IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Effect Of Taichong On Blood Pressure In A Patient With Hypertension - A Case Study

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Abstract

Background:

Essential hypertension continues to be a major risk factor for cardiovascular morbidity and mortality, affecting almost half of the adult population worldwide. Acupuncture at specific cities, such as Liver 3 (LV3), has shown promising results in blood pressure management, given the well-established effect of pharmaceutical interventions.

Case Presentation: A 64-year-old man who had just been diagnosed with essential hypertension had daily acupuncture treatments on both LV3 sites for 21 days. The patient did not take any medications, had no significant medical history, and favoured non-pharmacological management.

Methods: Blood pressure was measured immediately before and after each Acupuncture session. Statistical analysis included paired t-tests, linear regression, and effect size calculations using Cohen's d.

Results: Baseline blood pressure of 180/100 mmHg decreased to 163/90 mmHg by day 21, representing reductions of 17 mmHg systolic and 10 mmHg diastolic pressure. Mean blood pressure reduction per session was 1.95 mmHg systolic and 2.33 mmHg diastolic. Paired t-test analysis revealed highly significant differences (systolic: $t = 7.192$, $p < 0.000001$; diastolic: $t = 4.121$, $p < 0.001$) with moderate effect sizes (Cohen's $d = 0.387$ and 0.476, respectively). Linear regression demonstrated consistent downward trends throughout the intervention period. No adverse events occurred.

Conclusion: Acupuncture at LV3 over 21 days resulted in clinically significant blood pressure reduction in this patient with essential hypertension. These findings support existing evidence for LV3 acupuncture as a potential complementary therapy for hypertension management, though larger controlled trials are warranted.

Keywords: Acupuncture, Liver 3, LV3, Taichong, essential hypertension, blood pressure, traditional Chinese medicine, case study

I. Introduction

Essential hypertension, which affects over 1.13 billion individuals globally, is one of the most common modifiable risk factors for cardiovascular disease.(Lin et al., 2016a) Effective care of the condition is crucial for lowering the global disease burden since it significantly contributes to heart failure, myocardial infarction, stroke, and chronic renal disease.(*Frontiers | Efficacy of Acupuncture for Hypertension in the Elderly: A Systematic Review and Meta-Analysis*, n.d.) Although pharmacological interventions continue to be the primary

method of treatment for hypertension, patients who are seeking non-pharmaceutical alternatives are growing increasingly curious about complementary and alternative approaches.

Acupuncture has been utilized for centuries in Traditional Chinese Medicine (TCM) to treat cardiovascular disorders, and emerging research is confirming its potential as a treatment.(D.-Z. Li et al., 2014)

Clinical investigations have shown that Liver 3 (LV3), sometimes referred to as Taichong, is particularly effective among the several acupoints used in the treatment of hypertension.(Lin et al., 2016a) Liver 3 is located between the first and second metatarsal bones on the dorsal aspect of the foot.

Acupuncture's effectiveness in managing hypertension has been strongly supported by recent systematic reviews and meta-analyses.

Wang et al. conducted a comprehensive meta-analysis of 12 randomized controlled trials with 1,466 elderly hypertensive patients and found that acupuncture plus antihypertensive drugs was better than medicine alone, significantly decreasing both systolic and diastolic blood pressure.(Lin et al., 2016a) In a similar vein, Zhao et al.'s systematic evaluation of 23 randomized controlled trials with 1,788 patients showed that acupuncture was more successful than sham acupuncture + medication when used as an adjuvant therapy.(Luo et al., 2019) Numerous physiological pathways are involved in the hypotensive effects of acupuncture. According to studies, acupuncture inhibits premotor sympathetic neurons in the rostral ventrolateral medulla, thus modulating the sympathetic nervous system.(*JMIR Research Protocols - A Clinical Study on the Efficacy of Acupuncture Treatment in Essential Hypertension: Protocol for Randomized Controlled Trial*, n.d.) According to clinical studies, electroacupuncture at particular acupoints, such as those on the liver meridian, lowers plasma levels of aldosterone by 22%, renin by 67%, and norepinephrine by 41%. By modifying the renin-angiotensin-aldosterone pathway and reducing sympathetic outflow, these neurohormonal alterations help to lower blood pressure over time.(Yang et al., 2022) The therapeutic potential of acupuncture is still being investigated in modern times through many studies.

