



Article

Effectiveness of Electro-Acupuncture on Blood Pressure in Hypertensive Patients in Sanan Village Girimarto Wonogiri

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ABSTRACT

Hypertension is the root of various non-communicable diseases that are still a health problem in Indonesia. Acupuncture therapy can reduce systolic and diastolic blood pressure in patients with hypertension. Hypertension generally occurs in the elderly, but some studies show that hypertension can appear since adolescence. The method used is Quasi Experimental Design with a pretest-posttest two groups design. The sample used was 32 research subjects. The sampling technique used was purposive sampling technique. The statistical test used was the Paired T-test. This research was conducted in Sanan Village, Girimarto, Wonogiri Regency in February-March 2024. From the hypothesis test above using the Paired T-Test test because the research data was normally distributed and homogeneous. The results showed that for the acupuncture therapy Group, the $p\text{-value} < 0.001$, which means the $p\text{ value} < 0.05$, so H_a is accepted and H_0 is rejected. In the acupuncture therapy Group, $p < 0.001$, which means the $p\text{-value} < 0.050$, the results show that electroacupuncture is more effective on blood pressure in hypertensive patients. Conclusion: Electro-acupuncture therapy is effective on high blood pressure in hypertensive patients in Sanan Village Girimarto Wonogiri.

I. INTRODUCTION

Hypertension is the root of various non-communicable diseases that are still a health problem in Indonesia. Blood pressure is one of the parameters of the function of the cardiovascular system in humans. Hypertension itself is better known as the “silent killer,” where people who have hypertension have no symptoms at all. Hypertension can present a

variety of serious diseases, ranging from heart, kidney, to the brain. The risk of hypertension is currently more prevalent in developing countries with low income.

According to WHO, hypertension is the leading cause of death worldwide. Hypertension sufferers are estimated to reach 1.28 billion adults 30-79 years old worldwide. In addition, it is estimated that 46% of adults with hypertension do not realize they have the condition. One of the

global targets for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030⁽¹⁾. The 2018 Basic Health Research reported that the national prevalence of hypertension in Indonesia based on population measurements was highest in South Kalimantan (44.1%) and lowest in Papua (22.2%)⁽²⁾.

The number of people with hypertension in the female sex (36.85%) is more than the number of people with hypertension in the male sex (31.34%)⁽²⁾. The prevalence of people in Central Java Province according to Riskesdas 2018 in hypertension cases was 37.57% and for rural areas (37.01%). The prevalence of hypertension cases in women (40.17%) is higher than that of men (34.83%)⁽³⁾. According to the Central Java Provincial Health Office in 2019, it shows that Wonogiri Regency has a percentage of 50.02% for the category of non-communicable diseases, such as hypertension cases⁽⁴⁾.

The form of treatment for people with hypertension can be with pharmacological and non-pharmacological therapies⁽⁵⁾. Pharmacological therapy is a treatment that uses anti-hypertensive drugs such as Calcium Channel Blockers, Diuretics, and Adrenergic Blockers. Non-pharmacological therapy is a treatment carried out by modifying lifestyles such as diet, adequate exercise, reducing salt consumption, not drinking alcohol, not smoking, and regulating diet. Acupuncture is a method of therapy by puncturing points on the surface of the body to treat diseases and other health conditions. Acupuncture is one of the non-pharmacological therapies⁽⁶⁾. But non-pharmacological therapy can also be done with electroacupuncture, cupping, herbal therapy, acupressure, and others⁽⁷⁾.

Acupuncture is becoming an increasingly popular therapy. Apart from its effectiveness, acupuncture also has relatively small side effects compared to other treatments. Acupuncture therapy can also reduce systolic and diastolic blood

pressure in patients with hypertension⁽⁸⁾. The mechanism of acupuncture in cases of hypertension is that the stabbing of acupuncture points can produce stimulation of the autonomic nerves, then cause sympathetic excitatory inhibition, so that there is an obstacle to the vasoconstrictor nerves, which results in vasodilation.

