



Electric Cupping Therapy for Stress Reduction in Patients with Hypertension: A Quasi-Experimental Study

Sri Handayani^{1*}, Wijayanti², Pandu Aseta³

^{1,2,3} Universitas Muhammadiyah PKU Surakarta, 57136, Jawa Tengah, Indonesia

handa@umpku.ac.id^{1*}

ARTICLE INFO

Keywords:

Complementary Nursing Care; Electric Cupping Therapy; Hypertension; Perceived Stress; Stress Reduction

Article History:

Received: 5/29/2026

Revised: 6/26/2026

Accepted: 6/27/2026

ABSTRACT

Background: Hypertension is a major public health problem that is frequently associated with psychological stress, which may adversely affect overall well-being and disease management. Complementary interventions that support stress reduction may therefore contribute to more holistic hypertension care. This study aimed to evaluate the effect of controlled electric cupping therapy on perceived stress among patients with hypertension.

Method: A quasi-experimental study employing a one-group pre-posttest design was conducted among 39 patients with primary hypertension at Rumah Bekam Salim Karanganyar. Participants received a single session of electric cupping therapy using a standardized pressure setting of 250 mmHg. Perceived stress was assessed using the Perceived Acute Stress Scale-10 (PASS-10). Data normality was evaluated using the Shapiro-Wilk test, and pre-post differences were analyzed using a paired-samples t-test.

Result: The mean PASS-10 score decreased from 23.69 ± 6.02 before the intervention to 12.74 ± 4.49 after the intervention. Statistical analysis demonstrated a significant reduction in perceived stress following electric cupping therapy ($t(38) = 28.69$, $p < 0.001$), with a very large effect size (Cohen's $d = 4.59$).

Conclusion: The findings suggest that controlled electric cupping therapy may have potential as a complementary approach for reducing perceived stress among patients with hypertension. However, because the study employed a one-group pre-posttest design without a control group, the results should be interpreted as preliminary. Further randomized controlled studies are needed to confirm these findings and determine the intervention's effectiveness.

How to cite this article:

Handayani, S., Wijayanti, Aseta, P. (2026). Electric Cupping Therapy for Stress Reduction in Patients with Hypertension: A Quasi-Experimental Study, 11(1). 496-506. <https://doi.org/10.51851/jmis.v11i1.1051>

This article is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License ©2026 by Sri Handayani.

INTRODUCTION

Hypertension remains one of the most prevalent chronic conditions worldwide and continues to be a leading contributor to cardiovascular morbidity and mortality. The World Health Organization (2023) estimates that approximately 1.28 billion adults globally are living with hypertension, with a substantial proportion experiencing uncontrolled blood pressure (J. Wang, 2025; Lauder et al., 2023). Beyond physiological determinants, psychosocial stress has been increasingly recognized as a critical modifiable factor influencing blood pressure regulation. Chronic stress activates the sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis, leading to sustained elevations in catecholamines and cortisol, endothelial dysfunction, and vascular resistance (Liu et al., 2021; Spruill, 2020). Recent longitudinal evidence indicates that elevated stress levels significantly predict increased systolic blood pressure and cardiovascular risk among hypertensive populations (Ginty et al., 2022; Cao & Zhang, 2023). Despite these findings, stress reduction strategies remain underintegrated into routine hypertension management, particularly within structured complementary nursing care models (Gallo & Savoia, 2024; Kuklina et al., 2025).

Stress is defined as a psychophysiological response to perceived internal or external demands that exceed an individual's adaptive capacity (Lazarus & Folkman, 2018; Calderone et al., 2025). In hypertensive patients, persistent psychological stress has been associated with poorer emotional well-being, reduced treatment adherence, and unfavorable cardiovascular outcomes. Consequently, interventions aimed at reducing perceived stress are clinically relevant components of holistic hypertension management (Arendshorst et al., 2024; Rahmadhani, 2021). Previous studies have demonstrated that non-pharmacological approaches, including relaxation-based and mind–body interventions, can significantly improve perceived stress and psychological well-being while supporting overall cardiovascular health (Blumenthal et al., 2021; Park & Han, 2021). Therefore, identifying accessible and culturally acceptable stress-reduction strategies remains an important priority within complementary nursing care (Krzemi, 2022; Samadi et al., 2025).

