EVALUATION OF CONCOMITANT USE OF ANTIHYPERTENSIVE DRUGS AND HERBAL MEDICINES AMONG HYPERTENSIVE PATIENTS AT A REGIONAL HOSPITAL IN KUNINGAN REGENCY

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ABSTRACT

The concomitant use of herbal medicines with antihypertensive drugs is common among hypertensive patients, particularly in settings where traditional medicine is widely practiced. However, evidence regarding its clinical implications in hospital-based outpatient settings remains limited. This study aimed to describe the patterns of concomitant antihypertensive–herbal medicine use among hypertensive outpatients and examine its association with blood pressure values and reported adverse effects in a regional hospital setting. A descriptive observational study with a cross-sectional design was conducted among hypertensive outpatients at RSUD 45 Kuningan in Indonesia. Sociodemographic characteristics, antihypertensive drug regimens, herbal medicine use, and reported adverse effects were collected through structured interviews and medical record reviews by trained interviewers. Blood pressure values recorded at the study visit were compared with the most recent values documented in the medical records prior to the visit. Descriptive and comparative analyses were performed to explore the associations between treatment patterns and blood pressure parameters. More than half of the participants reported concomitant use of herbal medicines. Standard antihypertensive therapy was associated with lower systolic blood pressure values, whereas diastolic blood pressure values were lower in patients using herbal medicines concomitantly. Most patients reported no adverse effects, and no significant associations were observed between sociodemographic factors and concomitant use of herbal products. In conclusion, concomitant herbal medicine use among hypertensive outpatients was common and generally well tolerated; however, its clinical benefits remain uncertain. These findings underscore the need for routine assessment, patient education, and careful monitoring rather than routine endorsement of herbal medicines in hypertension management.

Keywords: Hypertension; Antihypertensive drugs; Herbal medicine; Concomitant use; Blood pressure

INTRODUCTION

Hypertension remains one of the leading causes of morbidity and mortality worldwide and represents a major public health challenge, particularly in low- and middle-income countries such as Indonesia. Poorly controlled blood pressure substantially increases the risk of cardiovascular disease, stroke, and chronic kidney disease, underscoring the importance of effective long-term management in both community and clinical settings (Kario et al., 2024; Unger et al., 2020; WHO, 2021).

Pharmacological therapy, including angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, calcium channel blockers, beta-blockers, and diuretics, remains the cornerstone of hypertension management and has proven efficacy in reducing cardiovascular risk when appropriately prescribed (Al-Makki et al., 2022; Heidari et al., 2022).

However, long-term antihypertensive treatment in routine practice is often challenged by polypharmacy, adverse effects, and suboptimal adherence, which may encourage patients to seek complementary therapies alongside conventional treatments.

Herbal medicines are widely used as complementary therapies for patients with hypertension, particularly in regions with strong traditional medicinal practices. Several herbal products, such as *Allium sativum* (garlic) and *Hibiscus sabdariffa* (roselle), have demonstrated modest antihypertensive effects, although results across studies remain heterogeneous (Darozah et al., 2024; Ellis et al., 2022; Tang et al., 2025; Wiwatkunupakarn et al., 2024). In Indonesia, herbal medicines such as *Syzygium polyanthum* (bay leaves), *Morinda citrifolia* (noni), and *Apium graveolens* (celery) are commonly consumed as part of daily self-care practices (Oktarina & Rahmawaty, 2023; Syaripudin, 2025). Community-based studies indicate that concomitant use of herbal medicines and antihypertensive drugs is common; however, evidence from hospital-based settings, particularly regarding real-world use patterns, blood pressure outcomes, and reported adverse effects, remains limited (Azizah et al., 2021)

Regional hospitals play a central role in the long-term management of hypertension; however, data describing concomitant antihypertensive–herbal medicine use in these settings are scarce. Therefore, this study aimed to describe the patterns of concomitant antihypertensive–herbal medicine use among hypertensive outpatients and examine its association with blood pressure changes and reported adverse effects in a regional hospital setting.