Puncture of LV 3 Taichong point resulted in a decrease in plasma angiotensin II and blood pressure, so it can be concluded that the renin angiotensin system has an important role in lowering blood pressure with acupuncture⁽⁹⁾. GB 20 Fengchi point also affects lowering blood pressure in people with hypertension⁽¹⁰⁾. GB 20 Fengchi is a point that functions to clear heat in the head, relieve headaches, hypertension, and muscle stiffness⁽¹¹⁾.

Acupuncture therapy modalities for hypertension cases can be added with electrostimulators. Several studies have shown that electroacupuncture produces a sympathetic inhibition effect so that it can result in a decrease in the sympathetic drive of the heart and then vasodilation and a decrease in blood pressure. Electroacupuncture is generally acceptable because it is relatively cheap, safe, and inexpensive therapy compared to other therapeutic methods⁽¹²⁾.

II. METHODS

This study used quantitative methods with a quasi-experimental design, which is a pseudo-experimental study where researchers do not fully control the variables in the study⁽¹³⁾. This research design uses a two-group pre-test post-test design, where the group is pre-tested before treatment, then post-tested after treatment⁽¹⁴⁾.

This study was divided into two groups with two different treatments. The first treatment group was acupuncture therapy with the administration of electrostimulators at LV points 3 Taichong, GB 20 Fengchi, and EX-HN 5 Taiyang. Then for the second treatment group, manual acupuncture therapy was carried out at LV

points 3 Taichong, GB 20 Fengchi, and EX-HN 5 Taiyang.

The population in this study were residents of Sanan Village, Girimarto, Wonogiri who suffered from hypertension. Based on preliminary studies conducted by researchers in November 2023, data from the Girimarto Health Center were obtained as many as 110 research subjects who experienced hypertension with the age category 35-60 years. The sampling technique used in this study was purposive sampling.

The tools and materials used in this study are a sphygmomanometer, acupuncture needles size 0.5-1 cun, electrostimulator, alcohol swab, sterile cotton, hand-scoon and mask, Nierbeken and used needle holder, assessment sheet, informed consent sheet.

III. RESULT

Research on the effectiveness of electroacupuncture on blood pressure in hypertensive patients in Sanan Village, Girimarto, Wonogiri Regency conducted from February to March 2024 obtained data from a population of 110 research subjects who experienced hypertension. Acupuncture therapy is carried out in accordance with a schedule that has been mutually agreed upon. Acupuncture therapy was carried out 3 times a week and carried out for 10 treatments.

Table 1. Distribution of study subjects by gender (n = 32)

Gender	Group I		Group II	
	N	%	N	%
Female	9	56.3	16	100
Male	7	43.8	0	0.0

Table 1. Shows that the research subjects in Group 1 of Electro Acupuncture Therapy were mostly female as many as 9 people (56.3%), and in Group 2 of Manual Acupuncture Therapy the most gender was female as many as 16 people (100%).

Table 2. Distribution of study subjects by age (n = 32)

Age	Group I		Group II	
	N	%	N	%
35 - 45	6	37.5	0	0.0
46 - 55	4	25.0	12	75.0
56 - 65	6	37.5	4	25.0

Table 2. Age shows that in Group 1 Electro Acupuncture the most people aged 35-45 years were 6 people (37.5%) and in Group 2 Manual Acupuncture Therapy the most people aged 46-55 years were 12 people (75.0%).

Table 3. Distribution of study subjects by occupation (n = 32)

Occupation	Group I		Group II	
	N	%	N	%
Housewife	6	37.5	13	81.3
Employee	10	62.5	3	18.8

Table 3. Occupation showed that in Group 1 Electro Acupuncture the most employees were 10 people (62.5%) and in Group 2 Manual Acupuncture Therapy the most IRTs were 13 people (81.3%).

