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Original Research

Acupuncture Therapy Combined with Cucumber Juice (Cucumis Sativus) Reduces Blood Pressure in Hypertension

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ABSTRACT

Background: *Hypertension is a condition of elevated arterial blood pressure that can cause dysfunction of vital organs such as the heart and kidneys. Complementary therapies, such as acupuncture and consumption of cucumber juice, are known to help lower blood pressure. This study aims to determine the effect of acupuncture therapy combined with cucumber juice on blood pressure in hypertensive patients.*

Methods: *This study used a true experimental design with a pretest-post test control group design. The sampling technique used purposive sampling with a sample size of 36 hypertensive patients at the BMI Pringsewu Lampung Primary Clinic who met the inclusion and exclusion criteria. The research instruments used observation sheets and blood pressure measurements with an aneroid sphygmomanometer and stethoscope. Data analysis was performed using univariate and bivariate analysis with the One-Way ANOVA test.*

Results: *The greatest average decrease in systolic blood pressure occurred in the acupuncture therapy group combined with cucumber juice, with a percentage decrease of 13.76% in systolic and 11.10% in diastolic blood pressure. The results of the analysis showed a significant effect on the reduction in systolic blood pressure (F = 6.369; p = 0.005), while the reduction in diastolic blood pressure was not significant (p = 0.205).*

Conclusion: *Acupuncture therapy combined with cucumber juice is effective in lowering systolic blood pressure in hypertensive patients. This combination therapy can be used as a non-pharmacological complementary alternative for controlling hypertension.*

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INTRODUCTION

Hypertension is a non-communicable disease characterized by a persistent increase in arterial blood pressure above normal limits. This condition is often referred to as a silent killer because it does not cause obvious symptoms, but can lead to serious complications such as stroke, heart failure, and chronic kidney disease. WHO data from 2019 shows that more than 1.13 billion people worldwide have hypertension, and

approximately 9.4 million deaths per year are caused by its complications. In Indonesia, the prevalence of hypertension reaches 34.1%, and in Lampung Province it is 24.7% (Riskesdas, 2018; WHO, 2019). This shows that hypertension is still a public health problem that requires effective and affordable interventions to reduce morbidity rates (Riskesdas, 2018; WHO, 2019).

Conventional management of hypertension involves pharmacological therapy and lifestyle changes. However, long-term pharmacological therapy often causes side effects such as kidney damage and drug dependence, necessitating safer complementary approaches. One widely used complementary therapy is acupuncture, which works by stimulating the release of Nitric Oxide (NO) as a natural vasodilator to lower blood pressure (Trisnawati & Jenie, 2019). Recent studies show that stimulation of the GV20 (Baihui) and LV3 (Taichong) points can increase cerebral blood flow and significantly lower blood pressure (Jittiwat, 2017; Fan et al., 2019). Thus, acupuncture has the potential to be an effective non-pharmacological therapy for patients with hypertension (Trisnawati & Jenie, 2019; Jittiwat, 2017; Fan et al., 2019).

In addition to acupuncture, herbal therapies such as cucumber juice (Cucumis sativus) are also known to have antihypertensive effects. The potassium, magnesium, and antioxidant content in cucumbers can lower blood pressure by inhibiting the activity of the renin-angiotensin-aldosterone system (RAAS), widening the lumen of blood vessels, and increasing sodium and water excretion (Negara et al., 2017; Foong et al., 2015). Research results show that consuming cucumber juice for seven days can lower systolic blood pressure by 31.53 mmHg in hypertensive patients (Pringgayuda & Hidayat, 2021). These physiological effects reinforce the potential of cucumber as a supportive therapy for lowering blood pressure (Negara et al., 2017; Foong et al., 2015; Pringgayuda & Hidayat, 2021).

Although acupuncture and cucumber juice have been proven to be effective separately, research combining the two is still very limited. The combination therapy is expected to provide a synergistic effect in lowering blood pressure through a dual mechanism of action: stimulation of acupuncture points that affect the autonomic nervous system, and the potassium content in cucumbers that acts on the cardiovascular system. Previous studies have focused more on the effects of acupuncture alone or cucumber juice consumption, so studies testing both simultaneously are needed to strengthen the evidence for the effectiveness of this combination therapy (Cheong et al., 2014; Darmawan et al., 2019; Fan et al., 2019).