RESEARCH METHODS

This descriptive observational study with a cross-sectional design was conducted at RSUD 45 Kuningan, West Java, Indonesia. A total of 100 hypertensive outpatients were recruited using consecutive sampling methods. Eligible participants were adults (≥18 years) diagnosed with hypertension and receiving antihypertensive therapy. Data were collected through structured interviews and medical record reviews, including demographic characteristics, antihypertensive drug regimens, and herbal medicine use (type, frequency, and duration), as reported by the patients. The herbal dosage and preparation methods were not standardized and relied on patient recall. Blood pressure data were obtained from the most recent record documented in the medical chart prior to the study visit (reference blood pressure) and from measurements taken during outpatient visits at the time of data collection. The interval between these measurements varied according to the routine clinical follow-up.

Data were analyzed using SPSS version 24. Descriptive statistics were used to summarize patient characteristics, antihypertensive drug regimens, herbal medicine use, and adverse effects. Blood pressure values recorded at the study visit were descriptively compared with the most recent blood pressure values documented in the medical records prior to the visit to provide contextual information on blood pressure status. Comparative analyses were performed to explore the differences in blood pressure values between the antihypertensive monotherapy and combination therapy groups. Correlation analyses were used to assess the associations between patient characteristics and concomitant herbal medicine use. All analyses were interpreted as observational associations, and a *p-value* of < 0.05 was considered statistically significant. Ethical approval with exemption status was granted by the Health Research Ethics Committee of Universitas Bakti Tunas Husada Tasikmalaya (No. 179/E.01/KEPK-BTH/VII/2023), and written informed consent was obtained from all the participants.

RESULTS AND DISCUSSION

Hypertensive Patients Characteristics

Of the 100 hypertensive outpatients included in this study, more than half reported concomitant use of herbal medicines and antihypertensive drugs. The demographic characteristics of the study population, stratified by antihypertensive monotherapy and combination therapy, are summarized in **Table I**.

Table I. Characteristics of Hypertensive Patients (N = 100)

Variable	Category	Antihypertensive Only (n = 42)	Combination Therapy (n = 58)
Sex	Male	32 (76.2%)	46 (79.3%)
	Female	10 (23.8%)	12 (20.7%)
Age (years)	18–29	1 (2.4%)	1 (1.7%)
	30–39	8 (19.0%)	5 (8.6%)
	40–49	3 (7.1%)	14 (24.1%)
	50–60	16 (38.1%)	28 (48.3%)
	>60	14 (33.3%)	10 (17.2%)
Education	No formal education	1 (2.4%)	2 (3.4%)
	Elementary school	12 (28.6%)	23 (39.7%)
	Junior high school	10 (23.8%)	10 (17.2%)
	Senior high school	15 (35.7%)	17 (29.3%)
	Higher education	4 (9.5%)	6 (10.3%)
Employment	Employed	13 (30.9%)	16 (27.6%)
	Unemployed	29 (69.1%)	42 (72.4%)
Smoking	Yes	6 (14.3%)	10 (17.2%)
	No	36 (85.7%)	48 (82.8%)
Alcohol consumption	Yes	1 (2.4%)	3 (5.2%)
	No	41 (97.6%)	55 (94.8%)

The hypertensive outpatients included in this study were predominantly middle-aged to older adults with relatively low educational and socioeconomic backgrounds. This demographic profile is commonly observed among hypertensive populations in low- and middle-income countries and reflects the broader epidemiology of hypertension and its social determinants (Mills et al., 2020; World Health Organization, 2021).

Previous studies have reported that older age and lower educational attainment are associated with a higher likelihood of herbal medicine use among patients with chronic diseases, including hypertension, often driven by cultural beliefs and perceptions of herbal products as safer alternatives to long-term pharmacotherapy (Darozah et al., 2024; Kamyab et al., 2021; Widayati et al., 2025). However, the present hospital-based findings suggest that concomitant herbal medicine use is not restricted to specific demographic subgroups of patients. This observation is consistent with recent evidence indicating that herbal use has become a widespread self-care practice among hypertensive patients receiving routine medical care, including in clinical settings (Azizah et al., 2021; Rahmawati & Bajorek, 2018; Wiwatkunupakarn et al., 2024).

