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Original Research

The Effect of Acupressure Therapy at SP6 And LI4 Points on Lowering Blood Pressure in Elderly with Hypertension

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ABSTRACT

Background: Hypertension is a condition in which blood pressure is higher than normal values of ≥140/≥90 mmHg. Effective blood pressure control is the main goal to prevent and treat hypertension. In addition to pharmacological approaches, blood pressure can be controlled with non-pharmacological approaches such as acupressure therapy. This study aims to determine the effect of acupressure therapy at the SP6 and LI4 points on reducing blood pressure in elderly individuals with hypertension. **Methods:** This study was designed with a quasy-experiment with the type of research pre and post-test with control group with purposive sampling technique. Data were analyzed using the Wilcoxon test and the Mann-Whitney test. The population amounted to 81 elderly people with hypertension with the number of samples used in this study as many as 46 elderly samples with hypertension (23 in intervention group and 23 in control group). The majority of respondents were aged 65-69 years, female, worked as traders, and had elementary school education and did not go to school. Blood pressure was measured using a sphygmomanometer. Acupressure on SP6 and LI4 points was given to the intervention group for 3 weeks with a frequency of 2 times in 1 week, while the control group was given conventional treatment. **Results:** The results of the post-test difference in blood pressure between the intervention group and the control group with the Mann Whitney U-Test test showed a p-value = 0.000 ($p < 0.05$), it can be concluded that there is a significant difference between the intervention group and the control group. **Conclusions:** The study concludes that there is an effect of acupressure therapy at point SP 6 and LI 4 on lowering blood pressure in the elderly with hypertension. It is hoped that the results of the study can be used as an alternative therapy in lowering blood pressure.

Keywords: Acupressure; blood pressure; hypertension

1. INTRODUCTION

Increasing age is a high-risk challenge for the elderly population. The elderly become prone to contracting a disease when compared to the younger population as their physical strength decreases. Elderly can be said to be someone who is over 60 years old.[1] Hypertension or high blood pressure is an increase in systolic blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mmHg in a recurrent state.[2] Chronically elevated arterial blood pressure is

called chronic hypertension where each heartbeat means blood is pumped by the heart to the rest of the body through the arteries. The heart needs to work harder to pump when blood pressure is too high. This can lead to organ damage and other medical conditions.[3]

The prevalence of hypertension in Indonesia according to Riskesdas (2018) shows that 25.8% of the Indonesian population had hypertension in 2013 and an increase in 2018 by 8.3% to 34.11%.[4] Bali Province with the percentage of hypertension incidence obtained through measurement at the age of ≥18 years in 2018 was 29.97%.[5] Based on data from the Bali Health Profile in 2022, the total number of people with hypertension aged >15 years in Bali is 562,519 people. Tabanan Regency is ranked first with 131,099 people with hypertension with the highest prevalence of hypertension in UPTD Puskesmas Kediri I, namely 15,488 people with hypertension.[6] The results of a preliminary study conducted at UPTD Puskesmas Kediri I Tabanan Regency obtained data on 434 people diagnosed with hypertension during July-December 2023. Based on interviews conducted, elderly patients who are detected with hypertension do not know alternative therapies other than taking antihypertensive drugs to relieve hypertension.

Management of hypertension can be done with pharmacological and non-pharmacological approaches. One of the non-pharmacological treatments is acupressure therapy.[7] Acupressure is a therapy that can be performed by any individual by using fingers or tools such as blunt objects as stimulating points in certain parts of the body to balance the energy in the body.[8] Acupressure is a non-invasive treatment with many advantages such as being able to be done independently, minimal side effects, no cost, and acupressure therapy is safe and uses few tools.[9]

A randomized clinical trial conducted by Lin et al. involved 80 participants divided equally into two groups. The experimental group (n=40) received acupressure at the Taichong (LR3) acupoint, while the control group (n=40) received acupressure at a sham acupoint. After adjusting for confounding factors such as age, gender, and medication use, the reduction in both systolic and diastolic blood pressure was found to be significantly greater in the experimental group than in the control group. These results suggest that acupressure at the Taichong acupoint is more effective in lowering blood pressure in hypertensive patients than acupressure at non-specific (sham) points.[10] The SP6 (Sanyinjiao) point, located four fingers above the ankle, is used to treat digestive and genital disorders, ankle edema, constipation, and to promote relaxation by lowering blood pressure. The LI4 (Hegu) acupressure point, located between the first and second metacarpal bones, is used to treat symptoms such as headaches, fever, limb pain, hemiplegia, and to reduce high blood pressure.