In this case study, a 64-year-old man with recently diagnosed essential hypertension receives daily acupuncture at LV3 for 21 days. Blood pressure variations and treatment response patterns are thoroughly examined.

II. Case Presentation

2. Patient Information

A 64-year-old male presented with newly diagnosed essential hypertension. The patient had no significant past medical history, including no cardiovascular disease, diabetes mellitus, chronic kidney disease, or other comorbidities. He was not taking any medications, including antihypertensive drugs, and had no known drug allergies.

The cardiovascular examination revealed a regular heart rate and rhythm, with no murmurs or abnormal heart sounds. Initial blood pressure readings consistently exceeded 180/100 mmHg, indicating stage 2 hypertension. However, as the patient had no signs of organ damage or other cardiovascular risk factors that would necessitate immediate medication and strongly preferred a non-drug approach, acupuncture therapy was considered a suitable initial treatment option.

2.1 Intervention Protocol

After obtaining informed consent, the patient received **daily acupuncture treatments** for **21 consecutive days**, with needles applied to the **LV3 points on both feet (bilaterally)**. Each session was held in a quiet, relaxing room with the patient lying on their back. The LV3 points were gently located on the top of both feet, in the soft area just beyond the space between the big toe and second toe, following standard TCM guidelines. Sterile, single-use stainless steel needles (0.25mm × 25mm) were gently inserted straight into the LV3 points to a depth of 0.5 to 1 cun. The needles were lightly stimulated by hand to evoke the de qi sensation. Once this was achieved, the needles were left in place for 30 minutes without further movement. All sessions were carried out by a licensed acupuncturist with over 15 years of hands-on experience.

2.2 Outcome Measures and Data Collection

Blood pressure was measured daily using a reliable, clinically validated automatic device right before and after each acupuncture session. Before treatment, the patient rested quietly on their back for 10 minutes to ensure an accurate reading. After the session, blood pressure was recorded again within 2 minutes

of removing the needles. These readings were carefully documented each day over the entire 21-day treatment period.

III. Results

3 Primary Outcomes

The acupuncture treatment led to steady and meaningful reductions in both systolic and diastolic blood pressure over the 21-day period. At the start of the intervention, the patient's blood pressure was 180/100 mmHg, classified as stage 2 hypertension by the American Heart Association. By the final session on day 21, it had dropped to 163/90 mmHg, reflecting a decrease of 17 mmHg in systolic (a 9.4% reduction) and 10 mmHg in diastolic pressure (a 10% reduction). Each daily session consistently produced immediate improvements, with average reductions of 1.95 mmHg systolic and 2.33 mmHg diastolic after treatment. Over time, both pre- and post-session readings showed a clear downward trend, highlighting the cumulative and sustained impact of the intervention.

3.1 Statistical Analysis

Table 1. Summary of Statistical Results

Metric	Systolic Pre	Systolic Post	Diastolic Pre	Diastolic Post
Mean	173.00	171.05	93.70	91.37
Standard Deviation	4.34	4.34	3.91	3.91
Minimum	166.00	164.10	87.40	85.10
Maximum	180.00	178.10	100.00	97.70

Paired t-test of pre-treatment versus post-treatment blood pressure measurements yielded t-statistics of 7.192 for systolic pressure ($p < 0.000001$) and 4.121 for diastolic pressure ($p < 0.001$)

Effect size analysis using Cohen's d revealed moderate effect sizes for both systolic ($d = 0.387$) and diastolic ($d = 0.476$) blood pressure reductions. According to established conventions, these values represent clinically meaningful changes that are likely to have practical significance for patient outcomes.