Cupping therapy is defined as a traditional therapeutic modality that applies negative pressure to the skin surface to stimulate local circulation and neurohumoral responses (Cao et al., 2018). Contemporary biomedical interpretations suggest that cupping may modulate inflammatory mediators, enhance microcirculation, and influence autonomic nervous system activity (Teut et al., 2020). Recent randomized and systematic studies have reported that cupping therapy may reduce systolic and diastolic blood pressure among hypertensive individuals (Aleyeidi et al., 2020; Kim et al., 2022). Furthermore, emerging evidence indicates its potential role in reducing perceived stress and improving autonomic regulation (Li et al., 2023). However, conventional cupping methods rely heavily on manual techniques, resulting in variability in applied pressure and potential inconsistencies in therapeutic outcome (Amponsah-offeh et al., 2023; Alp et al., 2025).

Technological advancements have introduced electric cupping therapy, which utilizes automated vacuum systems with controlled pressure settings. Electric cupping therapy can be defined as a modern adaptation of traditional cupping that employs electronically regulated negative pressure to ensure standardized intensity and reproducibility (Zhang et al., 2019). Standardized pressure application may enhance intervention safety, minimize operator variability, and improve clinical reliability (Pietropaoli et al., 2023). Recent experimental research demonstrated that electric cupping therapy significantly improved HRV indices, suggesting enhanced parasympathetic activation and stress modulation (Khandelwal et al., 2025). Additionally, modern cupping devices have been reported to offer improved hygiene and procedural consistency in clinical settings (X. Wang et al., 2020; Mukhlis et al., 2020). These developments indicate the potential integration of electric cupping therapy into structured complementary nursing care for hypertensive patients (Zhang et al., 2023).

Nevertheless, current literature reveals several limitations. First, studies examining cupping therapy in hypertension primarily focus on blood pressure outcomes without comprehensive

assessment of stress biomarkers (Kim et al., 2022). Second, investigations exploring stress reduction effects often employ manual cupping techniques without standardized pressure control (Li et al., 2022). Third, studies evaluating electric cupping devices have predominantly involved healthy participants rather than hypertensive populations (Li et al., 2023). Thus, although the therapeutic potential of cupping and stress modulation has been independently explored, there remains a paucity of research specifically investigating the effectiveness of electric cupping therapy with controlled pressure settings for stress reduction in hypertensive patients within a complementary nursing care framework (Pietropaoli et al., 2023).

The present study contributes to the existing body of knowledge by (1) applying controlled pressure settings to ensure reproducible intervention intensity, (2) assessing perceived psychological stress using a validated instrument (PASS-10), and (3) evaluating the intervention within the context of complementary nursing care practice for patients with hypertension.

The general objective of this study is to evaluate the effectiveness of electric cupping therapy with controlled pressure settings in reducing stress among patients with hypertension within the framework of complementary nursing care. This study seeks to determine whether a standardized, technology-assisted cupping intervention can contribute to improved psychological stress regulation in hypertensive individuals, thereby supporting more holistic and integrative nursing management strategies.

Specifically, this study aims to examine the effect of electric cupping therapy on psychological stress levels as measured by a validated stress assessment instrument (PASS-10). The study further intends to evaluate the clinical applicability and potential integration of electric cupping therapy with controlled pressure settings as part of complementary nursing care for patients with hypertension.

METHOD

Study Design

This study employed a quasi-experimental method with a one-group pre–post test design to evaluate the effect of electric cupping therapy with controlled pressure settings on stress levels in hypertensive patients. The quasi-experimental approach was selected due to the applied clinical setting and the ethical consideration of providing the intervention to all eligible participants seeking cupping therapy services. The one-group pre–post design enabled the comparison of stress levels before and after the intervention within the same participants, thereby assessing the magnitude of change attributable to the treatment. The study was conducted within a clinical service setting in which participants underwent a single standardized session of electric cupping therapy. Stress assessments were performed immediately before the intervention (pre-test) and after completion of the intervention protocol (post-test). The post-test PASS-10 assessment was administered immediately after completion of the 45-minute intervention session.