In a study entitled Effect of Acupressure Seven Meridian Points on Blood Pressure Changes in Hypertensive Patients conducted on 30 respondents with the method of one group pretest post-test pre-experimental design. The results of this study state that there is an effect of acupressure therapy on blood pressure in hypertensive patients with a p-value <0.05.[11]

Based on the results of the preliminary survey, with many hypertensive elderly who do not know complementary therapy to relieve hypertension, the researcher wants to know the effect of acupressure therapy at points SP 6 and LI 4 on lowering blood pressure in elderly with hypertension in Banjar Sanggulan and Banjar Anyar, Banjar Anyar Village, Kediri District, Tabanan Regency. A preliminary study conducted at UPTD Puskesmas Kediri I, Tabanan Regency, found that 434 individuals received healthcare services and were diagnosed with hypertension by a physician between July and December 2023. Based on interviews, elderly patients diagnosed with hypertension were not aware of alternative therapies other than taking antihypertensive medication to manage their condition. The objective of this study is to determine the effect of acupressure therapy at the SP6 and LI4 points on reducing blood pressure in elderly individuals with hypertension. Research on the effect of acupressure at the SP6 and LI4 points has not yet been conducted at the specified study site. It is hoped that, following this study, elderly individuals with hypertension will gain knowledge about non-pharmacological approaches to controlling blood pressure.

2. METHODS

2.1 Study Design

This study utilized a quasi-experimental research design with a pre-test and post-test method and a control group. This investigation engaged two groups, specifically an intervention group that received treatment and a control group. The tools applied for data collection included the Standard Operating Procedures (SOP) for Accupressure at the SP6 point and LI4 point, blood

pressure measuring instruments (sphygmomanometer), and sheets for documenting blood pressure. The data gathered in this research comprised both primary and secondary data. Primary data were gathered or directly obtained by the researchers via blood pressure assessments conducted before and after the accupressure therapy. Secondary data came from journals, institutions, reports, government agencies, and other references. In this research, the secondary data used were obtained from records of elderly hypertension patient visits at Health Center I Kediri, Tabanan.

2.2 Population

The study was conducted with a total of 46 participants who consented to be part of the sample, divided equally into two groups: 23 in the intervention group and 23 in the control group. The samples were selected from the population based on the research objectives/problems defined by the researchers, ensuring that the selected sample represented the characteristics of the known population. The inclusion criteria included elderly individuals aged ≥60 years residing in Banjar Sanggulan and Banjar Anyar, Banjar Anyar Village, Kediri Subdistrict, Tabanan Regency. Participants were elderly individuals diagnosed with hypertension, having a systolic blood pressure of ≥140 mmHg and a diastolic blood pressure of ≥90 mmHg, and taking antihypertensive medication. They also had no comorbidities/complications, physical disabilities, or psychological disorders, and were willing to participate in the study by signing an informed consent form. The exclusion criteria included elderly individuals with hypertension who withdrew during the study, those experiencing fever, those taking antiplatelet medication, those with accompanying headache, and those in a physically weakened condition

2.3 Data Collection

Slovin's Formula was used to determine the study's sample, which included 46 participants (23 in the intervention group and 23 in the control group). Participants in this study were chosen using a non-probability sampling technique. The data were collected from hypertension patient visit records at Kediri I Public Health Center, Tabanan. The hypertension data were then filtered based on patients residing in Banjar Anyar and Banjar Sanggulan, Kediri Village, Tabanan Regency. Subsequently, blood pressure measurements and direct field interviews were conducted, during which informed consent was obtained. A data collection form was also completed, which included patient information such as name, age, education, occupation, and gender, as well as blood pressure measurement results before and after the acupressure therapy intervention at the SP6 and LI4 points.

