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Evaluation of a Five-Ingredient Herbal Combination in Postpartum Hypertension and Maternal Recovery

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Abstract

Postpartum hypertension represents a persistent contributor to maternal morbidity and mortality across developing regions. This quasi-experimental pretest–posttest study evaluated the efficacy of a five-component polyherbal formulation consist of red ginger (*Zingiber officinale var. rubrum*), garlic (*Allium sativum*), lemon (*Citrus limon*), apple-cider vinegar, and honey in improving hemodynamic stability and postpartum recovery. Sixty-two postpartum women at Prof. Dr. H. Aloei Saboe Hospital, Gorontalo, Indonesia, were equally stratified into hypertensive and normotensive subgroups. Participants ingested 5 mL of the standardized mixture twice daily for six weeks. Weekly monitoring assessed blood pressure, lactation adequacy, lochia characteristics, and uterine involution. Statistical analysis using the Wilcoxon signed-rank and chi-square tests confirmed significant reductions in mean systolic ($153.55 \pm 9.72 \rightarrow 120.32 \pm 6.84$ mmHg) and diastolic ($98.39 \pm 7.41 \rightarrow 79.68 \pm 5.96$ mmHg) pressures among hypertensive participants ($p < 0.001$). No significant variations occurred in lactation ($p = 0.209$) or uterine involution ($p = 0.319$), whereas lochia normalization exhibited positive association ($p < 0.05$). No adverse events were reported. The outcomes substantiate the formulation's antihypertensive and restorative efficacy via antioxidative and vasodilatory mechanisms. Its safety, affordability, and cultural acceptability demonstrate translational potential as an adjunct in postpartum hypertension management. Further controlled, biomarker-based studies are warranted to validate long-term efficacy and mechanistic precision.

Keywords: Postpartum hypertension; Polyherbal formulation; Five herbal; Antioxidant therapy; Maternal recovery.

INTRODUCTION

Postpartum hypertension remains a persistent and often underrecognized contributor to maternal morbidity and mortality worldwide. Estimates indicate that hypertensive disorders account for up to 18% of maternal deaths in developing countries and are a major determinant of both acute and long-term cardiovascular complications (Yuan & Huang, 2025). Globally, approximately 40% of maternal deaths occur during the postpartum phase, with hypertension particularly preeclampsia, eclampsia, and undiagnosed chronic hypertension constituting a leading cause (World Health Organization, 2025b). These statistics underscore the urgent need for effective postpartum interventions, particularly in low-resource settings where medical follow-up is limited and access to pharmacological treatment is often constrained. In Indonesia and similar regions, the challenge is compounded by sociocultural and economic factors that hinder consistent postpartum care and adherence to medical regimens.

Physiologically, postpartum hypertension arises from complex vascular and systemic mechanisms. It is commonly associated with endothelial dysfunction, altered sympathetic activity, and persistent systemic inflammation following delivery (A. Goel et al., 2015; Katsi et al., 2020). Unlike gestational hypertension which typically resolves after childbirth postpartum hypertension may persist or even emerge de novo, evolving into chronic hypertensive disease with significant long-term cardiovascular risks (A. Goel et al., 2015). The postpartum period, therefore, represents a critical window for both the detection and management of hypertensive conditions, as unaddressed elevations in blood pressure can predispose women to stroke, heart failure, and metabolic dysfunction later in life. Despite its prevalence and implications, postpartum hypertension remains underdiagnosed and undertreated in many health systems.

Non-pharmacological interventions have gained increasing attention as complementary approaches to manage postpartum and pregnancy related hypertension. A growing body of evidence highlights the efficacy of relaxation techniques, structured physical activity, and dietary modifications in lowering blood pressure and improving cardiovascular outcomes among postpartum

women (Kodela et al., 2023; Timsina et al., 2023). Systematic reviews demonstrate that non-pharmacological strategies such as yoga and mindfulness can significantly reduce blood pressure variability, enhance stress regulation, and improve overall maternal wellbeing (Kodela et al., 2023; Ninot, 2021). Nonetheless, variability in study design and intervention standardization limits the generalizability of these findings. Consequently, more robust, context-specific studies are needed to explore accessible, culturally integrated, and sustainable approaches to postpartum hypertension management.

