Jurnal Keterapian Fisik
Vol. 10, No. 2, November 2025
https://doi.org/10.37341/jkf.v10i2.459

Original Research

Evaluating the Therapeutic Effect of Taichong (LR3) and Zusanli (ST36) on Hypertension in the Elderly

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ABSTRACT

Background: *Hypertension is a health problem commonly experienced by the elderly and is one of the most prevalent conditions in this age group. The effect of acupuncture in lowering blood pressure includes regulating vasoactive substances in the blood vessel endothelium. One of the active substances known to be affected by release and activation through acupuncture is Nitric Oxide (NO). This study aimed to determine the effectiveness of taichong and zusanli points of acupuncture for hypertension patients.*

Methods: *This study employed a one-group pre-test–post-test pre-experimental design involving 40 elderly participants selected through accidental sampling during an elderly exercise program. Acupuncture intervention was performed on the LR3 and ST36 points according to clinical guidelines for 10 minutes per session by certified practitioners, with close monitoring and no reported side effects. Data were analyzed using SPSS version 22, and post-intervention comparisons were conducted using paired samples t-test.*

Results: *The analysis showed a reduction in mean systolic blood pressure of 10.95 mmHg after the acupuncture intervention (95% CI: 155.53 to 165.87, p-value < 0.01), indicating a statistically significant pre–post difference within the sample. In contrast, the mean diastolic blood pressure decreased by 1.15 mmHg (95% CI: 76.76 to 84.19, p-value > 0.05), suggesting no statistically significant change.*

Conclusion: *These findings reflect an improvement in systolic, but not diastolic, blood pressure among the participating elderly individuals. Acupuncture shows potential as a supportive therapy in lowering systolic blood pressure in the elderly.*

ARTICLE HISTORY
Received: February 13th, 2025
Accepted: December 4th, 2025

KEYWORDS
acupuncture; complementary; hypertension; taichong, zusanli;

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Cite this as: Darmawati, I. D. A. A., Rastiti, I. A. A., & Strisanti, I. A. S. (2025). Evaluating the Therapeutic Effect of Taichong (LR3) and Zusanli (ST36) on Hypertension in the Elderly. *Jurnal Keterapian Fisik*, *10*(2), 131-138. https://jurnalketerapianfisik.com/index.php/jpt/article/view/459

INTRODUCTION

In the Technical Service Unit (UPT) in Gianyar Regency, there were 10.097 visits for hypertension cases found in the Payangan District and most cases (Astiari, 2016; Gianyar, 2022). Based on the survey conducted by the ITEKES Bali Field Work Practice

students in Melinggih Village in 2023, it was found that out of 217 elderly respondents, 171 elderly people suffered from hypertension spread across five hamlets Association, such as Sema, Badung, Payangan Desa, Melinggih, and Geria (Dharmapatni et al., 2023). Hypertension is a degenerative disease caused by an unhealthy lifestyle, such as lack of physical activity, smoking habits, high-fat and high-calorie foods, and alcohol consumption habits. Hypertension or high blood pressure is a condition where the pressure in blood vessels is consistently too high (140/90 mmHg or higher) (Christiyawati & Purwanto, 2021).

The role of renin and angiotensin is most important for blood pressure regulation. Renin produced in the kidneys plays an important role as an enzyme for the separation of angiotensin I, and the converting enzyme plays a role as a separator of angiotensin II, which then becomes angiotensin III. The increase in persons who have blood pressure is due to the inhibiting effect of sodium secretion in angiotensin I and III. Disruption of sodium excretion, renal perfusion, and the renin-angiotensin-aldosterone system due to glomerulonephritis or renal artery stenosis caused by chronic kidney disease. This is a cause of increased blood pressure in a person (Kamil & Septiawan, 2020).

According to a report by The New York State Commission on Acupuncture, hypertension is a disease that can often be treated with acupuncture (Hasnah & Dian Ekawati, 2016; Rustiati, 2022). Several studies have shown reduced blood pressure by acupuncture, both prehypertension and hypertension (Kusuma et al., 2021; Nompo, 2020; Wijayanti et al., 2023). Acupuncture therapy can harmonize the flow of Qi and blood that will, relax spasms, and lower blood pressure (Kamaliyah et al., 2020).