2.4 Data Analysis

The data were analyzed using SPSS software. Univariate analysis was conducted to describe the characteristics of the data and to fulfill the research objectives. This analysis aimed to determine the frequency distribution of demographic variables such as age, gender, education level, occupation, and blood pressure measurements before and after the intervention.

Bivariate analysis was used to determine the relationship between the independent and dependent variables. Prior to conducting the bivariate test, a normality test was carried out using the Shapiro-Wilk test, as the sample size was fewer than 100 participants. Since the data were not normally distributed, a non-parametric test was employed. The Wilcoxon signed-rank test was used to examine whether acupressure therapy at the SP6 and LI4 points had a significant effect on reducing blood pressure. A result of $p < 0.05$ indicated that the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted, suggesting a significant effect. Conversely, a p value > 0.05 indicated that H_0 was accepted and H_1 was rejected, suggesting no significant effect.

Furthermore, the Mann-Whitney U test was conducted to assess the difference in mean outcomes between the two groups. A p value < 0.05 indicated a significant difference in the mean values between the groups, whereas a p value > 0.05 indicated no significant difference.

2.5 Ethical Practices

This study followed the ethical guidelines which was approved from the Denpasar Polytechnic Health Research Ethics Commission with reference number DP.04.02/F.XXXII.25/0302/2024. All participants were informed about the purpose and procedures of the study, and written informed consent was obtained prior to participation. All personal data were kept confidential and used solely for research purposes. Participants' identities were anonymized during data processing to ensure privacy.

3. RESULTS

The frequency distribution of respondent characteristics based on age, gender, occupation, and education can be seen in Table 1 below. Based on the findings during the study and relevant theories, it can be assumed that the elderly who have hypertension are mostly in the age range of 65-69 years, then elderly with female gender, elderly who work as traders, and with elementary school education levels. With increasing age and women tend to be more at risk of developing hypertension after menopause. In addition to the decline in physiological function with age, declining estrogen levels can cause increased blood pressure in menopausal women, where the hormone estrogen has been shown to protect blood vessels from damage. In terms of occupation, each job can affect the physical activity of each individual and provide different work pressures that can affect the blood pressure of each individual. In addition, in terms of education, the lower one's level of education can increase one's risk of contracting diseases due to the lack of information and education obtained about health.

Table 1. Characteristics of respondents by age, gender, occupation, and education in Banjar Sanggulan and Banjar Anyar

No.	Characteristics		Intervention Group		Control Group	
			N	%	N	%
1	Age					
		60-64	4	17.4	7	30.4
		65-69	8	34.8	7	30.4
		70-74	8	34.8	4	17.4
		≥75	3	13.0	5	21.7
2	Gender					
		Female	22	95.7	19	82.6
		Male	1	4.3	4	17.4
3	Occupation					
		Farmer/Labor	6	26.1	2	8.7
		Trader	7	30.4	7	30.4
		Self-Employed	0	0.0	1	4.3
		Housewife	6	26.1	6	26.1
		Doesn't work	4	17.4	7	30.4
4	Education					
		Not in school	5	21.7	8	34.8
		Elementary School	9	39.1	6	26.1
		Junior High School	5	21.7	5	21.7
		Senior High School	4	17.4	4	17.4
	Total		23	100	23	100

Based on Table 2 before being given acupressure therapy treatment at points SP 6 and LI 4 in the intervention group, it is known that the average pre-test systole value is 148.00 mmHg with a standard deviation of 6.551 mmHg. The lowest systole blood pressure was 140 mmHg and the highest was 170 mmHg, with a median value of 148 mmHg. After being given treatment for 6 meetings, the average post-test systole value was 131.74 mmHg with a standard deviation of 4.059 mmHg. The lowest systole blood pressure was 126 mmHg and the highest systole blood pressure was 140 mmHg with a mean of 130 mmHg. With a difference of 8.26 mmHg in the mean value of pre-test and post-test systole blood pressure.

