

BLOOD PRESSURE CHANGES FOLLOWING LAUGHTER THERAPY AMONG OLDER ADULTS WITH HYPERTENSION IN CIBINGBIN, INDONESIA

Nuniek Tri Wahyuni^{a*}, Wildan Alwi Mufiz^b, Popi Ovtapiana^c, Didi Taswidi^d, Sumarni^e,

^{a,b,c,d,e} Department/Study Program of Nursing, Sekolah Tinggi Ilmu
Kesehatan Cirebon, Cirebon, Indonesia

*Corresponding e-mail: nuniek.triwahyuni@yahoo.com

ABSTRACT

Hypertension is a common health problem among older adults and requires both pharmacological and non-pharmacological management. Laughter therapy is a simple non-pharmacological intervention that may promote relaxation and influence cardiovascular responses. This study aimed to examine changes in systolic and diastolic blood pressure following laughter therapy among older adults with hypertension in the working area of Cibingbin Community Health Center, Indonesia. A pre-experimental one-group pretest-posttest design was used involving 84 older adults with hypertension. Blood pressure was measured before and after the laughter therapy intervention using a manual sphygmomanometer. The mean systolic blood pressure decreased from 154.64 ± 14.84 mmHg before the intervention to 153.69 ± 14.56 mmHg after the intervention, while the mean diastolic blood pressure decreased from 96.07 ± 9.73 mmHg to 95.18 ± 10.66 mmHg. Wilcoxon signed-rank analysis showed statistically significant differences in systolic ($p = 0.011$) and diastolic blood pressure ($p = 0.016$). These findings indicate a statistically significant reduction in blood pressure following laughter therapy; however, the magnitude of the mean reduction was small. Further controlled studies with standardized intervention protocols and longer follow-up are needed to determine its clinical effectiveness.

Keywords: Blood pressure; Hypertension; Laughter therapy; Older adults

INTRODUCTION

Hypertension remains a major global public health problem, particularly among older adults. The World Health Organization estimated that approximately 1.4 billion adults aged 30–79 years were living with hypertension in 2024, while only a relatively small proportion had their blood pressure adequately controlled (WHO, 2025). In Indonesia, the Survei Kesehatan Indonesia (SKI) 2023 reported a hypertension prevalence of 30.8% among adults aged ≥ 18 years based on blood pressure measurements, while West Java showed a higher prevalence of approximately 34.4% (Kemenkes, 2024). These findings indicate the continuing need for effective hypertension management, particularly in community and primary health-care settings.

Hypertension management requires both pharmacological treatment and non-pharmacological approaches. Current hypertension guidelines emphasize lifestyle modification, including healthy dietary patterns, sodium reduction, regular physical activity, weight management, and stress management as important components of blood pressure control (Johnson et al., 2025). Non-pharmacological interventions are also relevant in nursing practice because they may complement standard treatment and support self-management among older adults (Baughman et al., 2024).

Laughter therapy is a simple complementary intervention that may promote relaxation and reduce stress-related physiological responses. A systematic review and meta-analysis by Stiwi and Rosendahl (2022) reported beneficial effects of laughter-inducing interventions on various psychological and physiological outcomes. Kramer and Leita (2023) further found that laughter interventions were associated with reduced cortisol levels, suggesting a potential stress-regulation mechanism. Among older adults, Yoshikawa et al. (2019) reported a reduction in systolic blood pressure following a structured laughter intervention. Although these findings indicate the potential benefits of laughter-based interventions, evidence regarding their effects on blood pressure remains limited and heterogeneous. Previous studies have differed in intervention duration, frequency, delivery method, participant characteristics, and study settings, making the magnitude and consistency of blood pressure responses difficult to determine. In particular, evidence regarding the immediate blood pressure response to a brief, structured laughter therapy session among community-dwelling older adults with hypertension in primary health-care settings remains limited.