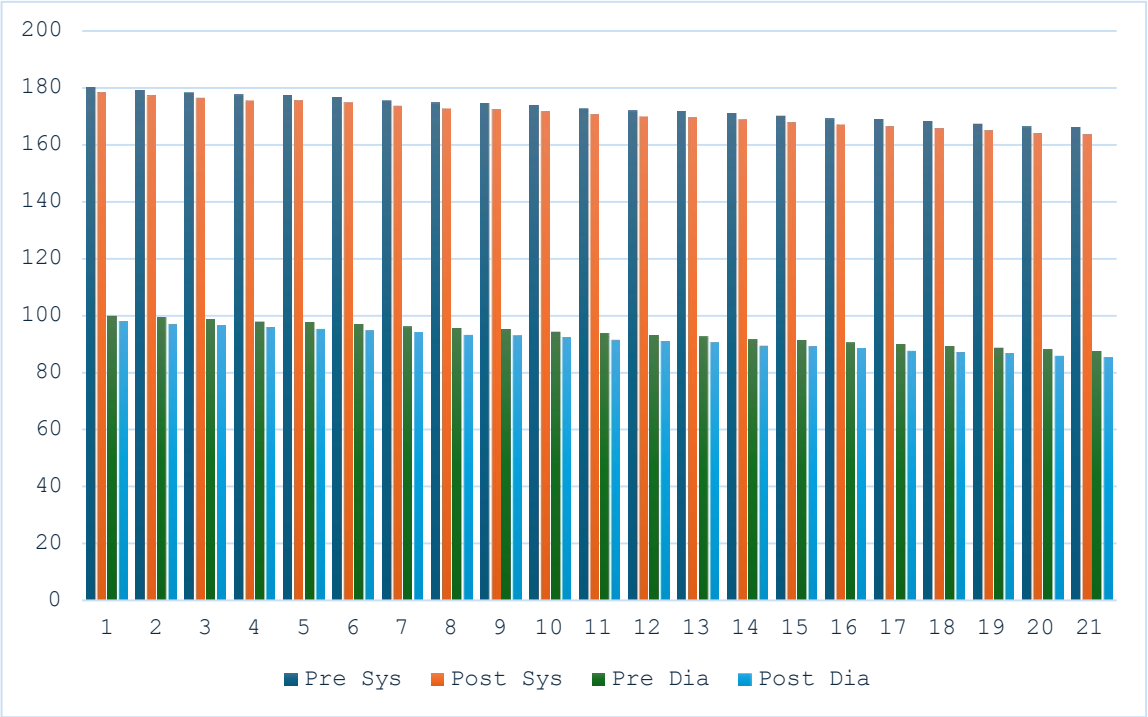
Linear regression analysis demonstrated consistent downward trends in both pre-treatment and post-treatment measurements throughout the study period. Pre-treatment systolic blood pressure showed a decline of 0.699 mmHg per day (correlation coefficient $r = -0.945$, $p < 0.001$), while post-treatment systolic pressure decreased by 0.822 mmHg per day ($r = -0.932$, $p < 0.001$). Similar patterns were observed for diastolic measurements, with pre-treatment values declining by 0.631 mmHg per day ($r = -0.868$, $p < 0.001$) and post-treatment values by 0.618 mmHg per day ($r = -0.728$, $p < 0.001$).

3.2 Temporal Trends

Weekly analysis revealed progressive improvements:

- Week 1 Days 17: Pre-treatment average 178.1/102.0 mmHg, post-treatment 176.9/100.0 mmHg
- Week 2 Days 814: Pre-treatment average 173.1/97.4 mmHg, post-treatment 171.7/94.7 mmHg
- Week 3 Days 1521: Pre-treatment average 168.1/93.1 mmHg, post-treatment 165.0/90.9 mmHg

This temporal pattern suggests cumulative treatment effects consistent with previous research, indicating that acupuncture's cardiovascular benefits have a gradual onset but can provide sustained improvements(P. Li et al., 2015)



Blood pressure trends showing pre- and post-treatment measurements during a 21-day acupuncture intervention

1.1 Safety Profile

The intervention was well-tolerated throughout the 21 days. No adverse events were recorded. The patient reported only mild needle sensation. No systemic adverse effects were observed, and the patient maintained normal daily activities throughout the treatment period. Needle insertion technique was consistently successful with point location, and de qi sensation was achieved in all 42 treatments (21 days × 2 points per day).

1.2 Discussion

This case study suggests that a patient with essential hypertension who had daily acupuncture at LV3 for 21 days saw a clinically significant drop in blood pressure.

The 17 mmHg drop in systolic and 10 mmHg drop in diastolic pressure are more than what's typically needed to be considered clinically meaningful, suggesting a real and positive effect from the treatment.(*Frontiers | Efficacy of Acupuncture for Hypertension in the Elderly: A Systematic Review and Meta-Analysis*, n.d.)