Needling on acupoint LV3 (Taichong) causes a decrease in blood pressure accompanied by a decrease in plasma angiotensin II, and can stimulate the release of neurotransmitters, especially serotonin and norepinephrine, so that it will affect decreasing blood pressure. In addition, ST 36 (Zusanli) has been proven to be able to lower blood pressure and increase NO/NOS activity, which plays a role in relaxing the smooth muscle of blood vessels (Hariyanto et al., 2020). Preliminary findings from a community health screening conducted in Melinggih Village identified 171 out of 217 elderly residents across five hamlets as hypertensive based on two consecutive blood pressure measurements taken 5 minutes apart.

This indicates an urgent need for effective complementary interventions to support blood pressure management in this population. Although previous studies have demonstrated the potential of acupuncture particularly at Taichong (LR3) and Zusanli (ST36) to reduce blood pressure through neuroendocrine and vasodilatory mechanisms, these findings have not yet been examined or validated within the elderly population of Banjar Payangan Desa. There is currently no empirical evidence assessing pre- and post-blood pressure changes following acupuncture at LR3 and ST36 specifically among hypertensive older adults in this community.

Existing studies have primarily evaluated the effects of LR3 and ST36 acupuncture on hypertension in general populations or controlled clinical settings. However, no study has specifically investigated its impact among elderly hypertensive individuals in rural community settings such as Banjar Payangan Desa, where hypertension rates are high and non-pharmacological interventions remain underutilized. This gap highlights the need for localized evidence to support community-based acupuncture interventions. Through the explanation above, this study aims to identify the effectiveness of acupuncture therapy in the elderly with hypertension in Payangan Desa Hamlet, Melinggih Village, Payangan District.

MATERIALS AND METHOD

This study used a pre-experiment with one group pre-test and post-test control group design. This design was chosen because it allowed researchers to observe immediate physiological changes before and after acupuncture in the same group, making it suitable for preliminary studies with limited resources, time, and respondent access. The study population was a group of elderly people in Melinggih village who had a high prevalence of hypertension, making them relevant for assessing the initial response to acupuncture intervention.

The research sample was taken by accidental sampling with a sample size of 40 people who attended the elderly exercise activity. The use of accidental (convenience) sampling introduces substantial selection bias, as participants were recruited based on their availability during the elderly exercise activity. The choice of sampling technique was influenced by practical constraints related to researcher access and respondent availability. The inclusion criteria of the participants were that: (1) they were willing to be subjects of the study by filling out informed consent; and (2) cooperating during the research process. Have blood pressure above systolic ≥140 mmHg and/or diastolic blood pressure ≥ 90 mmHg, respondent sufferers with or without drug therapy. The sample exclusion criteria in this research include people who cannot read and write and hypertension sufferers with severe complications.

The research variables consisted of independent variables in the form of acupuncture stimulation at the Taichong (LR3) and Zusanli (ST36) points and dependent variables in the form of systolic and diastolic blood pressure in the elderly. The acupuncture intervention followed standard clinical practice guidelines. Sterile, single-use stainless-steel needles (0.25 × 40 mm) were inserted at Taichong (LR3) and Zusanli (ST36) bilaterally.

Needles were inserted to a depth of approximately 0.5–1 cun at LR3 and 1–1.5 cun at ST36, depending on participants' body habitus. Manual stimulation was performed using mild rotation until the deqi sensation was achieved. Each treatment session lasted approximately 10 minutes. All procedures were conducted by a certified acupuncture practitioner with formal training and licensure. Participants were monitored continuously for potential adverse reactions, including dizziness, pain, bleeding, or signs of infection; no serious side effects were reported during the intervention period. The data on blood pressure was collected before and after treatment of acupuncture. The instrument in this study used an observation sheet and a sphygmomanometer. The sphygmomanometer used has clinically standardised validity and reliability, enabling it to provide consistent and accurate blood pressure measurements in public health settings.