This gap is relevant to community nursing practice because simple, low-complexity complementary interventions may be feasible to integrate into health-promotion and stress-management activities alongside established hypertension management. Therefore, this study aimed to examine changes in systolic and diastolic blood pressure following a single 5–10-minute structured laughter therapy session among older adults with hypertension in the working area of Cibingbin Community Health Center, Kuningan Regency, Indonesia. The specific contribution of this study lies in evaluating the immediate blood pressure response to a brief and structured laughter intervention



in a real-world primary health-care setting among community-dwelling older adults with hypertension.

METHODS

This study employed a quantitative pre-experimental one-group pretest-posttest design. The study was conducted in January 2026 in the working area of Cibingbin Community Health Center, Kuningan Regency, West Java, Indonesia. The study involved older adults with hypertension and examined changes in systolic and diastolic blood pressure before and after laughter therapy.

The study population consisted of 539 older adults with hypertension registered in the working area of Cibingbin Community Health Center. The sample size was estimated using Slovin's formula, $n = N/[1 + N(e^2)]$, where n represents the required sample size, N represents the total population, and e represents the margin of error. With a population of 539 older adults and a margin of error of 10% ($e = 0.10$), the estimated sample size was approximately 84 participants, and 84 participants were included in the study.

Participants were eligible if they were aged ≥ 60 years, willing to participate, and registered as older adults with hypertension in the working area of Cibingbin Community Health Center. Participants who withdrew from the study or did not complete the intervention were excluded.

A proportionate stratified random sampling technique was used, with each village within the Cibingbin Community Health Center working area treated as a stratum. The number of participants allocated to each village was determined proportionally using the formula $nh = (Nh / N) \times n$, where nh represents the sample allocated to each village, Nh represents the number of older adults with hypertension in each village, N represents the total population (539), and n represents the total sample size (84). Following proportional allocation, eligible participants within each village were randomly selected from the sampling frame using a lottery method until the required number of participants for each stratum was reached.

Laughter therapy was administered using a structured procedure consisting of a hand-clapping warm-up, breathing exercises, enthusiastic laughter, greeting laughter, and lion laughter. The intervention was delivered in a single session lasting approximately 5–10 minutes.

Systolic and diastolic blood pressure were measured before and after the intervention using a manual sphygmomanometer and stethoscope. The measurements were recorded on an observation sheet. The primary nursing outcomes were changes in systolic and diastolic blood pressure.

Potential confounding factors that may influence blood pressure, including caffeine and sodium intake, smoking or nicotine exposure, physical activity, psychological stress, sleep, dietary intake, and antihypertensive medication use, were not comprehensively controlled or statistically adjusted in this study. Therefore, the observed pre-post blood pressure changes should be interpreted cautiously, as these

Nuniek Tri Wahyuni et al., Blood Pressure Changes Following....

factors may have contributed to the changes and limit the ability to attribute them solely to laughter therapy.

Participant characteristics were analyzed descriptively and presented as frequencies, percentages, means, and standard deviations, as appropriate. Differences in systolic and diastolic blood pressure before and after the intervention were analyzed using the Wilcoxon signed-rank test. Statistical significance was set at $p < 0.05$.

Ethical approval for this study was obtained from the Research Ethics Committee of RSD Gunung Jati, Cirebon City, Indonesia. All participants received information regarding the purpose, procedures, potential benefits, and their rights as research participants, and written informed consent was obtained before data collection. Participant confidentiality and anonymity were maintained throughout the research process.

RESULTS

Participant Characteristics

Table 1. Characteristics of participants ($n = 84$)

Characteristics	n (%) / Mean $\pm$ SD
Age, years	72.51 $\pm$ 8.24
Range	60–85
Sex	
Male	5 (5.95)
Female	79 (94.05)
Occupation	
Farmer	63 (75.00)
Housewife	16 (19.05)
Others	5 (5.95)
Education	
Elementary school	59 (70.24)
Junior high school	20 (23.81)
Senior high school	5 (5.95)

A total of 84 older adults with hypertension participated in the study. The mean age of participants was 72.51 $\pm$ 8.24 years, ranging from 60 to 85 years. Most participants were female (94.05%), worked as farmers (75.00%), and had completed elementary school education (70.24%).