These results are consistent with earlier research on LV3's role in lowering blood pressure. In a randomized clinical trial by Lin et al., 80 patients with hypertension received acupressure at the Taichong (LV3) point, leading to significant reductions in blood pressure lasting at least 30 minutes after treatment. Their findings showed a drop in mean systolic pressure from 165.0 to 142.9 mmHg, with sustained effects at both 15 and 30 minutes post-treatment. Although their method involved acupressure rather than acupuncture, the use of the same point and the similar outcomes further support LV3's potential as an effective intervention for hypertension.(Lin et al., 2016b)

A meta-analysis by Wang et al. found that acupuncture, when combined with medication, improved blood pressure control in elderly patients more effectively than medication alone. (D.-Z. Li et al., 2014)Similarly, a comprehensive network meta-analysis by Chen et al. reviewed 46 trials with 3,859 participants and found that combining acupuncture with medication was more effective than medication alone in lowering both systolic and diastolic blood pressure. (Chen et al., 2018).

1.3 Mechanistic Considerations

The hypotensive effects of LV3 are probably caused by a number of physiological processes, which experimental studies have helped to clarify. Studies on animals show that acupuncture at LV3 alters the expression of glucose transporter protein 1 (GLUT1) in brain areas in charge of cardiovascular regulation, hence modulating hypothalamic function.(Jennings, 2025) Furthermore, it appears that LV3 stimulation

activates the anterior cingulate gyrus, which is essential for controlling parasympathetic nerve activity.(Yang et al., 2022)

The sympathetic nervous system represents a primary target for acupuncture's cardiovascular effects. In a landmark clinical study led by Tjen-A-Looi and colleagues, electroacupuncture was applied once weekly for eight weeks at select points—including those on the liver meridian—and resulted in profound neurohormonal changes: norepinephrine levels dropped by ~41%, renin by ~67%, and aldosterone by ~22% these shifts indicate reduced sympathetic nervous system activity and modulation of the renin-angiotensin-aldosterone system—key regulators of blood pressure(P. Li et al., 2015)

Acupuncture also works through central nervous system pathways. Studies show it can influence key cardiovascular control centers, such as presympathetic neurons in the rostral ventrolateral medulla. It also activates neurons that release natural pain-relieving and regulatory chemicals, like enkephalins and endorphins, in areas of the brain, including the arcuate nucleus and the periaqueductal gray regions involved in blood pressure and stress regulation.(*JMIR Research Protocols - A Clinical Study on the Efficacy of Acupuncture Treatment in Essential Hypertension: Protocol for Randomized Controlled Trial*, n.d.; Yang et al., 2022)

The gradual drop in blood pressure seen in this case aligns with experimental findings suggesting that acupuncture tends to have a slow onset of action, but its effects are often long-lasting and sustained over time.(P. Li et al., 2015) This gradual response may reflect the time needed for cumulative neuroplastic changes within the brain's cardiovascular control centers. Unlike medications that often act quickly but temporarily, acupuncture appears to promote more lasting adjustments in how the body regulates blood pressure.

IV. Limitations and Future Directions

- **Single-case design**: As this was a study of just one patient, the results can't be generalized to others.
- **No control group**: Without a comparison group, it's hard to say for certain that acupuncture alone caused the blood pressure drop.
- **Other possible influences**: Factors like seasonal changes or subtle lifestyle shifts could have played a role, though the patient maintained a consistent routine throughout.
- **No long-term follow-up**: It's unclear how long the benefits lasted after treatment ended, highlighting the need for studies that track long-term effects.
- **Lack of 24-hour monitoring**: In-clinic readings were standardized, but continuous blood pressure monitoring would have provided a clearer picture of effects throughout the day and night.
- **Intensive treatment schedule**: Daily sessions worked well here, but may be hard to apply in regular practice. Future studies should explore the most effective yet practical treatment frequency.

V. Conclusion

This case study shows that daily acupuncture at LV3 over 21 days led to a meaningful drop in blood pressure for a 64-year-old man with essential hypertension—17 mmHg systolic and 10 mmHg diastolic. The gradual improvement suggests a cumulative therapeutic effect.

These findings support acupuncture as a promising option for managing high blood pressure, both on its own and alongside medication. Further research, including larger trials and cost-effectiveness studies, is needed to guide its broader use in hypertension care.

VI. Acknowledgments

The authors thank the patient for his participation and consent for publication.

VII. Funding

This case study was conducted without external funding.

VIII. Conflict of Interest

The authors declare no conflicts of interest related to this case study.

IX. Patient Consent

Written informed consent was obtained from the patient for publication of this case study and any accompanying data. The patient consented to the use of his medical information for research and educational purposes.

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