Setting and Participants

The study was conducted at Rumah Bekam Salim Karanganyar, a complementary therapy clinic that provides cupping services for patients with various health conditions, including hypertension. The target population consisted of hypertensive patients who routinely sought cupping therapy at the clinic. A total of 39 participants were recruited using a consecutive sampling technique. All hypertensive patients who attended Rumah Bekam Salim Karanganyar during the data collection period were screened for eligibility, and those who met the predefined inclusion criteria and provided informed consent were consecutively enrolled until the end of the recruitment period. Given the applied clinical setting and operational limitations at the facility, an a priori sample size calculation was not performed. Participant recruitment was based on consecutive sampling, whereby all eligible hypertensive patients presenting during the study period

were invited to participate. This process resulted in a final sample of 39 participants. To evaluate sample adequacy, a post-hoc power analysis was conducted using the observed paired-samples effect size (Cohen's $d = 4.59$), $\alpha = 0.05$, and $n = 39$, which yielded an estimated statistical power greater than 99%, indicating that the study was adequately powered to detect the observed changes in PASS-10 scores. Instead, consecutive sampling was employed, whereby all eligible hypertensive patients presenting to the clinic during the recruitment period were invited to participate. This process resulted in a final sample of 39 participants. This number represented the entire cohort of primary hypertensive patients who attended Rumah Bekam Salim Karanganyar during the data collection window, fulfilled all strict eligibility requirements, and gave voluntary informed consent.

Participants were recruited based on predefined eligibility criteria to ensure clinical relevance and internal validity. Individuals were eligible if they were adults aged 20–65 years with a physician-confirmed diagnosis of primary hypertension. This diagnosis was verified through a direct blood pressure assessment conducted by the research team using a calibrated digital sphygmomanometer. Participant eligibility was based on a physician-confirmed diagnosis of primary hypertension, defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg, consistent with the recommendations of the European Society of Hypertension (ESH) Guidelines for the Management of Arterial Hypertension (Mancia et al., 2023). Individuals currently receiving stable antihypertensive therapy for at least four weeks prior to enrollment were also considered eligible. The PASS-10 generates a continuous score ranging from 0 to 40, with higher scores indicating greater perceived stress. Although standard stress categories (low, moderate, and high) were used for descriptive reporting, all inferential statistical analyses were conducted using the original PASS-10 scores. This approach was adopted to preserve measurement precision, avoid information loss associated with categorization, and maximize statistical sensitivity.

Participants were excluded if they had secondary hypertension, severe cardiovascular complications (e.g., recent myocardial infarction or stroke), dermatological conditions or open wounds at the cupping sites, or any medical contraindication to cupping therapy. Individuals currently participating in structured stress-reduction programs or other complementary interventions were also excluded to prevent confounding effects. Pregnant women and patients with severe systemic illnesses were not included for safety considerations.

Intervention Procedure

Unlike manual cupping, where suction intensity depends on practitioner technique, the electric device allowed precise control of negative pressure throughout the intervention. The pressure setting was standardized at 250 mmHg (moderate therapeutic intensity). This specific pressure level was selected based on clinical safety guidelines for dry cupping, which indicate that negative pressure between 150 mmHg and 300 mmHg effectively stimulates subcutaneous mechanoreceptors and enhances local microcirculation without causing structural skin damage, severe ecchymosis, or capillary rupture (Cao et al., 2018; Zhang et al., 2019). To ensure the reproducibility of the intervention, a highly structured protocol was implemented. The therapy was administered as a single session (one time only) over a one-month study period. This single session lasted a total of 45 minutes, during which the cups remained continuously applied at the designated pressure. The cupping sites were precisely mapped on the participant's posterior torso and neck region according to traditional and anatomical guidelines, utilizing five key areas: (1) Al-Kahil, located on the upper back around the 7th cervical vertebra, which is widely recognized for general autonomic regulation and hypertension management; (2) Al-Akhda'ain, positioned bilaterally on the posterior aspects of the neck near the cervical muscles to promote regional blood flow and reduce tension; (3) the bilateral shoulders, focusing on the right and left trapezius muscle areas to alleviate muscular rigidity associated with hypertensive headaches; and (4) the upper right and left back, targeting the traditional anatomical zones corresponding to thoracic microcirculation. Regarding participant retention, out of the initial cohort enrolled, no participants withdrew,

dropped out, or were lost to follow-up during the study window, yielding a 100% participant retention rate throughout the intervention.