Table 4. Distribution of study subjects by occupation (n = 32)

Syndrome	N	%
Hyperactivity of the liver	14	43.8
Liver fire burns	10	31.3
Liver and kidney yin deficiency	7	21.9
Accumulation middle jiao phlegm	1	3.1

Table 4. Syndrome differentiation states that the study subjects in Groups 1 and 2 had the most liver hyperactivity syndrome as many as 14 people (43.8%).

Table 5 explains that the frequency distribution based on systolic blood pressure in Group 1 electro-acupuncture therapy was mostly 160 mmHg as many as 6 people (37.5%) and systolic blood

pressure in Group 2 manual acupuncture therapy before therapy was mostly 140 mmHg as many as 4 people (25.0%).

Table 5. Frequency Distribution of Systolic Blood Pressure Before Therapy (n = 32)

Systolic	Group I		Group II	
	N	%	N	%
130	0	0.0	3	18.8
140	5	31.3	4	25.0
150	3	18.8	2	12.5
160	6	37.5	4	25.0
170	2	12.5	3	18.8

Table 6. Diastolic blood pressure in Group 1, electro-acupuncture therapy before therapy was mostly 100 mmHg as many as 9 people (56.3%) and diastolic blood pressure in Group 2, manual acupuncture therapy before therapy mainly was 90 mmHg in as many as 9 people (56.3%).

Table 6. Frequency Distribution of Diastolic Blood Pressure Before Therapy (n = 32)

Diastolic	Group I		Group II	
	N	%	N	%
90	5	31.3	9	56.3
100	9	56.3	3	18.8
110	1	6.3	3	18.8
120	1	6.3	1	6.3

Table 7. Frequency Distribution of Diastolic Blood Pressure After Therapy (n = 32)

Systolic	Group I		Group II	
	N	%	N	%
120	3	18.8	0	0.0
130	7	43.8	3	18.8
140	6	37.5	4	25.0
150	0	0.0	3	18.8
160	0	0.0	4	25.0
170	0	0.0	2	12.5

Table 7. Systolic blood pressure in Group 1, electro-acupuncture therapy after therapy, was mostly 130 mmHg in as many as 7 people (43.8%) and systolic blood pressure in Group 2, manual acupuncture therapy after therapy was mostly 140 and 160 mmHg, both 140 and 160 have the same 4 people (25.0%).

Table 8. Frequency Distribution of Diastolic Blood Pressure After Therapy (n = 32)

Diastolic	Group I		Group II	
	N	%	N	%
80	8	50.0	4	25.0
90	8	50.0	7	43.8
100	0	0.0	5	31.3

Table 8. Diastolic blood pressure in Group 1 electro-acupuncture therapy there was the same number of decreases, namely 80 mmHg and 90 mmHg with a total of 8 people (50.0%), and diastolic blood pressure in Group 2 manual acupuncture therapy before therapy was mostly 90 mmHg as many as 7 people (43.8%).

The normality test shows the sig value. in the electroacupuncture Group (I) pre-test systolic $p=0.017$, post-test systolic $p=0.004$, pre-test diastolic $p=0.002$, and post-test diastolic $p<0.001$. Sign value. in the acupuncture therapy Group (II), the pre-test systolic $p=0.050$, post-test systolic $p=0.012$, pre-test diastolic $p=0.001$, and post-test diastolic $p=0.005$. This shows that the data is normally distributed because $p < 0.050$. The Homogeneity test, the significant value of systolic and diastolic blood pressure in the electroacupuncture therapy treatment and the acupuncture therapy treatment showed that the results were $p > 0.05$, so it can be concluded that the data for the two groups were homogeneous

Table 9, shows for the electroacupuncture group the sig value. (2-tailed) $p < 0.001$ which means the p value < 0.05 then H_a is accepted and H_0 is rejected. In

the acupuncture therapy group, $p < 0.001$ was obtained, which means the p -value was < 0.05 , so H_a was accepted and H_0 was rejected, so the result was that electroacupuncture was more effective on blood pressure in hypertension sufferers

Table 9. Paired T- Test

Group	Mean Difference	p
Group I	11.87	<0.001
Group II	8.83	

Table 6 showed the highest average change in pain scale in Group I, namely 3.294 with $p < 0.001$ which means the significance value is $p = (0.000 < 0.05)$, so H_a is accepted and H_0 is rejected.