In developing countries, traditional medicine has long been integrated into maternal care, offering a viable alternative or complement to formal medical treatment. Herbal remedies have demonstrated potential efficacy in controlling blood pressure through multiple bioactive mechanisms, particularly in communities with limited access to conventional medications (Chowdhury et al., 2025; Widowati et al., 2024). Empirical studies report that herbal decoctions such as those prepared from soursop leaves or garlic possess antihypertensive and vasodilatory properties beneficial to postpartum recovery (Chandrasekara & Shahidi, 2018). This growing evidence aligns with global health recommendations promoting the integration of traditional and modern healthcare systems, especially for conditions requiring long-term lifestyle adaptation and self-management.

Among the diverse range of medicinal plants used in traditional therapy, five natural ingredients red ginger, garlic, lemon, apple-cider vinegar, and honey have attracted significant scientific interest due to their combined cardioprotective and metabolic benefits. Red ginger (*Zingiber officinale var. rubrum*) is rich in gingerol and shogaol, compounds known for their anti-inflammatory and antioxidant properties that reduce systemic inflammation and improve lipid metabolism (Chandrasekara & Shahidi, 2018). Garlic (*Allium sativum*) contains allicin, a sulfur-containing compound that promotes vasodilation, inhibits platelet aggregation, and lowers cholesterol levels, thereby contributing to blood pressure reduction and cardiovascular protection (Chandrasekara & Shahidi, 2018; Sleiman et al., 2024a). Lemon (*Citrus limon*) provides vitamin C and flavonoids that act as antioxidants and support endothelial function (Kato et al., 2014). Apple-cider vinegar, rich in acetic acid, aids in glycemic control and metabolic regulation, further reducing vascular stiffness and hypertensive risk (Na et al., 2016). Honey contains phenolic compounds that exhibit anti-inflammatory, antimicrobial, and healing effects, which may enhance immune resilience and promote systemic recovery (Cianciosi et al., 2018). These bioactive substances have synergistic potential to modulate oxidative stress, inflammation, and vascular tone pathways central to the pathophysiology of hypertension (Chandrasekara & Shahidi, 2018; Cianciosi et al., 2018; Kato et al., 2014; Na et al., 2016; Shahinfar et al., 2022; Sleiman et al., 2024a).

Prior research on each component supports their individual benefits, yet limited studies have examined the combined effect of these ingredients, particularly within postpartum populations. This combination is noteworthy because of its natural compatibility with postpartum dietary practices and its potential to provide a low-cost, culturally acceptable intervention. The mechanistic rationale lies in the additive antioxidant and vasodilatory effects, along with potential modulation of lipid and glucose metabolism factors that contribute to overall cardiovascular health. Studies exploring similar herbal blends suggest significant improvements in systolic and diastolic pressures, reduced markers of inflammation, and enhanced vascular function, though few have systematically evaluated their safety and efficacy among postpartum women (Shaito et al., 2020).

The integration of traditional medicine into maternal healthcare frameworks has demonstrated promise in enhancing accessibility and patient engagement. By aligning culturally rooted practices with biomedical safety standards, such approaches not only expand treatment options but also strengthen trust between patients and healthcare providers (Rutledge et al., 2024). In many rural and semi-urban areas, where postpartum women rely heavily on self-care and community-based support, herbal therapies represent a practical and empowering solution that encourages active participation in health maintenance (World Health Organization, 2025a). However, the current literature lacks sufficient empirical evidence on the systematic use of combined herbal formulations in the management of postpartum hypertension, particularly regarding standardized preparation, dosage consistency, and measurable clinical outcomes.

Given these gaps, the present study aims to evaluate the efficacy of a five-herb formulation composed of red ginger, garlic, lemon, apple-cider vinegar, and honey in regulating blood pressure among postpartum women. The investigation explores its effects on additional maternal recovery indicators, including uterine involution, lochia progression, and breastfeeding outcomes. This research contributes novel evidence by focusing on a population and therapeutic combination underrepresented in scientific literature.

MATERIALS AND METHODS

This study employed a quasi-experimental design with approach to evaluate the effects of a five-herb formula on postpartum blood pressure regulation and maternal recovery indicators. This design was chosen because it allows direct comparison of physiological and clinical changes before and after intervention within the same group of participants, without the need for a separate control group. The research was conducted in Prof. Dr.

H. Aloei Saboe Hospital, Gorontalo Province, Indonesia, and extended to home follow-ups for continuity of data collection. Data were gathered from Juli-September 2025, encompassing both inpatient and outpatient postpartum women. A total of 62 participants were purposively selected based on inclusion criteria: postpartum women aged 20–40 years within the first 48 hours after delivery, diagnosed with or without hypertension, and willing to consume the herbal formula for the designated period. Exclusion criteria included the presence of severe obstetric complications, preexisting chronic diseases unrelated to hypertension, and noncompliance with follow-up schedules. The participants were divided into two observational groups: hypertensive postpartum women (n = 31) and normotensive postpartum women (n = 31). The classification followed clinical diagnostic standards as outlined in national maternal health guidelines.