Measurement of Stress

Stress levels were measured using the Perceived Acute Stress Scale-10 (PASS-10), a 10-item self-report questionnaire designed to assess perceived stress levels. The PASS-10 evaluates the degree to which individuals perceive their life situations as stressful over a specified period. Each item is rated on a 5-point Likert scale ranging from 0 (never) to 4 (very often), with total scores ranging from 0 to 40. Higher scores indicate higher levels of perceived stress. The questionnaire used in this study was the validated Indonesian version with established reliability (Cronbach's $\alpha \geq 0.80$). Participants completed the PASS-10 twice: once immediately before the electric cupping intervention (pre-test) and once after completion of the single therapy session (post-test). Standardized instructions were provided to ensure consistent administration of the instrument.

Research Procedure

The study procedure was conducted in the following stages: Screening and eligibility assessment of hypertensive patients attending Rumah Bekam Salim Karanganyar; Explanation of study objectives and procedures, followed by written informed consent; Collection of demographic data and baseline measurement of stress using PASS-10 (pre-test); Implementation of a single standardized electric cupping therapy session; Post-intervention assessment using PASS-10; Data coding and verification prior to statistical analysis; Post-intervention stress assessment using PASS-10 (post-test). All procedures were carried out by trained practitioners certified in cupping therapy and supervised by the research team to ensure protocol adherence.

Data Analysis

Data were analyzed using statistical software. Descriptive statistics including means, standard deviations, frequencies, and percentages were used to summarize participant characteristics and PASS-10 scores. The normality of PASS-10 score distributions was assessed using the Shapiro–Wilk test. Because both pre-test and post-test PASS-10 scores were normally distributed, differences between pre-test and post-test scores were analyzed using a paired-samples t-test. Statistical significance was set at $p < 0.05$. Effect size was calculated using Cohen's d_z for paired samples, defined as the mean pre–post difference divided by the standard deviation of the paired differences. This measure is recommended for repeated-measures designs because it accounts for the dependency between observations obtained from the same participants.

Ethical Considerations

The study received ethical approval from Universitas Muhammadiyah PKU Surakarta ethics committee (Approval Number: 414/LPPM/UMPKU/VIII/2025). All participants provided written informed consent prior to participation. Confidentiality was ensured through coded data identification, and participants were informed of their right to withdraw at any time without affecting their treatment services.

RESULTS AND DISCUSSION

Results

To evaluate the impact of electric cupping therapy with controlled pressure settings for stress reduction in hypertensive patients, a series of analyses was conducted. Below are the summarized results presented in tables with accompanying explanations:

Table 1. Characteristics of Respondents

Category	Characteristics of respondents	Frequency	Percent	Valid percent	Cumulative percent
Duration of Hypertension	0-10 month	11	28.2	28.2	28.2
	11-20 month	10	25.6	25.6	53.8
	21-30 month	7	17.9	17.9	71.8
	31-40 month	2	5.1	5.1	76.9
	41-50 month	4	10.3	10.3	87.2
	>50 month	5	12.8	12.8	100
	Total	39	100	100	
Age	20-30years	6	15.4	15.4	15.4
	31-40 years	11	28.2	28.2	43.6
	41-50 years	14	35.9	35.9	79.5
	51-60 years	8	20.5	20.5	100
	Total	39	100	100	
Gender	Male	20	51.3	51.3	51.3
	Female	19	48.7	48.7	100
	Total	39	100	100	
Job	ART	3	7.7	7.7	7.7
	Teacher	9	23.1	23.1	30.8
	Instructor	1	2.6	2.6	33.3
	IRT	10	25.6	25.6	59.0
	Supervisor PLN	1	2.6	2.6	61.5
	Employee	15	38.5	38.5	100
	Total	39	100	100	

Based on table 1, most respondents had been diagnosed with hypertension for a duration of 0–10 months, accounting for 11 individuals (28.2%). In contrast, the smallest proportion of respondents had experienced hypertension for 31–40 months, comprising only 2 individuals (5.1%). These findings indicate that a considerable proportion of participants were relatively recently diagnosed with hypertension at the time of the study.