IV. DISCUSSION

Hypertension is categorized as Xuan Yuan (Vertigo), and Tuo Tong (Headache). Both are caused by stagnation of liver Qi, elevation of liver yang with kidney yin deficiency, and improper diet leading to spleen deficiency and accumulation of phlegm in the body. Hypertension can be caused by genetic, and emotional factors, fatigue, improper diet, age, and bad daily habits which often cause an imbalance of Yin and Yang.

The mechanism of acupuncture in cases of hypertension, namely stabbing at acupuncture points, can produce stimulation of the autonomic nerves which then creates an obstacle to sympathetic stimulation, resulting in an obstacle to the vasoconstrictor nerves which results in vasodilation. Puncture of the LV 3 Taichong point resulted in a decrease in plasma angiotensin II and blood pressure, so it can be concluded that the renin-angiotensin system has an important role in reducing blood pressure with acupuncture⁽⁹⁾. The GB 20 Fengchi point also affects reducing blood

pressure in hypertension sufferers⁽¹⁰⁾. GB 20 Fengchi is a point that functions to clear heat in the head, relieve headaches, hypertension and muscle stiffness⁽¹¹⁾.

Electroacupuncture has a central frequency using a frequency of 2-10 Hz to stimulate endorphins and enkephalins into the blood⁽¹⁵⁾. Endorphins and enkephalins are physiological regulators and humoral mediators between the central nervous system and the immune system. The descending nervous system releases endogenous opiates such as endorphins. The release of endorphin hormones results in increased levels of endorphin hormones in the body which will increase the production of the hormone dopamine. An increase in the hormone dopamine results in increased activity of the parasympathetic nervous system. The parasympathetic nervous system functions to control ongoing activities and works when the body is relaxed⁽¹⁵⁾. High levels of endorphins can reduce pain and the negative effects of stress⁽¹⁶⁾.

The activity of the sympathetic nervous system not only reduces renal blood flow, but also increases renal water and sodium retention, and increases blood pressure so that it can cause the brain to create the hormones serotonin and endorphins which cause a sensation of safety and relaxation. The body's metabolism improves and autonomic nervous reactions ultimately lead to reductions in blood pressure, pulse, and respiration⁽¹⁷⁾

V. CONCLUSION

The conclusions that can be drawn from this research are that among 32 subjects with hypertension, the majority were women, with the most common age group being 46-55 years (75.0%). In terms of occupation, most subjects in Group 1 were employees (62.5%), while in Group 2, the majority were housewives (81.3%). The most frequently observed syndrome was

hyperactivity (43.8%). Before the intervention, the highest recorded systolic blood pressure was 160 mmHg (37.5%), with an average of 3.31 mmHg for Group 1 and 3.00 mmHg for Group 2. The highest diastolic blood pressure was 100 mmHg (56.3%), with an average of 1.87 mmHg for Group 1, and 90 mmHg (56.3%) with

an average of 1.75 mmHg for Group 2. The paired t-test showed that both acupuncture and electroacupuncture therapy significantly reduced blood pressure, with a p-value of <0.001 ($p < 0.050$). These results suggest that electroacupuncture is more effective in lowering blood pressure in patients with hypertension.