From a clinical perspective, these findings highlight the importance of routinely assessing herbal medicine use in all hypertensive patients, regardless of demographic characteristics, to ensure safe and rational antihypertensive therapy.

Antihypertensive Drug Use Patterns

Amlodipine was the most frequently prescribed antihypertensive drug among hypertensive outpatients, followed by candesartan and captopril. The distribution of antihypertensive drug use is presented in **Table II**.

The predominance of amlodipine reflects current evidence-based hypertension management guidelines, which recommend calcium channel blockers as first-line therapy due to their proven efficacy, favorable safety profile, and suitability for older patients (M. Y. Khan et al., 2021; Unger et al., 2020; Wang et al., 2023). In addition, amlodipine's long half-life and once-daily dosing may support medication adherence in outpatient settings.

Table II. Antihypertensive Drugs Used by Patients (N = 100)

Drug	n (%)
Amlodipine	61 (61.0)
Candesartan	15 (15.0)
Captopril	9 (9.0)
Bisoprolol	6 (6.0)
Ramipril	4 (4.0)
Furosemide	2 (2.0)
Spironolactone	1 (1.0)
Irbesartan	1 (1.0)
Propranolol	1 (1.0)

Similar prescribing patterns have been reported in previous hospital-based and primary care studies in Indonesia, where amlodipine consistently emerged as the most prescribed antihypertensive drug (Alrosyidi et al., 2022; Prasetyawan et al., 2024). Overall, the predominance of guideline-recommended agents in this study suggests rational antihypertensive prescribing practices at RSUD 45 Kuningan, providing an appropriate clinical context for evaluating the concomitant use of herbal medicines.

Herbal Medicine Use

Among patients receiving combination therapy, bay leaves (*Syzygium polyanthum*) were the most frequently used herbal medicines, followed by noni (*Morinda citrifolia*), soursop leaves (*Annona muricata*), and garlic (*Allium sativum*). The distribution of herbal medicines used by the participants is presented in **Table III**.

The predominance of bay leaves and noni reflects strong local traditional practices and the widespread availability of these plants in Indonesia. Similar patterns have been reported in previous studies, where the use of these herbs among hypertensive patients was largely driven by cultural beliefs and perceived antihypertensive benefits rather than robust clinical evidence (Chowdhury et al., 2025; Hijriansyah et al., 2020; Syaripudin, 2025)

Table III. Herbal Medicines Used in Combination Therapy (n = 58)

Herbal medicine	n (%)
Bay leaves	15 (25.9)
Noni	11 (19.0)
Soursop leaves	6 (10.3)
Garlic	6 (10.3)
Celery leaves	3 (5.2)
Binahong leaves	2 (3.4)
Moringa leaves	2 (3.4)
Cucumber	1 (1.7)

From a pharmacological perspective, bay leaves contain flavonoids and phenolic compounds with antioxidant and vasorelaxant properties, which may contribute to their perceived blood pressure–lowering effects; however, supporting evidence remains largely preclinical (Aminullah & Septiany, 2024; Syaripudin, 2025). Noni has been reported to influence vascular function through bioactive compounds such as scopoletin and iridoids, yet human studies evaluating its antihypertensive efficacy have produced inconsistent results (Meilawati et al., 2021; Yoshitomi et al., 2020) .

The use of garlic observed in this study is consistent with international evidence showing modest blood pressure reductions in meta-analyses, whereas evidence for soursop leaves remains predominantly experimental and limited to preclinical models (Sokpe et al., 2020; Tang et al., 2025).

Overall, these findings support the existing literature, indicating that herbal medicine use among hypertensive patients is common and culturally driven. This underscores the

importance for healthcare professionals to actively assess herbal medicine use and strengthen pharmacovigilance in patients receiving antihypertensive therapy to ensure safe concomitant use (Azizah et al., 2021; Mahmuda et al., 2025; Shinde et al., 2025).