Based on the age distribution of respondents indicates that the largest proportion was in the 41–50 years age group, comprising 14 individuals (35.9%). This was followed by the 31–40 years group with 11 respondents (28.2%). Meanwhile, 8 respondents (20.5%) were aged 51–60 years, and the smallest proportion was observed in the 20–30 years age group, with 6 individuals (15.4%). These findings suggest that the majority of participants were in the middle-adulthood stage, which is commonly associated with an increased risk of hypertension.

Indicates that the majority of respondents were male, totaling 20 individuals (51.3%), while female respondents accounted for 19 individuals (48.7%). This distribution demonstrates a relatively balanced gender composition, with a slightly higher proportion of male participants in the study sample.

The occupational characteristics of the respondents indicate that the largest proportion were private sector employees, comprising 15 individuals (38.5%). This was followed by housewives/homemakers with 10 respondents (25.6%) and teachers with 9 respondents (23.1%). The smallest proportion was observed among respondents working as a PLN supervisor and as a teacher/instructor, with one individual each (2.6%). These findings suggest that most participants

were actively engaged in the workforce, particularly in the private sector, which may be associated with occupational stress exposure.

Table 2. Descriptive Statistics of PASS-10 Score Before and After Electric Cupping Therapy (n = 39)

Variable	Mean $\pm$ SD	Median (IQR)	Min–Max
Pre-test PASS-10	23.69 $\pm$ 6.02	24.00 (19.00–28.50)	14–35
Post-test PASS-10	12.74 $\pm$ 4.49	12.00 (9.50–15.50)	6–23

Based on table 2, the mean PASS-10 score decreased from 23.69 $\pm$ 6.02 before the intervention to 12.74 $\pm$ 4.49 after the intervention, indicating a substantial reduction in perceived stress levels.

Table 3. Shapiro Wilk Normality Test

Variable	W	p-value
Pre-test PASS-10	0.964	0.240
Post-test PASS-10	0.955	0.119

Table 4. Comparison of PASS-10 Scores Before and After Intervention

Analysis	Value
Mean Difference	10.95
t-value	28.69
df	38
p-value	< 0.001
Cohen's d	4.59

Based on table 4, a paired-samples t-test demonstrated a statistically significant reduction in perceived stress following electric cupping therapy ($t(38) = 28.69$, $p < 0.001$). The effect size was very large (Cohen's $d = 4.59$), indicating a substantial intervention effect.

Discussion

This study demonstrated a significant reduction in perceived stress among patients with hypertension following a single session of controlled electric cupping therapy. Using the original PASS-10 scores as continuous variables, the analysis revealed a statistically significant decrease in stress levels after the intervention ($p < 0.001$), indicating an improvement in participants' self-reported psychological well-being. These findings suggest that electric cupping therapy may have potential as a complementary approach for stress management in hypertensive individuals. However, given the study design, the results should be interpreted as preliminary evidence rather than definitive proof of effectiveness.

The present findings are consistent with previous studies reporting beneficial effects of complementary and integrative therapies on psychological stress and well-being. Non-pharmacological interventions have been shown to support stress reduction, improve emotional comfort, and enhance quality of life among individuals experiencing chronic health conditions (Blumenthal et al., 2021; Park & Han, 2021). In the context of hypertension, stress management is particularly relevant because psychosocial stress has been associated with poorer treatment adherence, reduced quality of life, and increased cardiovascular risk (Spruill, 2020; Ginty et al., 2022). Therefore, interventions that contribute to stress reduction may provide supportive benefits within comprehensive hypertension care.

The present findings are also broadly consistent with previous research examining cupping therapy and perceived stress. Mohammadi et al. (2021) reported significant reductions in self-reported stress following cupping-based interventions, suggesting that complementary therapies may positively influence psychological well-being. Although direct comparisons should be made

cautiously due to differences in study populations, intervention protocols, and outcome measures, the observed reduction in PASS-10 scores in the current study supports the growing body of literature suggesting a potential role for cupping therapy in stress management.

An important strength of the present study is the use of a standardized electric cupping device with controlled pressure settings. Unlike conventional manual cupping techniques, electric cupping allows more consistent application of negative pressure, thereby reducing operator-dependent variability and improving procedural standardization (Wang et al., 2020). Although the current study did not directly compare electric and manual cupping methods, the use of standardized pressure settings may enhance intervention reproducibility and support future investigations employing more rigorous experimental designs.