Blood Pressure Before and After Laughter Therapy

Table 2. Comparison of blood pressure before and after laughter therapy ($n = 84$)

Blood pressure	Pre-intervention Mean $\pm$ SD	Post-intervention Mean $\pm$ SD	Mean change (mmHg)	Z	p -value
----------------	--------------------------------	---------------------------------	--------------------	-----	------------

Nuniek Tri Wahyuni et al., Blood Pressure Changes Following....

Systolic	154.64 ± 14.84	153.69 ± 14.56	-0.95	-2.530	0.011
Diastolic	96.07 ± 9.73	95.18 ± 10.66	-0.89	-2.402	0.016

Before the intervention, the mean systolic blood pressure was 154.64 ± 14.84 mmHg and the mean diastolic blood pressure was 96.07 ± 9.73 mmHg. Following laughter therapy, the mean systolic blood pressure was 153.69 ± 14.56 mmHg, while the mean diastolic blood pressure was 95.18 ± 10.66 mmHg. The mean reductions were 0.95 mmHg for systolic blood pressure and 0.89 mmHg for diastolic blood pressure. The Wilcoxon signed-rank test showed a statistically significant difference between pre- and post-intervention systolic blood pressure ($Z = -2.530$, $p = 0.011$) and diastolic blood pressure ($Z = -2.402$, $p = 0.016$).

DISCUSSION

The findings of this study indicate that laughter therapy was followed by statistically significant changes in systolic and diastolic blood pressure among older adults with hypertension. However, the magnitude of the mean reduction was relatively small. Therefore, the findings should be interpreted as evidence of a measurable short-term blood pressure response following the intervention rather than as evidence that laughter therapy produces a substantial antihypertensive effect. Furthermore, because this study used a one-group pretest-posttest design without a control group, the observed changes cannot be attributed exclusively to laughter therapy.

From a nursing theoretical perspective, these findings can be interpreted using the Roy Adaptation Model (RAM), which views individuals as adaptive systems responding to internal and external stimuli through physiological and psychosocial adaptation processes. In the present study, hypertension and the stress associated with chronic illness can be considered stimuli requiring adaptive responses, while laughter therapy may function as a supportive intervention that facilitates relaxation and positive coping. The relevance of RAM in older-adult nursing is supported by Motaarefi et al. (2025), who reported improvements in general health and quality of life following a RAM-based educational intervention among older adults (Motaarefi et al., 2025). More specifically, Zhang et al. (2021) found that RAM-based nursing care among older adults with hypertension improved self-management, medication adherence, quality of life, and blood pressure control (Zhang et al., 2021). These studies support the use of adaptation-oriented nursing approaches to address both physiological and psychosocial needs in older populations.

A possible explanation for the blood pressure response observed in this study is the stress-modulating effect of laughter. Kramer and Leitao (2023), in a systematic review and meta-analysis, found that laughter interventions were associated with reductions in cortisol levels compared with control conditions, suggesting a potential pathway through which laughter may reduce physiological stress responses (Kramer & Leitao, 2023).

Nuniek Tri Wahyuni et al., Blood Pressure Changes Following....

This mechanism is conceptually consistent with the adaptive processes described in RAM, in which physiological and psychological responses interact in maintaining adaptation. Nevertheless, cortisol, autonomic activity, or perceived stress were not measured in the present study. Therefore, stress reduction should be considered a plausible explanatory mechanism, rather than a mechanism directly demonstrated by this research.

The findings are generally consistent with previous evidence regarding laughter-based interventions. Yoshikawa et al. (2019) reported a significant reduction in systolic blood pressure and heart rate following a laughter intervention among older adults attending an elderly day-care center (Yoshikawa et al., 2019). In addition, Stiwi and Rosendahl (2022), in a systematic review and meta-analysis of 45 randomized controlled trials involving 2,547 participants, reported beneficial effects of laughter-inducing interventions on physiological, physical, and mental health outcomes (Stiwi & Rosendahl, 2022). However, substantial heterogeneity was identified across studies. Variations in study design, participant characteristics, intervention duration, frequency, and type of laughter intervention may partly explain differences in the magnitude of effects across studies. Therefore, the relatively small blood pressure change observed in the present study should be interpreted within the specific intervention protocol and community setting in which it was conducted.