The average pre-test diastole pre-test value before treatment was 90.78 mmHg with a standard deviation of 1.678 mmHg. The lowest diastole blood pressure was 90 mmHg and the highest was 96 mmHg, with a median value of 90 mmHg. Whereas after being given treatment for 6 meetings, the average diastole post-test value was 77.48 mmHg with a standard deviation of 3.146 mmHg. The lowest diastole blood pressure was 70 mmHg and the highest diastole blood pressure was 80 mmHg with a median value of 78 mmHg. With a difference of 13.30

mmHg in the mean value of pre-test and post-test diastole blood pressure.

Based on Table 3 before being given conventional treatment in the control group, it is known that the average systole pre-test value before being given treatment is 148.43 mmHg with a standard deviation of 7.260 mmHg. The lowest systole blood pressure was 140 mmHg and the highest was 166 mmHg, with a median value of 146 mmHg. While after being given conventional treatment, the average post-test systole value was 143.83 mmHg with a standard deviation of 5.726 mmHg. The lowest systole blood pressure was 136 mmHg and the highest was 140 mmHg with a median value of 144 mmHg. With a difference of 4.60 mmHg in the mean value of pre-test and post-test systole blood pressure.

Table 2. Distribution of respondents based on blood pressure before and after acupressure therapy intervention at point SP 6 and LI 4 In the intervention group in Banjar Sanggulan

Blood pressure	Before intervention					After intervention				
	N	Mean	Median	SD	Min-max	N	Mean	Median	SD	Min-max
Systole	23	148.00	148.00	6.551	140-170	23	131.74	130.00	4.059	126-140
Diastole	23	90.78	90.00	1.678	90-96	23	77.48	78.00	3.146	70-80

Table 3. Distribution of respondents based on blood pressure before and after conventional treatment in the control group in Banjar Anyar

Blood pressure	Before intervention					After intervention				
	N	Mean	Median	SD	Min-max	N	Mean	Median	SD	Min-max
Systole	23	148.43	146.00	7.260	140-166	23	143.83	144.00	5.726	136-158
Diastole	23	91.74	90.00	2.281	90-98	23	87.48	88.00	1.504	84-90

The average pre-test diastole value before being given conventional treatment was 91.74 mmHg with a standard deviation of 2.281 mmHg. The lowest diastole blood pressure was 90 mmHg and the highest was 98 mmHg, with a mean of 90 mmHg. While after being given conventional treatment, the average post-test diastole value was 87.48 mmHg with a standard deviation of 1.504 mmHg. The lowest diastole blood pressure was 84 mmHg and the highest was 90 mmHg, with a median value of 88 mmHg. With a difference of 4.26 mmHg in the mean value of pre-test and post-test diastole blood pressure.

Based on the theory and research results above, the researcher assumes that the decrease in blood pressure in the control group can occur due to respondents' compliance in taking antihypertensive drugs, physical activity performed, or other factors carried out by the elderly in their daily activities.

Based on Table 4 above, it shows that the results of the Wilcoxon signed rank statistical test in the intervention group obtained a p-value of 0.000 ($p < 0.05$), it can be concluded that the hypothesis is accepted, which means that there is an effect of acupressure therapy at point SP 6 and LI 4 on lowering blood pressure in the elderly with hypertension. The control group showed a p-value of 0.00 ($p < 0.05$) which means that there is an effect of conventional therapy on lowering blood pressure in the elderly with hypertension.

Table 4. Hypothesis test results of the effect of acupressure therapy at point SP 6 and LI 4 on lowering blood pressure in elderly people with hypertension in Banjar Sanggulan and Banjar Anyar

Group	Z	*p*-value
Intervention group		
Pre-test and post-test systole	-4.420[b]	0.000
Pre-test and post-test diastole	-4.237[b]	0.000
Control group		
Pre-test and post-test systole	-3.904[b]	0.000
Pre-test and post-test diastole	-4.311[b]	0.000

Based on the results of the post-test difference test of systolic and diastolic blood pressure in the intervention group and control group in Table 5 which was tested using the Mann-Whitney U Test, the results obtained $p = 0.000$ ($p < 0.05$), so it can be concluded that there is a significant difference between the post-test systolic and diastolic blood pressure of the intervention group and the post-test systolic and diastolic blood pressure of the control group.