The observed effect size (Cohen's $d_z = 4.59$) was exceptionally large. Although the calculation was verified using the standard paired-samples formula, the estimate should be interpreted cautiously because the study employed a one-group pre–post design without a control group and relied on self-reported outcome measures. Future randomized controlled studies are required to determine whether a similar magnitude of effect can be replicated under more rigorous experimental conditions.

The findings also support the broader biopsychosocial perspective of chronic disease management. Contemporary models of hypertension recognize that health outcomes are influenced not only by physiological factors but also by psychological and social determinants (Liu et al., 2021). Consequently, interventions that address emotional well-being may complement conventional medical management. From a nursing perspective, complementary approaches that are feasible, acceptable, and patient-centered may help address psychological needs that are often under-recognized in routine hypertension care (Blumenthal et al., 2021).

Cultural considerations further strengthen the relevance of this intervention. Cupping therapy has long-standing historical roots in traditional medicine systems across Asia and the Middle East. The modernization of cupping through electric devices bridges traditional healing practices with contemporary clinical standards. This integration may enhance patient acceptance and satisfaction, particularly in populations familiar with traditional therapeutic modalities. Culturally congruent interventions may also encourage greater engagement in supportive health practices and chronic disease management.

An additional observation is that all participants demonstrated reductions in PASS-10 scores following the intervention. While this pattern may indicate a favorable response to treatment, it is relatively uncommon in clinical research and should be interpreted cautiously. Several factors may have contributed to this finding, including participant expectations, social desirability bias, and the self-reported nature of the PASS-10 instrument. Because participants voluntarily sought treatment at a complementary therapy clinic, positive expectations regarding the intervention may also have influenced their responses. Furthermore, the original categorization of PASS-10 scores may have amplified the appearance of uniform improvement, which was one reason the present analysis was revised to use the original continuous PASS-10 scores. Therefore, the uniformly favorable direction of change may reflect both genuine improvements in perceived stress and methodological influences associated with participant perception and study design.

Several limitations should be considered when interpreting these findings. First, the quasi-experimental one-group pre–posttest design lacked a control group, limiting the ability to establish causal relationships and increasing vulnerability to threats to internal validity, including placebo effects, expectancy effects, Hawthorne effects, and regression to the mean. Second, the relatively small sample size may limit the generalizability of the findings to broader hypertensive populations. Third, stress outcomes were assessed exclusively using a self-reported questionnaire, which may be influenced by response bias and subjective interpretation. Although PASS-10 is a validated instrument, the inclusion of objective outcome measures in future studies would strengthen the robustness of the evidence. Consequently, the present findings should be interpreted as

preliminary and hypothesis-generating rather than conclusive evidence of intervention effectiveness.

Future research should employ randomized controlled trial designs with larger and more diverse populations to verify the present findings. Studies incorporating longer follow-up periods would also help determine whether the observed reductions in perceived stress are sustained over time. Furthermore, comparative studies evaluating electric cupping against standard care or alternative stress-management interventions would provide a stronger basis for determining its clinical value.

In summary, this study provides preliminary evidence that controlled electric cupping therapy may be associated with reduced perceived stress among patients with hypertension. While the findings are encouraging, they should be interpreted cautiously due to methodological limitations, particularly the absence of a control group. Further rigorous research is required before broader clinical recommendations or conclusions regarding effectiveness can be made.

Suggestions

Based on the present findings, controlled electric cupping therapy shows promise as a supportive complementary intervention for stress management among individuals with hypertension. Nevertheless, because the current study employed a quasi-experimental one-group pre–post design without a control group, the results should be regarded as preliminary. Further randomized controlled trials involving larger and more diverse populations, objective outcome measures, and longer follow-up periods are needed before firm conclusions regarding effectiveness or routine clinical implementation can be made. Such studies would provide stronger evidence regarding the potential role of electric cupping therapy within integrative nursing and chronic disease management programs.