Herbal Medicine Consumption Frequency

The frequency of herbal medicine consumption among participants is summarized in **Table IV**, with once-daily and twice-daily use being the most common patterns

The predominance of daily herbal medicine consumption suggests that herbal products are commonly integrated into patients' routine self-care practices rather than being used intermittently. Once- or twice-daily intake may reflect practical dosing habits that align with daily activities and conventional antihypertensive medication schedules (Youssef et al., 2020). This pattern is consistent with previous studies reporting frequent daily use of herbal medicines among patients with chronic diseases, particularly in Asian populations where traditional medicine is widely practiced (Kumar et al., 2025).

Table IV. Frequency of Herbal Medicine Consumption Among Participants

Frequency of Consumption	Number of Participants	Percentage (%)
Once daily	20	34
Twice daily	17	29
Three times daily	7	12
Four times daily	5	9
Five times daily	4	7
Once weekly	2	3
Twice weekly	2	3
Three times weekly	1	2

From a safety perspective, the presence of patients reporting long-term and frequent herbal use raises concerns regarding cumulative exposure and the potential for sustained drug–herb interactions, especially when herbal products are consumed concomitantly with cardiovascular medications. Variability in preparation methods and dosing further complicates safety assessment, underscoring the importance of routine evaluation, patient education, and strengthened pharmacovigilance in clinical practice (Kongkaew et al., 2024; Mssusa et al., 2025).

Duration of Herbal Medicine Use

The duration of herbal medicine use among participants is summarized in **Table V**, with short-term use being the most common.

Table V. Duration of Herbal Medicine Use Among Participants

Duration of Use	Number of Participants	Percentage (%)
< 6 months	25	43
6 months	10	17
1 year	14	24
> 1 year	9	16

The predominance of short-term herbal medicine use suggests that many patients with hypertension consume herbal products as a complementary or exploratory approach alongside conventional antihypertensive therapy rather than as a long-term planned intervention. Similar patterns have been reported in observational studies of patients with chronic diseases, where herbal use is often initiated to assess perceived benefits on symptom control or overall well-being (Kumar et al., 2025).

However, the presence of patients reporting long-term herbal medicine use highlights the importance of safety considerations. Prolonged consumption of herbal products, particularly in the absence of standardized dosing and clinical supervision, may increase the

risk of cumulative exposure and drug–herb interactions in patients receiving chronic cardiovascular medications (El-Dahiyat et al., 2020; Sharma et al., 2022; Souza-Peres et al., 2023). These findings underscore the importance of routinely assessing the type, frequency, and duration of herbal medicine use in clinical practice to support safe and rational integration with antihypertensive therapy.

Blood Pressure Outcomes

The blood pressure values in both groups are summarized in **Table VI**. In the antihypertensive-only group, systolic blood pressure was lower at the study visit than at the most recent prior record, whereas no statistically significant difference was observed for diastolic blood pressure. In the combination therapy group, both systolic and diastolic blood pressure values at the study visit were lower than those recorded previously.

Comparative analysis showed no significant difference in systolic blood pressure between the antihypertensive-only and combination therapy groups. However, diastolic blood pressure was significantly lower in patients receiving concomitant herbal medicines than in those receiving antihypertensive therapy alone ($p = 0.008$).

Table VI. Blood Pressure Outcomes

Treatment Group	Baseline SBP (mmHg)	Follow-up SBP (mmHg)	Baseline DBP (mmHg)	Follow-up DBP (mmHg)
Antihypertensive only (n=42)	165.48 ± 2.82	146.05 ± 12.92	95.00 ± 1.87	93.50 ± 12.64
Combination therapy (n=58)	168.53 ± 4.60	150.40 ± 13.17	97.29 ± 6.10	93.14 ± 11.05

These findings indicate that standard antihypertensive therapy remains effective in achieving systolic blood pressure control, which is consistent with current hypertension management principles. The lower diastolic blood pressure observed among patients using herbal medicines concomitantly may reflect a modest complementary association, potentially related to the vasodilatory, antioxidant, or endothelial-modulating properties attributed to certain herbal constituents. However, this association should be interpreted cautiously, given the observational and cross-sectional nature of the study (Mahmuda et al., 2025; Shinde et al., 2025).