Table 5. Differential test results of the effect of acupressure therapy at point SP 6 and LI 4 on decreasing blood pressure in elderly people with hypertension in Banjar Sanggulan and Banjar Anyar

Group	Mann-Whitney U	N	Z	*p*-value
Post-test systole (intervention group with control group)	81,000	23	-4.042[b]	0.000
Post-test diastole (intervention group with control group)	0,000	23	-5.847[b]	0.000

b: based on positive ranks

4. DISCUSSION

Based on Table 1, the data above shows that as we age, the arteries in the body dilate and stiffen, reducing their ability to accommodate and stretch as blood flows through the blood vessels. This results in an increase in blood pressure when the heart contracts. The aging process also disrupts neurohormonal mechanisms such as the renin-angiotensin-aldosterone system, as well as increasing plasma concentrations in the periphery and resulting in glomerulosclerosis and intestinal fibrosis, which in turn increase vasoconstriction and vascular resistance, leading to increased blood pressure (hypertension).[12] Gender has a significant association with the risk of hypertension, especially elderly women have a higher risk of hypertension after experiencing menopause due to a decrease in estrogen hormone levels. Estrogen has been shown to protect blood vessels from damage.[13] According to research from Suryawan et al. (2022), every individual has a job that can affect the level of physical activity performed. Sources of stress in the workplace include heavy workloads, lack of adequate work facilities, unclear roles at work, ill-defined responsibilities, interpersonal problems, and pressure from work and family demands can trigger excessive stress and increased blood pressure.[14] The incidence of hypertension tends to be higher among individuals with low education levels, and tends to decrease as education levels increase. This could be due to the lack of knowledge about health among them.[15]

Giving acupressure therapy can reduce blood pressure in hypertensive patients by applying pressure to predetermined points or meridians so as to stimulate nerve waves which can then increase blood flow, relax spasms, and lower blood pressure, namely points SP 6 and LI 4 which will produce endorphin enzymes from the brain which then cause a sense of comfort and can reduce cortisol levels in the blood through regulation of the HPA axis.[16] Stimulation given at the point will stimulate the sensory nerves around the point of emphasis to the spinal cord. The release of endorphin that occurs after the third pituitary complex of the hypothalamus is activated will provide a sense of calm and comfort in people with hypertension which affects changes in blood pressure. Acupressure has another effect to stimulate the release of serotonin which has a function as a neurotransmitter as a producer of the hormone melatonin which can also lower blood pressure.[17]

Based on the results of the research and the theory above, the researcher assumes that the provision of acupressure therapy at points SP 6 and LI 4 can reduce blood pressure in the elderly with hypertension because the emphasis made at these points can stimulate the hypothalamus to release endorphin hormones which can then make respondents feel calm and relaxed which causes vasodilation of blood vessels and heart rate to slow so that blood pressure decreases.

The conventional procedure performed by the control group is taking antihypertensive medication. Adherence to taking antihypertensive drugs can help patients with hypertension control their blood pressure, while non-adherence to medication and other activities carried out by patients can lead to uncontrolled blood pressure. Maintaining a healthy lifestyle and taking antihypertensive drugs regularly and according to the prescribed dosage can stabilize blood pressure in hypertensive patients.[18] Good knowledge about hypertension, its treatment, and maintaining a healthy lifestyle plays an important role in improving patient adherence to medication and lifestyle recommendations. Conversely, symptoms of depression, limited interaction between patients and healthcare providers, and a lack of communication about patients' beliefs and behaviors contribute to poor adherence, which can affect blood pressure in patients taking antihypertensive drugs.[19]

The theory above aligns with a study conducted by Saputra et al. (2023) on the effect of acupressure therapy on blood pressure in patients with hypertension, carried out at the Holistic Center Asy-Syaafi health service

facility. The study concluded that among 20 respondents who received acupressure therapy at the Lr2 (Xingjian), Lr3 (Taichong), Sp6 (Sanyinjiao), Ki3 (Taixi), Li4 (Hegu), and PC6 (Neiguan) points for 15 minutes, there was a decrease in the average systolic blood pressure from 164.25 mmHg to 143.85 mmHg after the therapy. Similarly, the median diastolic blood pressure decreased from 100 mmHg before the intervention to 90 mmHg afterward. Statistical test results showed a significant difference in both systolic (p-value = 0.000) and diastolic blood pressure (p-value = 0.025) before and after the acupressure therapy.[20]

