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A randomized controlled trial of auricular acupressure in heart rate variability and quality of life for hypertension



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Available online 20 January 2015

KEYWORDS

Auricular acupressure;
Hypertension;
Heart rate variability (HRV);
Quality of life (QoL);
Pain;
Mental health

Summary

Background: Hypertension is one of the most common chronic diseases. Hypertensive patients who intend to control blood pressure need professional medical assistance. Auricular acupressure is a patient-dependent task, wherein a person does not have to rely on a healthcare professional to self-perform the task.

Objective: To evaluate the effects of auricular acupressure on heart rate variability (HRV) and quality of life (QoL) in patients with hypertension.

Methods: A randomized controlled trial with permuted block randomization was used. In total, 150 participants from a medical teaching hospital were randomly assigned to the experimental group that received auricular acupressure for 10 weeks, and the control group that received only routine care of equal duration. Outcomes were assessed through HRV parameters, heart rate, blood pressure, and QoL before and after the auricular acupressure intervention.

Results: After the adjustment of disease duration and mental health, a significant difference existed between the two groups in body pain ($p = .03$) and mental health ($p = .002$) of QoL, but not in HRV parameters, heart rate, blood pressure, and overall QoL ($p > .05$).

Conclusion: Acupressure can be applied at the acupoints of shenmen, sympathesis, kidney, liver, heart, and subcortex to improve physical pain and mental health of QoL for hypertensive patients. Auricular acupressure is acceptable and feasible although it does not support physiological benefits. Further studies are warranted to assure the effects of using auricular acupressure as an adjunctive care for patients with hypertension.

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Introduction

Hypertension is a critical global public health concern because of its high prevalence in 32% of American adults,¹ 34% in Taiwanese adults,² and 38% in Japanese adults.³ Hypertension is the primary cause of cerebrovascular disease and a major contributor to disease risk⁴ and disease burden.⁵ The total annual medical cost for hypertension was US\$ 130.4 billion in the United States.⁶ Having only 8% of the U.S. population, Taiwan expended antihypertensive medications valued at US\$ 240 million.⁷ Aging on the cardiovascular system is associated with increased related morbidity^{8,9} and mortality.¹⁰ Stress-related changes in physiology are also associated with the cardiovascular system, particularly anxiety¹¹ and depression,^{11,12} which are frequently related to hypertension. Hypertension, which is often perceived as asymptomatic, could decrease patients' quality of life (QoL).^{13,14} There 23–29% of these patients had their hypertension under control in the United Kingdom¹⁵ and 21–29% in Taiwan.¹⁶ The wide variety of antihypertensive drugs has reduced the risk for cardiovascular events and stroke,^{17–19} and mortality.¹⁹ However, certain medications carry side effects such as orthostatic hypotension,²⁰ gout,²¹ dizziness,²² and fatigue.²²

Hypertension can be managed using pharmacological and nonpharmacological approaches. Additional nonpharmacologic remedies, such as acupoint stimulation, are a considerable option. According to the principles of traditional Chinese medicine (TCM), auricular therapy is a method of acupoint stimulation applied to specific areas of the inner and outer ear lobe to treat disease or illness.^{23,24} In TCM, disease is considered to be caused by the imbalance of a person's energy, qi.²³ Acupuncture can be transmitted to the brain and to corresponding organs through nerves and meridian lines to regulate physiological reactions.^{25,26} Acupuncture has been proven to reduce blood pressure in hypertension.^{27,28} Similar to acupuncture, acupressure modulates and alleviates ill-health conditions by stimulating acupoints and meridians distributed in other parts of the body in order to regulate qi and activate the meridians and collateral systems.^{24,25} Therefore, auricular acupressure gently returns the body to a harmonized, balanced state, and contributes to treating health problems.^{24,26} It is a microsystem of the entire body and focuses stimulation on the ear acupoint.²⁹

Heart rate variability (HRV) has the potential to provide valuable insights into physiological and pathological conditions. Numerous studies have supported acupoint stimulation in improving physiological effect on HRV parameters.^{30–32} HRV measures fluctuations in autonomic inputs to the heart rather than the mean level of autonomic inputs. HRV parameters involve high-frequency (HF) representing the vagal nervous activity, low-frequency (LF) reflecting sympathetic modulations, and a LF/HF ratio referring to sympathovagal balance.³³ Previous studies have confirmed acupoint stimulation in improving physiological effect on HF and LF,³¹ LF/HF ratio,^{30,32} and blood pressure.^{27,34,35} Because auricular acupressure affects autonomic nervous functions, it may be effective in treating hypertension. In addition, the benefits of acupoint stimulation have shown an increase in QoL.^{36,37} Certain psychological factors, such as anxiety and depressive

symptoms, have frequently been associated with QoL.³⁸ Therefore, this consideration was controlled in hypertensive participants in this study. A recent meta-analysis has suggested further studies involving rigorous, high methodological quality and objective validation in improving hypertension.²⁷ However, the effects of auricular acupressure with rigorous research designs for hypertension are scant. Further studies involving high quality and objective validation of hypertension are necessary.

Purpose statement

This study evaluated the effect of auricular acupressure on HRV and QoL in patients with primary hypertension. We hypothesized that significant differences exist in HRV, HF, LF, LF/HF ratio, blood pressure, heart rate, and QoL between patients with and without auricular acupressure.

Research design and participants

This study used a randomized controlled trial with two groups. A statistician performed a permuted block randomization process that was used to assign participants in good balance to the experimental or control groups. The four-block design contained equal proportions in each group with randomization to remove sequence bias. A computer-generated table was obtained, and opaque, sealed envelopes were used to randomly allocate participants to one of two groups. The experimental group received the 10-week intervention with auricular acupressure, whereas the control group received regular nursing care of equal duration.

Adult outpatients diagnosed with primary hypertension were consecutively recruited from a 1027-bed medical teaching hospital in Northern Taiwan. The inclusion criteria were older than 20 years of age, Beck anxiety inventory (BAI) < 7, Beck depression inventory-second edition (BDI-II) < 13, taking antihypertensive medication within participant's own stabilized blood pressures, and no previous acupressure treatment for a hypertensive condition. Those who received any other complementary and alternative medicines for antihypertensive treatment, and who had severe arrhythmia, cardiac pacemakers, end stage renal disease, and ear infections, ulcers, swelling, and lack of skin integrity at the application sites in the course of the study were excluded. In power analysis using G-power 3.0, the sample size per group was estimated at 49 to reach 80% power with $\alpha = .05$ for detecting a medium effect size ($f = .25$) based on the primary outcome of QoL. With an estimated loss of 25% for a 10-week intervention, 150 participants in total were thought to be necessary.

Intervention

The study designed and provided the auricular acupressure intervention, which involved six common auricular acupoints for hypertensive patients, including the shenmen, sympathesis, kidney, liver, heart, and subcortex (Fig. 1). Stimulation on the shenmen can relax and decrease blood pressure, whereas stimulation on the sympathesis and

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