Additional evidence supports the potential cardiovascular benefits of laughter-based interventions, although the magnitude and consistency of the effects vary across studies. (Poniyem, Mekeama, L., & Nurlinawati, 2024), using a quasi-experimental pretest–posttest control-group design among 32 older adults with hypertension, reported a significant reduction in blood pressure following laughter therapy administered three times per week for one month ($p = 0.002$). Similarly, (Gayatri, P. R., Margareta, S. S., & Pratiwi, 2024) conducted a quasi-experimental nonequivalent-group study involving 46 older adults with hypertension and found significant changes in blood pressure following laughter therapy compared with baseline measurements ($p < 0.001$). These findings suggest that repeated laughter interventions may produce more pronounced blood pressure responses than the single brief 5–10-minute session used in the present study.

However, (Oliveira & Arriaga, 2022), in a systematic review of 32 studies examining laughter-inducing interventions and cardiovascular outcomes, found that blood pressure generally decreased in pre–post comparisons, whereas between-group effects were not consistently significant because of substantial heterogeneity in intervention type, participant characteristics, and study quality. This finding supports the cautious interpretation of the relatively small blood pressure reduction observed in the present study. Furthermore, (Hayashi et al., 2023), using data from 22,503 older adults in the Japan Gerontological Evaluation Study, found that frequent laughter alone was not independently associated with hypertension after multivariable adjustment, whereas higher subjective happiness was significantly associated with lower odds of hypertension (OR = 0.91, 95% CI: 0.86–0.97). Together, these findings suggest that the cardiovascular benefits associated with laughter may be influenced not only by the

Nuniek Tri Wahyuni et al., Blood Pressure Changes Following....

laughter intervention itself but also by intervention intensity, psychological well-being, participant characteristics, and other contextual factors.

Participant characteristics may also provide important context for interpreting the findings. The participants were older adults with a mean age of approximately 72 years, and the sample was predominantly female. The original dataset included 79 women and only five men. These characteristics indicate that the findings primarily reflect blood pressure responses among older women living in the community. However, the predominance of female participants should not be interpreted as evidence that laughter therapy is more effective in women because this study did not compare intervention responses according to sex. Rather, the sex distribution should be considered when evaluating the generalizability of the findings to older male populations. Occupation and educational level were useful for describing the study population, but because they were not analyzed in relation to blood pressure change, no conclusions regarding their influence on intervention response can be made.

From the perspective of nursing practice, laughter therapy may have potential as a simple complementary intervention to promote relaxation and psychosocial well-being among older adults with hypertension. Nevertheless, the relatively small magnitude of blood pressure reduction means that laughter therapy should not replace established hypertension management. The 2025 AHA/ACC hypertension guideline continues to emphasize accurate blood pressure assessment, lifestyle modification—including healthy diet, sodium reduction, physical activity, weight management and stress management—and pharmacological treatment when clinically indicated. The guideline also identifies nurses as important members of multidisciplinary hypertension-care teams, with roles in accurate blood pressure assessment, patient education, self-management support, lifestyle modification, medication reconciliation, and adherence.

Therefore, laughter therapy would be more appropriately positioned as an adjunctive nursing intervention within comprehensive hypertension care.

In community nursing services, structured laughter activities may potentially be incorporated into health-promotion or stress-management activities for older adults at community health centers or older-adult community programs. Its implementation should remain integrated with regular blood pressure monitoring, medication adherence support, lifestyle education, and appropriate referral when blood pressure remains uncontrolled. Current hypertension guidance supports multidisciplinary and community-based approaches and recognizes the role of nurses and community health workers in improving hypertension management. Thus, the practical value of laughter therapy may lie not only in blood pressure reduction, but also in providing an acceptable and low-complexity activity that supports psychosocial aspects of nursing care.