The Shapiro–Wilk test indicated that both the pretest and posttest scores were normally distributed (pretest: p-value = 0.200; posttest: p-value = 0.192). Because both p-values exceeded 0.05, the data satisfied the normality assumption required for performing the paired samples t-test. Data were analyzed using SPSS (IBM, version 22). The analysis of the paired samples t-test was conducted to compare the post-test treatment.

This study was approved by the Committee of Research of the Institute of Technology and Health Bali with an ethical approval letter number (No.04.0331/KEPITEKES-BALI/IX/2024). The subjects were asked to consent to participate in the study before the research began. Participants were informed about the study's objectives, procedures, potential risks, and benefits before signing the informed consent form. Although ethical clearance was obtained, additional details regarding

patient protection procedures were not described in the initial report. Safety monitoring was implemented throughout the intervention to detect adverse events, and participants were free to withdraw at any time without consequence.

RESULTS

Table 1. Baseline Blood Pressure Characteristics of Participants (n = 40)

Blood Pressure	Mean ± SD (mmHg)	Min–Max (mmHg)	95% CI (mmHg)
Systolic	160.70 ± 16.18	135–219	155.53–165.87
Diastolic	80.48 ± 11.61	55–110	76.76–84.19

Based on Table 1, it can be seen from 40 respondents that the average systolic blood pressure before acupuncture therapy was 160.70 mmHg with a standard deviation of 16.18. Meanwhile, the average diastolic blood pressure before acupuncture therapy was 80.48 mmHg, with a standard deviation of 11.61. The lowest value of diastolic blood pressure before acupuncture therapy was 55 mmHg, and the highest value was 110 mmHg.

Table 2. The Comparison of Blood Pressure Tests Before and After Acupuncture (n = 40)

Blood Pressure	Value				*p-value**
	Before		After		
	Mean	SD	Mean	SD	
Systole	160.70	16.18	149.75	15.99	**<0.001**
Diastole	80.48	11.61	79.33	11.34	0.464

Note: *t-test dependent

The results of the study are shown in Table 2 that there is a decrease in mean systolic blood pressure after acupuncture therapy of 10.95 mmHg with a p-value <0.05. Meanwhile, the average decrease in diastolic blood pressure was 1.15 mmHg with a p-value > 0.05, which means that there was no significant difference between diastolic blood pressure before and after acupuncture therapy.

DISCUSSION

According to the findings of this study, Blood pressure analysis in respondents before acupuncture therapy in Table 1 can be influenced by several factors such as genetic factors, biological changes that occur due to the aging process, and unhealthy lifestyles (Hariyanto, 2020). When the heart pumps a lot of blood and has narrow arteries that hold back the flow, it causes high blood pressure. Hypertension in the elderly will be exacerbated by changes in mechanical hemodynamics, arterial stiffness, neurohormonal and autonomic dysregulation, and decreased kidney function (Cita et al., 2023).

The mechanism of blood pressure reduction with acupuncture is still not fully understood. This is because the pathophysiology of hypertension itself is very complex and influenced by the interaction of various factors. Segmentally, through puncture at a certain point is a stimulus to the afferent nerve, which will be forwarded to the posterior horn of the spinal cord, then to the inter-mediolateral horn, then to the autonomic nervous system, which causes inhibition of sympathetic stimulation, thus causing vasodilation (Cita et al., 2023).

Acupuncture stimulation on collateral axons containing CGRP (calcitonin gene-related peptide) and synapses between axons with sympathetic nerve endings around blood vessels. The release of acetylcholine by activated sympathetic nerve endings causes local vasodilation around the acupuncture site. The occurrence of vasodilation and increased capillary permeability causes various metabolic wastes to be transported, and the supply of Adenosine Triphosphate (ATP), nutrients, and oxygen to be smooth (Yoriko et al., 2023).

Other effects of acupuncture in lowering blood pressure include regulating vasoactive substances in the endothelium of blood vessels. One of the vasoactive substances known to be able to be influenced by its release and activation through acupuncture is Nitric Oxide (NO). Needling at acupuncture points will stimulate parasympathetic nerve tone and suppress sympathetic nerve tone. The parasympathetic producing acetylcholine, where the binding of acetylcholine to endothelial cells will induce the formation of local Nitric Oxide in the endothelium, which then diffuses into the smooth muscle of blood vessels and changes local blood flow and circulation, where relaxation of the smooth muscle of blood vessels occurs (Astuti et al., 2023; Hamsih & Septiawan, 2021).

