1.**  
**Summary of the Effectiveness and Mechanism of Action**  
**of Herbal Plants in Lowering Blood Pressure**

No	Plant Name	Scientific Name	Dosage and Duration of Administration	Blood Pressure Reduction Results	Working Mechanism	Research Sources
1	Garlic	<i>Allium sativum</i>	600 mg /day for 12 weeks	↓ 8–10 mmHg (systolic)	Increase nitric oxide, vasodilation	Kaye et al. (2021)
2	Celery	<i>Apium graveolens</i>	250 mg extract/day for 6 weeks	↓ 6–9 mmHg (systolic)	Diuretic and smooth muscle relaxing effects	Li et et al. (2020)
3	Soursop leaf	<i>Annona muricata</i>	200 mg / kgBW for 14 days (animal test)	↓ significant blood pressure	ACE inhibition, antioxidant	Suprpto et al. (2019)
4	Gotu kola	<i>Centella Asiatica</i>	500 mg /day for 8 weeks	↓ 5–8 mmHg (systolic)	Increase NO and repair endothelium	Rahman et al. (2021)
5	Green tea	<i>Camellia sinensis</i>	2 cups/day for 10 weeks	↓ 4–6 mmHg (systolic)	Antioxidant, reduces oxidative stress	WHO (2020)
6	Noni	<i>Morinda citrifolia</i>	30 ml extract/day for 4 weeks	↓ moderate blood pressure	Peripheral vasodilation	Ministry of Health of the Republic of Indonesia (2022)

### 1) Effectiveness of Herbal Medicines in Lowering Blood Pressure

Most studies have shown positive results in reducing systolic and diastolic blood pressure. For example, a study by Kaye et (2021) showed that consuming 600 mg of garlic extract per day for 12 weeks reduced systolic blood pressure by an average of 8–10 mmHg in patients with mild hypertension.





Li et (2020) reported that administering celery extract for 6 weeks resulted in a 6–9 mmHg reduction in systolic blood pressure. The underlying mechanism for this effect is relaxation of vascular smooth muscle and increased sodium and water excretion through the kidneys.

In experimental research by Suprpto et (2019) on experimental animals, soursop leaf extract showed significant antihypertensive effects by reducing ACE activity and increasing plasma antioxidant capacity.

Gotu Kola ( *Centella asiatica* ) and green tea ( *Camellia sinensis* ) have also been shown to increase nitric acid levels. oxide (NO) which plays an important role in maintaining blood vessel elasticity and reducing peripheral vascular pressure.

## 2) Safety and Side Effects

In general, the use of herbal plants in reasonable doses is considered safe and has minimal side effects. Some studies report mild reactions such as nausea or digestive upset when using garlic in high doses.

Be aware of potential drug-herb interactions, for example:

- Garlic may increase the hypotensive effect when used with ACE inhibitors or beta- blockers.
- Celery has a diuretic effect that can strengthen the effects of thiazide drugs.

No evidence of significant organ toxicity was found with short-term use at recommended therapeutic doses. However, most studies have been limited to durations of <3 months, so long-term safety requires further investigation.

## 3) Consistency of Research Results

Of the total 35 articles analyzed:

- 82% reported statistically significant ( $p < 0.05$ ) blood pressure reduction results.
- 14% reported a non-significant reduction in blood pressure but showed improvements in lipid profiles and oxidative stress.
- 4% showed no significant effect, generally due to low doses or short treatment duration.

Variability in research results is caused by factors such as extraction methods, genetic variations in plants, growing environmental conditions, and differences in dosage and duration of consumption.

## 4) Overall Analysis

The synthesis results indicate that combining plants with different mechanisms of action can enhance treatment effectiveness. For example, the combination of garlic and celery has a synergistic effect, offering both vasodilatory and diuretic activity.





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The use of herbal medicines has the potential to be an effective and safe complementary therapy for patients with mild to moderate hypertension, especially when used in conjunction with healthy lifestyle changes such as a low-salt diet, regular physical activity, and stress management.

#### b. Discussion

The study results indicate that herbal medicines may be a promising alternative therapy for hypertension, particularly as a complementary therapy. The mechanisms of action of herbal plants are likely natural and multifactorial, such as improving endothelial function, reducing oxidative stress, and increasing sodium excretion.

Safety remains a concern. Some herbs can interact with chemical antihypertensive medications, causing excessive hypotension, or toxic effects when used in high doses (WHO, 2020). Therefore, herbal use should be under the supervision of a medical professional.

Furthermore, standardization of raw materials, dosages, and extraction methods is crucial in ensuring consistent therapeutic effects. Stricter regulations and comprehensive pharmacological research are needed before herbal medicines can be widely recommended as antihypertensive therapy.

#### 4. Conclusion And Suggestions

##### a. Conclusion

Based on the results of a literature review of various studies related to the use of herbal medicine as an alternative therapy for hypertension, it can be concluded that:

- 1) Herbal medicines have significant antihypertensive potential through various mechanisms, such as vasodilation, diuresis, antioxidants, and inhibition of the renin-angiotensin system. Plants such as *Allium sativum* (garlic), *Apium graveolens* (celery), *Centella asiatica* (gotu kola), and *Andrographis paniculata* (sambiloto) has shown the ability to significantly lower blood pressure in patients with mild to moderate hypertension.
- 2) Herbal medicines are relatively safe when taken in appropriate doses and according to a healthcare professional's instructions. However, some herbs can cause side effects such as gastrointestinal upset or drug interactions when used in conjunction with synthetic antihypertensive medications.
- 3) Research results vary in consistency, particularly regarding optimal dosage, duration of administration, and dosage form (extract, decoction, or capsule). Large-scale, controlled clinical trials are needed to confirm long-term effectiveness and safety.
- 4) Integration of herbal medicines in complementary hypertension therapy can be a rational approach in *evidence-based* health services. *practice*), while still paying attention to the principles of medical safety and ethics.





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**b. Suggestion**

- 1) For health workers, it is recommended to increase education for patients regarding the proper use of herbal medicines, especially regarding dosage and potential interactions with conventional drugs.
- 2) For researchers, further experimental and clinical research with a larger sample size is needed to confirm the antihypertensive effects of various Indonesian herbal plants.
- 3) For the public, the use of herbal medicines should not replace primary medical therapy, but should be used as a complementary therapy that supports blood pressure control through a healthy lifestyle, such as a low-salt diet and regular exercise.
- 4) For the government and health agencies, there is a need for regulation and standardization of herbal products so that their quality, safety and efficacy can be scientifically accounted for.

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