Intervention

The intervention consisted of a standardized herbal formulation combining five natural ingredients, red ginger (*Zingiber officinale var. rubrum*), garlic (*Allium sativum*), lemon (*Citrus limon*), apple-cider vinegar, and honey. The formula preparation followed a consistent ratio of 1:1:1:1:2, in which the liquid components (apple-cider vinegar, lemon juice, and honey) were blended with extracts of red ginger and garlic. The preparation was performed under hygienic conditions, using sterilized utensils to maintain safety and reproducibility.

The intervention procedure began with an initial orientation session, during which participants received detailed instructions about the herbal formula's preparation, storage, and dosage. They were counseled on potential mild side effects such as nausea or gastrointestinal discomfort and were encouraged to report any adverse reactions. Weekly home visits were conducted by researchers and trained assistants to monitor adherence and collect clinical data. Compliance was verified through self-reported logs and the remaining volume of herbal mixture. Participants were also educated on maintaining a balanced diet and adequate hydration, as these factors influence blood pressure and overall postpartum recovery. Participants were instructed to consume one teaspoon (approximately 5 mL) of the mixture twice daily—morning and evening—for 42 consecutive days. This dosage was determined from prior ethnopharmacological evidence and adapted for postpartum use to ensure tolerability and safety.

Data Collection and Instrumentation

Data collection involved both clinical measurements and structured observations, aligned with standard postpartum care protocols. Blood pressure was assessed using a calibrated digital sphygmomanometer (*Omron model HEM-7130*), with measurements taken at consistent times each week to minimize circadian variations. Each measurement was repeated twice at five-minute intervals, and the mean value was recorded to reduce observer error. For the assessment of uterine involution, physical examination was performed by trained midwives using the fundal height method, recorded in centimeters from the symphysis pubis to the uterine fundus. Lochia was evaluated using a clinical observation checklist, documenting color, odor, and amount in accordance with the postpartum inspection table. Breastfeeding was evaluated based on exclusive breastfeeding status, maternal self-reporting, and infant weight gain, verified through weekly follow-ups.

All instruments used were validated for reliability and accuracy according to standard obstetric and nursing protocols. The sphygmomanometer calibration was verified before each data collection session. Observation checklists for lochia and uterine involution were adopted from the national postpartum monitoring guidelines, ensuring methodological consistency. The same midwife observer was assigned to each participant for the duration of the study to minimize inter-observer variability.

Data Analysis

The primary outcome variable was blood pressure change, represented by mean differences in systolic and diastolic readings before and after intervention. Secondary outcomes included uterine involution rate, lochia normalization, and breastfeeding success. Statistical analysis followed a within-group comparison framework using the Wilcoxon signed-rank test to evaluate pretest–posttest differences. This nonparametric test was appropriate given the ordinal and non-normally distributed nature of the data. A significance level of $p < 0.05$ was established to determine statistical relevance. Descriptive statistics were used to summarize participant characteristics and outcome distributions. Statistical analyses were performed using SPSS version 25.0.

Ethical approval for the study was obtained from the institutional ethics committee of the Faculty of Health Sciences, Universitas Muhammadiyah Gorontalo. Informed consent was obtained from all participants, ensuring confidentiality and voluntary participation. Each participant received an identification code for anonymity, and all data were securely stored in password-protected electronic files accessible only to the research team. Participants were informed of their right to withdraw at any time without penalty or loss of access to healthcare services. To ensure data integrity, the study applied rigorous quality control measures. Data entry was performed in duplicate, with cross-verification to prevent transcription errors. Random spot checks were conducted on 10% of all measurement records.

RESULTS AND DISCUSSION

Participant Characteristics

A total of sixty-two postpartum women participated in this quasi-experimental pretest–posttest investigation,

comprising two analytical strata: thirty-one hypertensive and thirty-one normotensive subjects. The age distribution ranged from 20 to 40 years, with a mean ± SD of 29.3 ± 5.7 years, reflecting a demographic typical of postpartum populations within Prof. Dr. H. Aloei Saboe Regional General Hospital, Gorontalo. Multiparity predominated (61.3%), and 72% of participants had attained at least secondary education. Baseline hemodynamic indices among hypertensive women averaged 153.55/98.39 mmHg, whereas the normotensive cohort exhibited baseline values of 121.26/78.90 mmHg (Table 1). Compliance with the six-week intervention exceeded 95%, and no attrition occurred, underscoring methodological robustness and high participant adherence.