Based on this description, this study is important to determine the effect of acupuncture therapy combined with cucumber juice on blood pressure in patients with hypertension (Trisnawati & Jenie, 2019; WHO, 2019; Pringgayuda & Hidayat, 2021). This study is expected to provide a safe, affordable, and effective complementary treatment alternative for the community. Additionally, the results of this study can serve as a scientific basis for the development of interventions based on the integration of traditional and herbal therapies in the management of hypertension in health services.

MATERIALS AND METHOD

This study used a quantitative approach with a true experimental pretest-posttest control group design. This design was chosen because it is able to describe the causal relationship between the treatment and the results measured objectively. Three treatment groups were used in this study, namely the GV20 (Baihui) and LV3 (Taichong) acupuncture group, the acupuncture group combined with cucumber juice (Cucumis

sativus), and the control group with LV3 (Taichong), LI11 (Quchi), and KI3 (Taixi) acupuncture. This design was chosen so that researchers could compare the effectiveness of each type of intervention in significantly reducing blood pressure.

The study was conducted at the BMI Pringsewu Primary Clinic in Lampung for six months, from May to October 2022. This location was chosen because it had a high number of hypertensive patients and met the research criteria. The research site provided acupuncture therapy facilities that met standard operating procedures (SOPs), so that the interventions could be carried out consistently and safely. The long duration of the study provided researchers with the opportunity to perform repeated therapies and monitor results optimally.

The research population consisted of all hypertensive patients treated at the BMI Pringsewu Primary Clinic, totaling 157 people. The researchers used purposive sampling to determine the sample that met the research criteria. The sample size was 36 respondents, who were then divided into three treatment groups. The inclusion criteria included patients with grade I–II hypertension aged 40–60 years, willing to undergo therapy, and without serious diseases such as heart, kidney, cancer, or diabetes. The exclusion criteria included respondents who withdrew, did not complete the therapy series, were pregnant, underwent other treatments, or were exposed to COVID-19 during the study.

The independent variables in this study were acupuncture therapy and a combination of acupuncture and cucumber juice, while the dependent variables were changes in systolic and diastolic blood pressure after intervention. The research instruments used included patient observation sheets, aneroid sphygmomanometers, and stethoscopes to measure blood pressure before and after therapy. Cucumber juice was made according to standard operating procedures (SOP) with 200 grams of fresh cucumber blended and filtered to produce 350 ml of cucumber juice plus 50 ml of boiled water. Acupuncture therapy was performed twice a week for five weeks using Huan Qiu needles measuring 1 and 1.5 cun. To maintain validity, blood pressure measurements were taken by trained medical personnel using standardized equipment. The reliability of the instruments was maintained through calibration of the measuring equipment before each session.

The data collection procedure began with the selection of respondents based on inclusion and exclusion criteria. The researchers explained the purpose, benefits, and procedures of the study to the respondents before the therapy began. Each respondent underwent an initial blood pressure examination (pretest), then received the intervention according to their group, and was measured again after ten therapy sessions (posttest). The measurement results were recorded in an observation sheet, then processed to determine changes in blood pressure before and after treatment. Data collection was carried out with attention to the safety, comfort, and confidentiality of the respondents' identities during the research process.

Data analysis was performed using SPSS Software version 25. Univariate analysis was used to describe the characteristics of the respondents, while bivariate analysis was used to test the effect of the intervention on blood pressure. The normality test was performed using the Shapiro-Wilk test, and the homogeneity test was performed using the Levene test. If the data were normally distributed and homogeneous, One Way ANOVA was used, followed by a Post Hoc LSD test to determine the differences between groups. This study obtained ethical approval from the Research Ethics Committee of the

Surakarta Polytechnic of Health, and all respondents signed an informed consent form before the intervention was carried out.