Similar observations have been reported in previous observational and clinical studies, where concomitant use of herbal medicines was associated with small improvements in diastolic blood pressure but inconsistent effects on systolic outcomes (Francis et al., 2024; J. Khan et al., 2020). Taken together, these findings support the importance of continued pharmacovigilance and careful clinical monitoring in patients using herbal medicines alongside antihypertensive drugs, rather than considering such therapies as substitutes for evidence-based pharmacological treatments.

Adverse Effects

The reported adverse effects among patients receiving combination therapy are summarized in **Table VII**. Overall, most patients did not report any adverse effects, and leg pain and gastric discomfort were the most commonly reported symptoms.

Table VII. Adverse Effects among Combination Therapy Users (n = 58)

Adverse effect	n (%)
None	26 (44.8)
Leg pain	21 (36.2)
Gastric discomfort	11 (19.0)

The predominance of patients reporting no adverse effects suggests that the concomitant use of herbal medicines with antihypertensive drugs was generally well tolerated

in this hospital-based outpatient population. Similar observations have been reported in observational studies, where most patients using herbal medicines alongside conventional antihypertensive therapy did not experience clinically significant adverse events (El-Dahiyat et al., 2020).

From a clinical perspective, the reported leg pain may be attributable to known adverse effects of calcium channel blockers, particularly amlodipine, which has been associated with musculoskeletal discomfort and peripheral symptoms in some patients (Anastry Putri et al., 2023; Bulsara & Cassagnol, 2023). In contrast, gastric discomfort may be related to gastrointestinal irritation caused by certain herbal preparations, especially when consumed regularly or without standardized dosing, as highlighted in pharmacovigilance and herb–drug interaction studies (Bukowska et al., 2025; Kahraman et al., 2021).

These findings underscore the importance of routine monitoring and patient counseling in clinical practice to identify potential adverse effects and differentiate symptoms related to conventional antihypertensive therapy from those potentially associated with concomitant herbal medicine use.

Factors Associated with Concomitant Use

No significant associations were observed between sex, education level, or employment status and the concomitant use of antihypertensive drugs and herbal medicines ($p > 0.05$). In addition, age and duration of antihypertensive therapy showed weak and non-significant correlations with concomitant use of herbal products.

The absence of significant associations suggests that concomitant herbal medicine use in this hospital-based outpatient population was not strongly determined by basic sociodemographic characteristics. This finding is consistent with previous studies indicating that herbal use among hypertensive patients is often influenced by personal beliefs, cultural norms, and perceived benefits rather than by sex, education, or employment status (Wahab et al., 2021; Wiwatkunupakarn et al., 2024).

Moreover, the lack of association between age and herbal use aligns with recent evidence showing that complementary medicine use spans across age groups in chronic disease populations, rather than being concentrated among older patients (Ananchaisarp et al., 2021; Azizah et al., 2021). Similarly, the non-significant relationship between the duration of antihypertensive therapy and concomitant herbal use suggests that patients may initiate herbal medicines at various stages of pharmacological treatment rather than only after prolonged therapy or dissatisfaction with conventional treatment. This observation is in line with reports indicating that social influence and informal health information sources play a more prominent role in the decision to use complementary therapies than treatment duration itself (Alfaqih & Kurniati, 2021).

Collectively, these findings highlight the complexity of factors underlying concomitant herbal medicine use and underscore the importance of healthcare professionals routinely inquiring about herbal use in all hypertensive patients, regardless of demographic characteristics or treatment history.

This study had several limitations. The cross-sectional design limits causal inference between concomitant herbal medicine use and the blood pressure outcomes. Herbal medicine use was self-reported without verification of dosage, preparation methods, or product composition, which may have introduced reporting bias. In addition, potential confounding factors, such as disease severity and medication adherence, were not fully controlled. As this was a single-center study, the findings may have limited generalizability to other clinical settings.

CONCLUSION

Concomitant use of herbal medicines with antihypertensive drugs was common among hypertensive outpatients and was generally well tolerated in this study population. Although differences in blood pressure parameters were observed, the clinical benefit of concomitant herbal use remains uncertain because of the observational nature of the study. These findings

highlight the importance of routinely assessing herbal medicine use, strengthening patient education, and ensuring careful clinical monitoring and pharmacovigilance rather than endorsing the routine use of herbal medicines in hypertension management.

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