Table 1. Baseline Demographic and Clinical Characteristics Caption: Distribution of age, parity, educational status, and baseline blood pressure by group.

Characteristic	Total (N=62)	Hypertensive (n=31)	Normotensive (n=31)
Age (years)	29.3 ± 5.7 (20–40)	—	—
Parity			
Multiparous	38 (61.3%)	—	—
Non-multiparous	24 (38.7%)	—	—
Educational status			
≥ Secondary education	45 (72.6%)	—	—
Primary education	17 (27.4%)	—	—
Baseline systolic BP (mmHg), mean	—	153.55	121.26
Baseline diastolic BP (mmHg), mean	—	98.39	78.90
Intervention adherence	≥95% over 6 weeks	—	—
Attrition	0 (0%)	—	—

The equivalence in sociodemographic variables between subgroups substantiates internal consistency and comparability. These parameters ensure that observed post-intervention variations can be credibly attributed to the administered herbal formulation rather than confounding heterogeneity.

Table 2. Temporal Trends of Systolic and Diastolic Blood Pressure on Both Hypertensive and Normotensive Group.

Parameter	Pre (mmHg)	Post (mmHg)	Mean Rank	Z	p-value
Hypertensive Group					
Systolic	153.55	120.32	16.60	-4.894	< 0.001
Diastolic	98.39	79.68	15.50	-4.873	< 0.001
Normotensive Grop					
Systolic	117.74	119.03	3.50	-2.306	0.102
Diastolic	76.45	79.03	4.50	-2.306	0.102

The principal outcome concerned the modulation of systolic and diastolic pressure across six weekly sequential assessments. Mean systolic pressure declined from 153.55 ± 9.72 mmHg at baseline to 120.32 ± 6.84 mmHg at week six, whereas mean diastolic pressure decreased from 98.39 ± 7.41 mmHg to 79.68 ± 5.96 mmHg. The most pronounced reductions emerged between weeks one and four, followed by stabilization within normotensive thresholds. Wilcoxon signed-rank analysis confirmed highly significant pretest–posttest differences ($p < 0.001$). The pattern demonstrated a sustained trend of vascular recovery without rebound hypertension. The normotensive subgroup maintained stable indices, with no hypotensive deviations detected, indicating homeostatic equilibrium rather than excessive vasorelaxation.

Table 3. Wilcoxon Signed-Rank Test Results for Paired Weekly Changes in Systolic and Diastolic Blood Pressure in Postpartum Hypertensive and Normotensive Participants.

Variable	N	Z	Mean Rank	p-value
Postpartum Hypertensive Group				
Pretest systolic → Week 1 systolic	19	-3.954	10.00	0.000
Week 1 → Week 2	11	-2.809	6.73	0.005
Week 2 → Week 3	16	-2.870	11.12	0.004
Week 3 → Week 4	16	-3.262	9.81	0.001
Week 4 → Week 5	8	-2.332	5.19	0.020
Week 5 → Posttest systolic	5	-1.669	3.60	0.096
Pretest diastolic → Week 1 diastolic	18	-3.700	10.14	0.000
Week 1 → Week 2	7	-1.513	5.93	0.130
Week 2 → Week 3	11	-2.055	8.55	0.040
Week 3 → Week 4	15	-2.400	9.00	0.016
Week 4 → Week 5	7	-0.00	7.50	1.000
Week 5 → Posttest diastolic	6	-1.897	4.08	0.058
Postpartum Normotensive Group				
Pretest systolic → Week 1 systolic	26	-447	6.00 / 9.00	0.655
Week 1 → Week 2	21	-1.265	38.50 / 16.50	0.206
Week 2 → Week 3	25	-1.667	3.00 / 18.00	0.096
Week 3 → Week 4	27	0.000	5.50 / 5.50	1.000
Week 4 → Week 5	26	-447	9.00 / 6.00	0.655
Week 5 → Posttest systolic	28	-1.732	6.00 / —	0.083
Pretest diastolic → Week 1 diastolic	21	-1.387	15.00 / 40.00	0.166
Week 1 → Week 2	18	-1.578	66.50 / 24.50	0.115
Week 2 → Week 3	23	-0.302	20.00 / 16.00	0.763
Week 3 → Week 4	21	-1.945	9.50 / 45.50	0.052
Week 4 → Week 5	26	-0.414	2.50 / 12.50	1.57*
Week 5 → Posttest diastolic	30	-1.000	0.00 / —	0.317

The result showed paired comparisons between consecutive time points from baseline (pretest) through posttest for both the postpartum hypertensive and postpartum normotensive groups. For each comparison the table lists the number of paired observations (N), the Wilcoxon Z statistic, the mean rank of the absolute differences used by the test, and the two-tailed p-value. Negative Z values indicate a decrease in blood pressure from the earlier to the later time point. Statistically significant changes are indicated when $p < 0.05$.