REFERENCES

1. Oktaria M, Hardono H, Wijayanto WP, Amiruddin I. Hubungan pengetahuan dengan sikap diet hipertensi pada lansia. *J Ilmu Medis Indones*. 2023;2(2):69–75.
2. Badan Penelitian dan Pengembangan Kesehatan (Badan Litbangkes). Laporan Risesdas 2018 Nasional. Jakarta: Lembaga Penerbit Balitbangkes; 2018. p. 674.
3. Dinas Kesehatan Provinsi Jawa Tengah. Profil kesehatan Provinsi Jawa Tengah tahun 2019. Semarang: Dinas Kesehatan Provinsi Jawa Tengah; 2019. p. 61.
4. Destria. Penerapan foot hidroterapi dengan jahe merah terhadap perubahan tekanan darah pada pasien lansia dengan hipertensi di RSUD Dr. Soedirman Mangun Sumarso Kabupaten Wonogiri, Jawa Tengah. *J Ilmu Kesehat Mandira Cendikia*. 2023;2:15.
5. Adam L, Aswad A. Effect of cupping therapy on the blood pressure of people with hypertension in the working area of Central City Health Center, Gorontalo City 2020. *Eur J Res Dev Sustain*. 2022;3(3):23–30.
6. Syokumawena S, Pastari M, Meilina M. Pengaruh akupunktur terhadap tekanan darah. *JPP (Jurnal Kesehat Poltekkes Palembang)*. 2022;17(2):228–32.
7. Annisa ZS, Rudiyanto R, Sholihin S. Efektivitas terapi bekam pada penderita hipertensi: studi literatur. *Nurs Inf J*. 2021;1(1):36–41.
8. Santi YR, Paratmanitya Y, Pratiwi P. Terapi bekam dan akupunktur terhadap penurunan tekanan darah pada penderita hipertensi primer (esensial) di Klinik Herbal El Zahra Kota Tarakan. *JNKK (Jurnal Ners dan Kebidanan Indonesia)*. 2014;2(3):147–54.
9. Hariyanto S. Pengaruh terapi akupunktur terhadap penurunan tekanan darah pada lansia dengan hipertensi di Panti Werdha Mojopahit Mojokerto. *J Keperawatan*. 2020;9(1):1–7.
10. Emiliana N, Fauziah M, Hasanah I, Fadlilah DR. Analisis kepatuhan kontrol berobat pasien hipertensi rawat jalan pada pengunjung Puskesmas Pisangan tahun 2019. *AN-NUR J Kaji dan Pengemb Kesehat Masy*. 2021;1(2):119–32.
11. Rahmadhani YS. Penanganan hipertensi menggunakan akupunktur pada titik Fengchi (GB-20), Taichong (LR-3), Quchi (LI-11), Hegu (LI-4) serta kombinasi nutrisi smoothies belimbing manis (*Averrhoa carambola* L.) [tesis]. Surabaya: Universitas Airlangga; 2018.
12. Wang Y, Zhang L, Li L, Hu H, Pan P, Zhang B, et al. Electroacupuncture improves blood pressure in SHR by regulating the immune balance between Th17 and Treg. *Evid Based Complement Altern Med*. 2020;5375981.
13. Ta MI, Munif A. Metodologi penelitian bidang kesehatan: bahan ajar untuk mahasiswa. Yogyakarta: Penerbit Universitas Gadjah Mada; 2019.
14. Sugiono. 75 konsep dan penerapan metodologi penelitian ilmu keperawatan. Jakarta: Penerbit Salemba Medika; 2007. p. 60.

15. Koosnadi S, Sudirman S. Akupunktur untuk nyeri dengan pendekatan neurosain. Jakarta: CV Sagung Seto; 2009. p. 24–31.
16. Adiba FN. Analisis hubungan tertawa terhadap kadar endorfin berkaitan dengan fungsi imunitas tubuh [tesis]. Surakarta: Universitas Sebelas Maret; 2019.
17. Gunawan AW. Hypnotherapy: the art of subconscious restructuring. Jakarta: PT Gramedia Pustaka Utama; 2007.