From a nursing management and education perspective, the findings highlight the importance of implementing complementary interventions through standardized and evidence-based procedures. Nursing managers should ensure that any future use of laughter therapy is supported by clear protocols regarding participant eligibility, intervention duration and frequency, blood pressure monitoring, safety assessment, *Nuniek Tri Wahyuni et al., Blood Pressure Changes Following....*

documentation, and referral procedures. In nursing education, this study may also serve as an example of evidence-based complementary nursing care and the importance of distinguishing statistical significance from clinical significance. A statistically significant result should not automatically be interpreted as a clinically meaningful therapeutic effect.

This study has several strengths. It evaluated a simple complementary nursing intervention in a real community setting, involved 84 older adults, and used paired measurements that enabled assessment of within-participant blood pressure changes. However, several limitations should be considered. First, the absence of a control group limits causal interpretation. Second, several potential confounding factors that may influence blood pressure, including caffeine and sodium intake, smoking or nicotine exposure, physical activity, psychological stress, sleep, dietary intake, and antihypertensive medication use, were not comprehensively controlled or statistically adjusted. Consequently, these factors may have contributed to the observed pre-post blood pressure changes.

Third, the study assessed short-term blood pressure responses and therefore cannot determine whether the observed changes are sustained over time. Fourth, the predominance of female participants and the use of a single community setting limit generalizability. Finally, the study did not assess psychological stress, cortisol, quality of life, or other adaptive outcomes, so the proposed adaptation and stress-related mechanisms could not be directly examined. Future research should use controlled designs, standardized intervention protocols, repeated and standardized blood pressure measurements, longer follow-up, and additional physiological or psychosocial outcomes to determine whether laughter therapy produces reproducible and clinically meaningful benefit.

CONCLUSION

Laughter therapy was associated with statistically significant changes in systolic and diastolic blood pressure among older adults with hypertension in the working area of Cibingbin Community Health Center. However, the magnitude of the observed reduction was small and should be interpreted cautiously because the study used a one-group pretest-posttest design without a control group. Therefore, laughter therapy may be considered as a complementary nursing intervention to support relaxation and psychosocial adaptation, but it should not replace established hypertension management. Further controlled studies with standardized intervention protocols and longer follow-up are recommended to determine the consistency and clinical relevance of its effects.

IMPLICATIONS FOR NURSING PRACTICE

The findings suggest that laughter therapy may be used as a simple complementary nursing intervention to support relaxation among older adults with

Nuniek Tri Wahyuni et al., Blood Pressure Changes Following....



hypertension. In clinical and community nursing, it may be incorporated into health-promotion activities together with regular blood pressure monitoring, lifestyle education, medication adherence support, and standard hypertension management. For nursing education, this study may provide an example of evidence-based complementary care while emphasizing the importance of interpreting both statistical and clinical significance. In nursing management, implementation should be supported by standardized procedures, appropriate participant screening, safety monitoring, and clear referral criteria. Further development may focus on standardized intervention protocols and simple digital documentation or monitoring systems; however, technological applications were not evaluated in the present study and therefore require further research.

ACKNOWLEDGMENTS

The authors would like to express their gratitude to Sekolah Tinggi Ilmu Kesehatan Cirebon, Cibingbin Community Health Center, and all participants who contributed to this study. Appreciation is also extended to the health-care staff and community representatives who supported the coordination and implementation of the research.

ETHICAL STATEMENT AND CONFLICT OF INTEREST

This study was conducted in accordance with ethical principles for research involving human participants. Ethical approval was obtained from the Research Ethics Committee of RSD Gunung Jati, Cirebon City, Indonesia (Ethical Approval No. [insert approval number]). All participants received information regarding the purpose and procedures of the study and provided written informed consent before data collection. Participant confidentiality and anonymity were maintained throughout the research process. The authors declare no conflict of interest.