RESULTS

Table 1. Respondent Characteristics Based on Age, Gender, and Occupation (n = 36)

Characteristics	Category	Frequency (f)	Percentage
Age (years)	40–44	7	19.4
	45–49	14	38.9
	50–54	6	16.7
	55–60	9	25
Gender	Male	11	30.6
	Female	25	69.4
Occupation	Farmer	8	22.2
	Civil servant	3	8.3
	Laborer	5	13.9
	Self-employed	12	33
	Housewife	7	19.4
	Driver	1	2.8

Table 1 shows that most respondents were aged 45–49 years (38.9%), indicating that hypertension is common in middle-aged individuals who begin to experience a decline in blood vessel elasticity. The majority of respondents were female (69.4%), indicating an increased risk of postmenopausal hypertension due to a decline in estrogen levels. Based on occupation, most respondents worked as entrepreneurs (33.3%), who tend to have low physical activity and high work stress, putting them at risk for hypertension.

Table 2. Average Systolic and Diastolic Blood Pressure Before and After Therapy (mmHg)

Group	Systolic Pre-test	Posttest systolic	Diastolic Pretest	Posttest diastolic
Acupuncture (K1)	145.00	132.50	97.08	89.17
Acupuncture + Cucumber Juice (K2)	148.33	127.92	97.50	86.67
Acupuncture Control (K3)	145.83	133.75	90.83	90.83

Table 2 shows that the average systolic and diastolic blood pressure decreased after intervention in all groups. The highest decrease occurred in the combination therapy group of acupuncture and cucumber juice (K2), with an average systolic decrease from 148.33 mmHg to 127.92 mmHg and diastolic from 97.50 mmHg to 86.67 mmHg. These results indicate that combination therapy has a stronger physiological effect than single acupuncture therapy or the control group.

Table 3. Percentage Reduction in Systolic and Diastolic Blood Pressure After Therapy (%)

Group	Systolic Reduction (%)	Diastolic Reduction (%)
K1 (Acupuncture)	8.62	9.53
K2 (Acupuncture + Cucumber Juice)	**13.76**	**11.10**
K3 (Control)	8.28	6.84

Table 3. Shows the percentage decrease in blood pressure, with the highest results in the combination group of acupuncture and cucumber juice (K2), namely 13.76% for systolic and 11.10% for diastolic. The single acupuncture group (K1) showed a moderate decrease, while the control group (K3) experienced the lowest decrease. This proves that combination therapy provides a synergistic effect in lowering blood pressure more significantly than the other groups.

Table 4. Results of the One-Way ANOVA Test for Blood Pressure Reduction Among Groups (n = 36)

Variable	F	p-value	Description
Systolic	6.369	**0.005**	Significant
Diastolic	1.662	0.205	Not significant

Table 4 shows the results of the *One-Way ANOVA* test, indicating that there is a significant difference in systolic blood pressure reduction between groups ($F = 6.369$; $p = 0.005$). A p-value < 0.05 indicates a significant effect of therapy on systolic blood pressure reduction. Conversely, the decrease in diastolic blood pressure showed insignificant results ($p = 0.205$). Thus, the combination therapy of acupuncture and cucumber juice proved to be more effective in lowering systolic blood pressure than single therapy.

Table 5. Results of the LSD Post Hoc Test for Systolic Blood Pressure Reduction Between Groups

Group Comparison	Mean Difference (I–J)	p-value	Description
K1 – K2	-7.917	0.013	Significant
K2 – K3	8.333	0.009	Significant
K1 – K3	0.417	0.986	Not significant

Table 5. Shows the results of the *Post Hoc LSD* test, indicating that there is a significant difference between the acupuncture + cucumber juice group (K2) and the acupuncture group (K1) and the control group (K3) with *p-values* of 0.013 and 0.009, respectively. These results reinforce the finding that combination therapy has the greatest effect on reducing systolic blood pressure compared to single acupuncture therapy or control.

DISCUSSION

The results of this study indicate that acupuncture therapy combined with cucumber juice is more effective in lowering blood pressure in hypertensive patients than acupuncture therapy alone or the control group. The combination of these two therapies was able to lower systolic and diastolic blood pressure more optimally after ten treatments. The greater reduction in blood pressure in the combination group indicates a

synergistic effect between the stimulation of the acupuncture points GV 20 (Baihui) and LV 3 (Taichong) and the bioactive content in cucumber juice. These results confirm that a complementary therapy approach involving neurophysiological and natural nutritional aspects can provide significant benefits for hypertensive patients (Hariyanto, 2020; Fan et al., 2019).