In this research, needle pricking was carried out at meridian points, including ST 36 (Zusanli) and LV 3 (Taichong), because this acupuncture point has been proven by evidence-based Medicine (EBM) to have a curative effect almost the same as the antihypertensive drug reserpine. The result showed a significant decrease in systole pressure however; it was not seen in diastolic pressure because the patient's diastolic pressure was close to normal. The needle was inserted into the acupuncture point for 10 minutes. Needle pricking at point LV3 (Taichong) causes a decrease in blood pressure accompanied by a decrease in plasma angiotensin II (Wardoyo et al., 2022).

Needle pricking at LV 3 (Taichong) can also stimulate the release of endorphin hormones, which can smooth the flow of qi in the body and provide a feeling of relaxation in the body (Kamil & Septiawan, 2020). In addition, needle pricking at points LV3 (Taichong) and SP6 (Sanyinjiao) can stimulate the release of neurotransmitters, especially serotonin and norepinephrine, which will affect the lowering of blood pressure. This shows that the renin-angiotensin system plays an important role in lowering blood pressure with acupuncture (Hariyanto, 2020).

In addition, experimentally, the ST 36 point has been proven to lower blood pressure and increase NO/NOS activity, which plays a role in relaxing the smooth muscles of blood vessels. This is in line with the previous research on acupuncture, which was conducted on rats with renal hypertension, it was found that acupuncture at the Zusanli and Shenshu points remarkably lowered blood pressure, accompanied by a decrease in plasma ET and increased plasma NO (Darmawan et al., 2019; Hasnah & Dian Ekawati, 2016). In addition, needle insertion at the Zusanli point will stimulate the parasympathetic nerves and will cause the effect of dilating blood vessels and slowing the heart rate so that blood pressure decreases (Yoriko et al., 2023). The acupuncture mechanism affects several systems, such as reflexes, autonomic nerves, neuroendocrine, neurohumoral, and the central nervous system, which will stimulate the balance of Yin and Yang (Gea et al., 2023).

In our pre-experimental sample, acupuncture treatment at Taichong (LR3) and Zusanli (ST36) was associated with a clinically noticeable reduction in mean systolic blood pressure but not in mean diastolic blood pressure. Given the single-group pre–post design, these within-sample changes should be interpreted as preliminary observations

rather than evidence of a causal effect. This pre-experimental study found that acupuncture at Taichong (LR3) and Zusanli (ST36) was associated with a reduction in systolic blood pressure among elderly participants, aligning with prior evidence of autonomic modulation, vasodilation, and renin–angiotensin system involvement.

However, the absence of a control group, small sample size, accidental sampling, and uncontrolled confounders (medication, stress, diet, daily activity) limit causal interpretation and generalizability. Short treatment duration and limited procedural detail further constrain internal validity. Despite these limitations, the findings suggest potential benefit and feasibility of acupuncture in elderly hypertensive populations. Future studies should employ randomized controlled designs, standardized protocols, appropriate blinding, larger samples, extended follow-up, and incorporation of physiological markers (e.g., NO levels, autonomic function) to clarify mechanisms and strengthen the evidence base for acupuncture as an adjunctive therapy for hypertension.

CONCLUSION

Acupuncture at Taichong (LR3) and Zusanli (ST36) was associated with a significant reduction in systolic blood pressure among elderly participants with hypertension, while no significant change was observed in diastolic blood pressure. These findings indicate that acupuncture has the potential to be a complementary therapy that supports the management of systolic blood pressure in the elderly and needs to be further investigated through more rigorously controlled studies.

ACKNOWLEDGEMENT

The author would like to thank the Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) of the Institute Technology and Health of Bali as the funder of this research. The authors declare there is no conflict of interest with the parties involved in this research.

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

AI tools were used solely for grammar and language editing. The authors take full responsibility for the content and integrity of the manuscript.

CONFLICT OF INTERESTS

The authors declare no conflicts of interest.

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