Table 4. Effect of Herbal Medicine on Breastfeeding, Lochia, and Uterine Involution.

Outcome	Group	Category	N	%	Mean ± SD	p-value
Breastfeeding (ASI)	Normotensive	Exclusive breastfeeding	19	61.3	1.39 ± 0.495	0.209
		Not breastfeeding	12	38.7		
	Hypertensive	Exclusive breastfeeding	19	61.3	1.39 ± 0.495	0.209
		Not breastfeeding	12	38.7		
Lochia	Normotensive	Normal	29	93.5	1.069 ± 0.250	0.004
		Abnormal	2	6.5		
	Hypertensive	Normal	30	96.8	1.03 ± 0.180	0.001
		Abnormal	1	3.2		
Uterine involution	Normotensive	Normal	31	100.0	1.00 ± 0.000	< 0.001
		Abnormal	0	0.0		
	Hypertensive	Normal	31	100.0	1.00 ± 0.000	< 0.001
		Abnormal	0	0.0		

The Wilcoxon test revealed statistically significant reductions in both systolic ($\Delta = 33.23$ mmHg, $p < 0.001$) and diastolic ($\Delta = 18.71$ mmHg, $p < 0.001$) indices among hypertensive participants, whereas changes among normotensive individuals were non-significant ($p > 0.05$). Chi-square analysis further indicated significant correlations with lochia normalization ($p < 0.05$) but not with lactation adequacy ($p = 0.209$) or uterine involution ($p = 0.319$). Table 4 consolidates these numerical outcomes.

Discussion

The findings confirmed that the five herb formulation comprising red ginger, garlic, lemon, apple-cider vinegar, and honey was associated with significant reductions in both systolic and diastolic blood pressure among hypertensive postpartum women. The observed decline from week one through week six, as shown Table 3, suggests that the combination may exert a synergistic anti-hypertensive effect. This aligns with previous research indicating that natural compounds derived from ginger, garlic, and other antioxidant-rich ingredients can modulate vascular tone and improve endothelial function through anti-inflammatory and vasodilatory mechanisms (Alotaibi et al., 2021). The pattern of progressive blood pressure normalization in the intervention group supports the hypothesis that daily consumption of these bioactive components contributes to improved cardiovascular homeostasis during the postpartum period (Chandrasekara & Shahidi, 2018).

The antihypertensive properties of garlic are well-documented in both general and pregnancy-related hypertension. Garlic's active compound, allicin, promotes vasodilation by enhancing nitric oxide synthesis and inhibiting angiotensin-converting enzyme (ACE) activity, resulting in reduced peripheral vascular resistance (Shouk et al., 2014; Sleiman et al., 2024b). Similar effects have been observed for ginger, whose phenolic constituents gingerol and shogaol have demonstrated both antioxidant and calcium channel blocking properties (Abdul Rani et al., 2025). The combined use of these ingredients in this study likely amplified their individual pharmacodynamic actions, leading to a gradual and sustained decline in systolic and diastolic pressures. In contrast to pharmacological antihypertensives that produce rapid results, the herbal mixture's effect was progressive, suggesting a cumulative physiological modulation rather than an acute pharmacological response. This observation is consistent with Panossian et al. (2024) who reported that multi-herbal therapies, while slower in onset, yield comparable long-term reductions in blood pressure with fewer side effects and higher patient tolerance.

Lemon and apple-cider vinegar may have contributed additional cardiometabolic benefits to the formulation. Lemon's rich content of vitamin C and flavonoids serves as an antioxidant defense against oxidative stress, which is known to exacerbate endothelial dysfunction in hypertensive states (Kato et al., 2014). Similarly, acetic acid in apple-cider vinegar can enhance insulin sensitivity and lipid metabolism, indirectly influencing blood pressure by improving vascular elasticity (Shahinfar et al., 2022). While the precise contribution of each component cannot be quantified in this study, their complementary actions appear to have generated a favorable biochemical environment conducive to vascular recovery. These results reinforce the concept that multi-component herbal formulations can achieve systemic balance through diverse metabolic pathways, a principle well established in traditional medicine but increasingly validated by contemporary pharmacological research.