This study is in line with the results of research conducted by Yulisda (2023) with the title Effect of Giving Acupressure Therapy on Decreasing Blood Pressure in Elderly Patients with Hypertension conducted on 32 respondents who were divided into two groups, namely the intervention group and the control group with a p-value of 0.001 <0.05 which can be concluded that there is an effect of giving acupressure therapy on lowering blood pressure in elderly people with hypertension.[21]

A study consistent with this research was conducted by Majid and Rini (2016) at Social Institution X in Palembang. The study employed a quasi-experimental design with a pre- and post-test with control group approach. Data were analyzed using the Wilcoxon test, while comparisons between groups were assessed using the Mann-Whitney test. The study involved 32 respondents divided into two groups: a treatment group and a control group. In the treatment group, a significant decrease was observed in the average systolic and diastolic blood pressure after administering acupressure therapy at the SP6 and LI4 points. In contrast, the control group showed no significant difference in the average systolic and diastolic blood pressure after the intervention. These findings indicate that acupressure therapy has an effect on lowering blood pressure, with a p-value of 0.001 ($p<0.05$).[22]

Another study conducted by Sukmadi et al. (2021) examined the effect of acupressure therapy on reducing blood pressure in patients with hypertension. This study employed a quasi-experimental design using a one-group pre- and post-test method. A pre-test was administered to respondents before the acupressure therapy session, which was performed once for 15 minutes to measure their initial blood pressure. Following the acupressure session, blood pressure was measured again 10 minutes after the therapy as post-test data. The results showed that acupressure therapy had an effect on lowering blood pressure in hypertensive patients.[23]

Based on the results of the study, the researcher assumes that the provision of acupressure therapy at points SP 6 and LI 4 has an effect on lowering blood pressure in the elderly with hypertension, this is due to the emphasis made on meridian points during acupressure therapy can stimulate and stimulate parasympathetic nerves which then produce endorphins which make individuals feel comfortable and relaxed and are vasodilating vascular so that heart rate slows down and blood pressure decreases.[24] In addition, the release of the hormone serotonin from pressing on acupressure points will activate the pineal gland which will release the hormone melatonin and help lower blood pressure.[25]

This study has several limitations that should be considered when interpreting the results. First, the sample size was relatively small and limited to elderly patients from specific areas, which may affect the generalizability of the findings to broader populations. Second, the study relied on self-reported data during interviews, which could be subject to recall bias. Third, the duration of the intervention was relatively short, limiting the ability to assess long-term effects of acupressure therapy on blood pressure. Future research with larger sample sizes, more diverse populations, and longer follow-up periods is recommended to validate and expand upon these findings. The fourth, with the results of this study, it is hoped that future researchers can address the limitations of this research by further examining other factors that may influence changes in blood pressure in patients or study samples, such as the lifestyle of the participants, to avoid biased results. Additionally, researchers are encouraged to perform blood pressure measurements both pre-test and post-test before and after each therapy session within a single meeting.

5. CONCLUSION

The hypothesis in this study is posited that acupressure therapy at the SP6 and LI4 points has an effect on reducing blood pressure in elderly individuals with hypertension. Based on the research findings, it can be concluded that after giving acupressure therapy at the SP6 and LI4 points to elderly individuals with hypertension in Banjar Sanggulan, as the intervention

group, resulted in a decrease in blood pressure after three weeks of therapy. Based on the results of this study, it is recommended that future researchers address the limitations by further exploring other factors that may influence changes in blood pressure among patients or research samples, such as the participants' lifestyle, in order to minimize potential bias in the findings. Researchers are also encouraged to conduct pre-test and post-test blood pressure measurements before and after each therapy session within a single meeting.

Ethical Approval

This study followed the ethical guidelines which was approved from the Denpasar Polytechnic Health Research Ethics Commission with reference number DP.04.02/F.XXXII.25/0302/2024.

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Competing Interests

All the authors declare that there are no conflicts of interest.

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Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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