REFERENCES

- Baughman, C., Gong, Y., Wu, Y., Hanlon, E., & Juraschek, S. (2024). Nonpharmacologic Management of Hypertension in Older Adults. *Clinics in Geriatric Medicine*, 40(4), 615–628. <https://doi.org/10.1016/j.cger.2024.04.013>
- Gayatri, P. R., Margaretta, S. S., & Pratiwi, W. N. (2024). The Effect of Laughter Therapy on Blood Pressure in Older People With Hypertension. *Journal Keperawatan Widya Gantarai Indonesia*, 8(3), 237–242. <https://doi.org/10.53801/jcn.v3i1.124>
- Hayashi, F., Shirai, Y., Ohira, T., Shirai, K., Kondo, N., & Kondo, K. (2023). Subjective Happiness, Frequency of Laughter, and Hypertension: A Cross-Sectional Study Based on the Japan Gerontological Evaluation Study (JAGES). *International Journal of Environmental Research and Public Health*, 20(9). <https://doi.org/10.3390/ijerph20095713>



- Johnson, H. M., Shimbo, D., Abdalla, M., Altieri, M. M., Bress, A. P., Carter, J., Commodore-Mensah, Y., Egan, B., Melnyk, B. M., Ogunniyi, M. O., Schott, S. L., Watson, K. E., & Williamson, J. D. (2025). 2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM Guideline for the Prevention, Detection, Evaluation and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Joint Committee . In *Circulation* (Vol. 152, Number 11). <https://doi.org/10.1161/CIR.0000000000001356>
- Kemenkes. (2024). *Survei kesehatan Indonesia*. Kemenkes.
- Kramer, C. K., & Leita, C. B. (2023). Laughter as medicine: A systematic review and meta-analysis of interventional studies evaluating the impact of spontaneous laughter on cortisol levels. *PLoS ONE*, 18(5 May), 1–15. <https://doi.org/10.1371/journal.pone.0286260>
- Motaarefi, H., Habibzadeh, H., Dorosti, A. M., Habibpour, Z., Sakhaei, S., & Seyednazari, M. A. (2025). The effect of Roy Adaptation Model on the quality of life and general health of elderly people in nursing homes: randomized controlled trial. *BMC Geriatrics*, 25(1). <https://doi.org/10.1186/s12877-025-06585-2>
- Oliveira, R., & Arriaga, P. (2022). A systematic review of the effects of laughter on blood pressure and heart rate variability. *Humor*, 35(2), 135–167. <https://doi.org/10.1515/humor-2021-0111>
- Poniyem, Mekeama, L., & Nurlinawati, N. (2024). Effect of laughter therapy on blood pressure reduction in elderly with hypertension. *Jurnal Ilmu Kesehatan Dharma Indonesia*, 4(1), 37–48.
- Stiwi, K., & Rosendahl, J. (2022). Efficacy of laughter-inducing interventions in patients with somatic or mental health problems: A systematic review and meta-analysis of randomized-controlled trials. *Complementary Therapies in Clinical Practice*, 47(January 2021), 101552. <https://doi.org/10.1016/j.ctcp.2022.101552>
- WHO. (2025). Global report on hypertension 2025. In *The Lancet* (Vol. 406, Number 10517). [https://doi.org/10.1016/S0140-6736\(25\)02208-1](https://doi.org/10.1016/S0140-6736(25)02208-1)
- Yoshikawa, Y., Ohmaki, E., Kawahata, H., Maekawa, Y., Ogihara, T., Morishita, R., & Aoki, M. (2019). Beneficial effect of laughter therapy on physiological and psychological function in elders. *Nursing Open*, 6(1), 93–99. <https://doi.org/10.1002/nop2.190>
- Zhang, J., Guo, L., Mao, J., Qi, X., Chen, L., Huang, H., Sun, Y., & Yang, X. (2021). The effects of nursing of Roy adaptation model on the elderly hypertensive: a randomised control study. *Annals of Palliative Medicine*, 10(12), 12149–12158. <https://doi.org/10.21037/apm-21-2803>