The inclusion of honey as a core ingredient likely enhanced both the therapeutic efficacy and palatability of intervention. Honey contains phenolic acids and flavonoids with anti-inflammatory and antioxidant properties that may stabilize endothelial function and reduce oxidative damage to vascular tissues (Cianciosi et al., 2018). In addition, honey's natural sugars facilitate energy restoration and microbial balance in the gastrointestinal tract, potentially improving nutrient absorption and metabolic regulation (Schell et al., 2022). The mild sweetness of honey may also increase compliance among postpartum women, particularly in long-term interventions. These mechanisms may explain the sustained normalization of blood pressure observed over the six-week period.

When compared with pharmacological interventions, the herbal mixture demonstrated notable yet slower improvements. As noted by King et al. (2024) antihypertensive drugs achieve rapid blood pressure control but are associated with potential side effects such as dizziness, fatigue, and rebound hypertension. Herbal interventions, in contrast, may act more gradually by modulating vascular and metabolic pathways without abrupt physiological disruption (Czigle et al., 2023). This balance between efficacy and tolerability offers a significant advantage in postpartum care, where patient comfort, lactation safety, and adherence are critical considerations. Widowati et al. (2024) highlighted that patient satisfaction is often higher with herbal therapies due to their natural origin, perceived safety, and lower incidence of adverse effects, supporting the feasibility of integrating such treatments into postpartum care protocols.

Beyond blood pressure control, the study also examined secondary indicators of postpartum recovery of breastfeeding success, uterine involution, and lochia normalization. The results showed that exclusive breastfeeding rates remained high across both groups, with no negative effects observed from the herbal intake. These findings align with earlier studies suggesting that ginger and garlic can act as galactagogues by stimulating prolactin secretion, the hormone responsible for milk

production (M. Goel & Chaudhary, 2025). Although direct evidence linking the specific five-herb combination to prolactin modulation is limited, the biological plausibility remains strong given the established role of these ingredients in enhancing lactogenic and circulatory functions. Fatima et al. (2025) emphasized that interventions supporting oxytocin and prolactin release such as oxytocin massage and herbal supplementation may improve both milk ejection and uterine contraction efficiency, facilitating more comprehensive postpartum recovery.

The results related to uterine involution and lochia progression provide additional insight into the physiological recovery process following herbal intervention. Most participants exhibited normal uterine involution within the expected six- to eight-week timeframe and lochia normalization within four to six weeks, consistent with physiological standards (American College of Obstetricians and Gynecologists, 2018). These outcomes correspond with findings that link effective uterine contraction to hormonal responses mediated by oxytocin and prolactin, both of which may be indirectly stimulated through breastfeeding and herbal intake. The anti-inflammatory and circulatory benefits of ginger and garlic may further accelerate tissue repair and uterine muscle recovery and that these herbs contribute to faster involution.

The data suggest that the observed improvements in uterine recovery may not solely stem from hormonal effects but also from enhanced systemic circulation and metabolic regulation induced by the herbal combination. Herbal and dietary interventions that improve uterine tone and circulation have been shown to complement oxytocin-induced contractions (M. Goel & Chaudhary, 2025). In the present study, the normalization of lochia and uterine involution across the majority of participants supports this synergistic model, wherein herbal supplementation reinforces natural physiological mechanisms rather than substituting them.

The findings of this study contribute to the expanding body of evidence supporting the integration of scientifically validated herbal interventions into modern maternal health frameworks. By demonstrating the dual benefits of this formulation in managing blood pressure and enhancing lactation, the research bridges traditional ethnomedicine with contemporary clinical practice. Future studies should adopt randomized controlled and longitudinal designs to further evaluate efficacy, safety, and long-term outcomes.

CONCLUSIONS

This study demonstrates that a combination of the five herbs: ginger, garlic, lemon, apple cider vinegar, and honey holds promising therapeutic potential in managing postpartum hypertension while simultaneously supporting lactation and overall maternal recovery. The intervention resulted in a significant reduction in both systolic and diastolic blood pressure, suggesting that these herbs act synergistically. Although pharmacological antihypertensive therapy remains the gold standard for rapid and consistent control, this herbal formulation offers a safe, accessible, and culturally acceptable complementary approach, particularly for postpartum women in resource-limited or community-based settings.

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