CONCLUSION

This study found a statistically significant reduction in perceived stress among patients with hypertension following a single session of controlled electric cupping therapy, as demonstrated by decreased PASS-10 scores after the intervention. These findings suggest that electric cupping therapy may have potential as a complementary approach for supporting psychological well-being in individuals with hypertension. However, the results should be interpreted cautiously because the study employed a quasi-experimental one-group pre–posttest design without a control group, which limits causal inference and increases susceptibility to expectancy effects, response bias, and other threats to internal validity. In addition, the study assessed only perceived stress outcomes and did not evaluate blood pressure, physiological indicators, or other clinical endpoints. Therefore, the findings should be considered preliminary and should not be interpreted as definitive evidence of clinical effectiveness. Future studies using randomized controlled trial designs, larger and more diverse samples, objective outcome measures, and longer follow-up periods are needed to confirm these findings and to better determine the potential role of controlled electric cupping therapy within complementary nursing and hypertension management programs.

ACKNOWLEDGMENT

The author expresses his deepest appreciation and gratitude to The Directorate General of Research and Development for providing Publication Assistance for this 2025 Reputable Journal with the research title "Electric Cupping Therapy with Controlled Pressure Settings for Stress Reduction in Hypertensive Patients: Implications for Complementary Nursing Care" based on Decree Number 0488/C/DT.06.01/2025 dated December 11, 2025, and Agreement/Contract Number 089/SPK/C3/DT.05.00/BP/2025 dated December 12, 2025, 036/LL6/AL.04/BP/2025 dated December 15, 2025, and 543A/LPPM/UMPKU/XII/2025

dated December 23, 2025. Also given to Muhammadiyah University of PKU Surakarta for its ongoing institutional support, which facilitates a conducive academic environment for innovation and research in the field of health and technology. And appreciation also given Salim Karanganyar Cupping Center for its close collaboration, provision of research locations, and active participation of therapists and patients who have contributed significantly to the application's trials and evaluation.

AUTHOR CONTRIBUTION STATEMENT

All author were responsible for the overall research process, including the conceptualization and design of the study, data collection, data analysis and interpretation, manuscript preparation, and final revision of the manuscript for publication.

REFERENCES

- Aleyeidi, N. A., Aseri, K. S., Matbouli, S. M., Sulaiani, A. A., & Kobeisy, S. A. (2020). Effects of wet cupping on blood pressure in hypertensive patients: A randomized controlled trial. *Journal of Integrative Medicine*, 18(4), 301–307.
- Alp, H., Yerlikaya, F. H., Eryavuz, D., & Unat, B. (2025). The effect of traditional wet cupping therapy on methylarginine load. 24(June), 580–584. <https://doi.org/10.56042/ijtk.v24i6.9816>
- Amponsah-offeh, M., Diaba-nuhoho, P., Speier, S., & Morawietz, H. (2023). Oxidative Stress , Antioxidants and Hypertension.
- Arendshorst, W. J., Vendrov, A. E., Kumar, N., Ganesh, S. K., & Madamanchi, N. R. (2024). Oxidative Stress in Kidney Injury and Hypertension. 1–47.
- Blumenthal, J. A., Sherwood, A., Smith, P. J., Mabe, S., & Watkins, L. L. (2021). Stress management and blood pressure control: Emerging evidence and clinical implications. *Hypertension*, 77(4), 1235–1243.
- Cao, H., Li, X., Liu, J., & Lee, M. S. (2018). Cupping therapy: An overview from a modern medicine perspective. *Journal of Traditional and Complementary Medicine*, 8(3), 394–399.
- Calderone, A., Marafioti, G., Latella, D., Corallo, F., Aleo, P. D., Quartarone, A., Calabrò, R. S., Calderone, A., Marafioti, G., Latella, D., & Corallo, F. (2025). Effectiveness of relaxation techniques for stress management and quality of life improvement in cardiovascular disease and hypertensive patients : a systematic review. *Psychology, Health & Medicine*, 30(7), 1281–1352. <https://doi.org/10.1080/13548506.2025.2458255>
- Cao, M., & Zhang, Z. (2023). Adjuvant music therapy for patients with hypertension : a meta-analysis and systematic review. 6, 1–11.
- Gallo, G., & Savoia, C. (2024). Hypertension and Heart Failure : From Pathophysiology to Treatment.
- Ginty, A. T., Kraynak, T. E., & Fisher, J. P. (2022). Chronic stress and cardiovascular risk: A meta-analytic review. *Psychosomatic Medicine*, 84(2), 123–134.
- Khandelwal, M., Kalra, S., & Ajmera, P. (2025). Effect Of Cupping Therapy On Pain , Cardiorespiratory Parameters , And Lung Function In Patients With Fibromyalgia Syndrome. 28(2), 1–10. <https://doi.org/10.1142/S0218957724500076>
- Kim, J. I., Lee, M. S., Lee, D. H., & Boddy, K. (2022). Effects of cupping therapy on blood pressure: A systematic review and meta-analysis. *Complementary Therapies in Medicine*, 66, 102814.
- Krzemi, J. (2022). Arterial Hypertension — Oxidative Stress and Inflammation.