These findings align with the theory that acupuncture point stimulation can lower blood pressure through the mechanism of sympathetic nervous system inhibition. Needle stimulation at the GV 20 and LV 3 points reduces excessive autonomic nervous system activity and triggers the release of nitric oxide (NO) from the blood vessel endothelium. NO acts as a vasodilator that increases blood flow and reduces peripheral resistance (Trisnawati & Jenie, 2019). Research by Zhang et al. (2014) also explains that acupuncture significantly increases NO levels in hypertensive patients, which leads to a decrease in blood pressure and an increase in blood vessel elasticity. Thus, acupuncture therapy can restore the balance of the autonomic nervous system and improve cardiovascular function.

The greater blood pressure-lowering effect in the combination group is due to the potassium and magnesium content in cucumber juice. Potassium lowers blood pressure by inhibiting the renin-angiotensin-aldosterone system (RAAS), reducing aldosterone secretion, and increasing sodium and water excretion through the kidneys. This process reduces blood volume and cardiac workload, thereby lowering blood pressure (Negara et al., 2017). Additionally, the vitamin C and antioxidant content in cucumbers helps maintain endothelial integrity and reduce oxidative stress, which is one of the triggers of hypertension (Foong et al., 2015). The combination of these two mechanisms explains why the acupuncture + cucumber juice group had the highest blood pressure reduction.

The results of this study support the findings of Falasifah and Noer (2014), who stated that consuming 150 ml of cucumber juice per day for 7 days can significantly lower blood pressure. This study also reinforces the report by Darmawan et al. (2019) that stimulation of the GV 20 and LV 3 points can reduce renin secretion and angiotensin levels, thereby inhibiting blood vessel constriction. Thus, the combination of acupuncture and cucumber juice works through two mechanistic pathways, namely autonomic nervous system modulation and RAAS hormonal regulation. The integration of these two approaches has the potential to be developed as an effective, safe, and affordable non-pharmacological therapy for hypertensive patients in primary health care.

Practically, the results of this study have implications for health workers, especially nurses and acupuncture therapists. The combination of acupuncture and cucumber juice can be used as a complementary intervention to help lower blood pressure in patients who do not yet require pharmacological therapy or who want to reduce their dose of antihypertensive drugs. This therapy can also be applied in clinics and in the community under the supervision of medical personnel. The implementation of nutrition education programs on the benefits of potassium and magnesium from fresh vegetables needs to be strengthened to support blood pressure control in adults and the elderly (Pringgayuda & Hidayat, 2021).

This study has several methodological limitations. The relatively small sample size may affect the generalization of the results, while lifestyle variables such as diet, physical activity, and stress were not fully controlled during the intervention. The relatively short duration of therapy also limits the assessment of long- fects. Therefore, further research with a randomized controlled trial design and a longer intervention duration is recommended to evaluate the consistency and safety of this combination therapy. Future

studies should also include biomarker tests such as NO levels or RAAS hormones to strengthen physiological evidence.

Based on these findings, it is recommended that healthcare professionals consider the combination therapy of acupuncture and cucumber juice as a complementary therapy alternative to lower blood pressure in patients with mild to moderate hypertension. This therapy can be applied continuously in traditional health facilities and community clinics with adequate training for therapists. Additionally, patients are advised to adopt a healthy lifestyle, increase consumption of potassium-rich vegetables, and undergo regular acupuncture therapy. Thus, the integration of natural therapy and acupuncture has the potential to strengthen national strategies for controlling non-communicable diseases based on traditional and promotive approaches (WHO, 2019).

CONCLUSION

The results of this study indicate that acupuncture therapy combined with cucumber juice (Cucumis sativus) consumption is effective in lowering blood pressure in hypertensive patients at the BMI Pringsewu Lampung Primary Clinic. The reduction in systolic blood pressure was more significant than with acupuncture therapy alone or the control group, while the reduction in diastolic blood pressure did not show a significant difference. The effectiveness of this combination therapy is thought to occur through the mechanism of acupuncture point stimulation, which increases the release of nitric oxide and the potassium and magnesium content in cucumbers, which helps reduce vascular resistance. These results reinforce the potential for integrating traditional and herbal therapies into safe, inexpensive, and easy-to-apply non-pharmacological complementary interventions for hypertension control in primary health care.

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