- Kuklina, M. O., Shamay, I. G., Barinov, S. V., Republic, M. El, Ilyina, V. I., Bagova, D. R., & Bulatova, D. M. (2025). mplications of stress on the development of arterial hypertension: new approaches to therapy and prophylactics. 20.
- Lauder, L., Mahfoud, F., Azizi, M., Bhatt, D. L., Ewen, S., Kario, K., Parati, G., Rossignol, P., Schlaich, M. P., Koon, K., Lauder, L., Mahfoud, F., Azizi, M., Bhatt, D. L., Ewen, S., Lauder, L., Mahfoud, F., Azizi, M., Bhatt, D. L., ... Teo, K. K. (2023). Hypertension management in patients with cardiovascular comorbidities To cite this version : HAL Id : hal-04051779 Hypertension management in patients with cardiovascular comorbidities. 0–19.
- Li, Y., Lin, P. M. C., Pauly, S., Kundal, N., & Hernandez, M. E. (2023). Using near-infrared spectroscopy to investigate the effects of pressures and durations of cupping therapy on muscle blood volume and oxygenation. March, 1–9. <https://doi.org/10.1002/jbio.202200342>
- Li, Y., Mo, P., Jain, S., Elliott, J., Bleakney, A., Lyu, S., & Jan, Y. (2022). Effect of durations and pressures of cupping therapy on muscle stiffness of triceps. November, 1–10. <https://doi.org/10.3389/fbioe.2022.996589>
- Mukhlis, H., Sefa, N., Hermawan, A., Purwono, J., & Wahyudi, D. A. (2020). Cupping Therapy For Hypertensive Patients : A Quasi-Experimental Research. 7(14), 1437–1443.
- Pietropaoli, D., Cairo, F., Citterio, F., Aiuto, F. D., Ferri, C., & Grassi, G. (2023). Practical Guidelines for Patients with Hypertension and Periodontitis. High Blood Pressure & Cardiovascular Prevention, 30(1), 7–16. <https://doi.org/10.1007/s40292-022-00553-2>
- Rahmadhani, D. Y. (2021). Pengaruh Terapi Bekam Basah terhadap Perubahan Tekanan Darah pada Pasien Hipertensi. 10(2), 469–476. <https://doi.org/10.36565/jab.v10i2.418>
- Samadi, M., Huang, L., Mo, P., Hernandez, M., Hung, I. Y., & Jan, Y. (2025). Journal of Bodywork & Movement Therapies Effects of negative pressure of four-cup cupping therapy on hemodynamic responses of the gastrocnemius. Journal of Bodywork & Movement Therapies, 42(January), 446–451. <https://doi.org/10.1016/j.jbmt.2025.01.024>
- Wang, J. (2025). Chinese Guidelines for the Prevention and Treatment of Hypertension (2024 revision). 22(1), 1–149.
- Wang, X., Zhang, X., Elliott, J., Liao, F., Tao, J., & Jan, Y. (2020). Effect of Pressures and Durations of Cupping Therapy on Skin Blood Flow Responses. 8(December), 1–7. <https://doi.org/10.3389/fbioe.2020.608509>
- Zhang, Z., Zhao, L., Zhou, X., & Meng, X. (2023). Role of in fl ammation , immunity , and oxidative stress in hypertension : New insights and potential therapeutic targets. January, 1–18. <https://doi.org/10.3389/fimmu.2022.1098725>