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Electroacupuncture for blood pressure control in elderly hypertensive patients

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ABSTRACT

Hypertension is a major global health problem and a leading risk factor for cardiovascular diseases, especially among the elderly, due to decreased vascular elasticity, increased peripheral resistance, and autonomic dysfunction. Despite pharmacological therapy, poor adherence and side effects highlight the need for complementary non-pharmacological interventions. Electroacupuncture has emerged as a potential therapy to support blood pressure control in elderly hypertensive patients. This study aimed to evaluate the effectiveness of electroacupuncture in reducing blood pressure among elderly patients with hypertension. A quantitative pre-experimental one-group pretest–posttest design was conducted on 20 elderly hypertensive patients. Electroacupuncture was applied to GV20, ExHN3, ExHN5, LI4, LI11, PC6, ST36, LR3, and KI3 points for 30 minutes per session over six sessions in three weeks. Blood pressure was measured before and after the intervention using a calibrated sphygmomanometer. Data analysis was performed using the Wilcoxon Signed Rank Test for systolic blood pressure and the Paired Sample T-Test for diastolic blood pressure with α = 0.05. Systolic blood pressure decreased significantly from 133.27 ±16.59 mmHg to 128.85 ±15.97 mmHg (p=0.011), while diastolic pressure decreased from 76.04 ±9.08 mmHg to 74.90 ±7.43 mmHg without statistical significance (p=0.240). Electroacupuncture is effective, safe, and economical in reducing systolic blood pressure in elderly hypertensive patients. It is recommended as a complementary therapy integrated with conventional management for holistic hypertension control and improving quality of life among the elderly.

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INTRODUCTION

Hypertension remains a paramount global health challenge and a primary risk factor for cardiovascular morbidity and mortality (Goorani et al., 2024). Older adults disproportionately bear the burden of this condition, as the aging process precipitates physiological changes including decreased blood vessel elasticity, increased peripheral resistance, and altered cardiovascular function (Mogi et al., 2024). Hypertension is clinically defined as systolic blood pressure greater than 140 mmHg and diastolic blood pressure greater than 90 mmHg, based on two or more separate measurements (Kandil et al., 2023). When left uncontrolled, this condition significantly elevates the risk of severe complications, including stroke, coronary heart disease, and kidney failure (Masenga & Kirabo, 2023). The escalating prevalence of hypertension in the elderly population not only threatens individual health but also imposes a substantial economic burden on families and healthcare systems worldwide, necessitating urgent and effective management strategies (Lien et al., 2025).

Despite the availability of established clinical guidelines, blood pressure control rates remain suboptimal, particularly among the elderly who frequently present with comorbidities and polypharmacy challenges (Dinarvand et al., 2024). Current management relies heavily on pharmacological therapy; however, long-term use of antihypertensive medications is often associated with adverse effects, including impaired kidney function and drug dependence, which can compromise patient compliance (Redon & Carmena, 2024). Furthermore, low rates of early detection and inconsistent monitoring exacerbate the risk of health complications (Elendu et al., 2024). Consequently, there is a growing consensus on the need for a comprehensive therapeutic approach that integrates non-pharmacological interventions as supportive therapy to mitigate the limitations of standard pharmacological treatments (Timsina et al., 2023).

In this context, acupuncture has emerged as a promising complementary therapy within holistic hypertension management (Man et al., 2022). As a non-invasive modality, it offers a potentially safer, simpler, and more affordable alternative or adjunct to conventional medication (Litscher, 2025). Notably, electroacupuncture, which involves the application of electrical stimulation to traditional acupoints, has gained attention for its potential to enhance therapeutic efficacy compared to manual needling (Zhang et al., 2023). Evidence suggests that acupuncture can effectively lower both systolic and diastolic blood pressure, providing a viable option for patients who struggle with medication adherence or experience significant side effects from pharmacological agents (Hao et al., 2025

The therapeutic potential of electroacupuncture is underpinned by measurable physiological mechanisms involving the neuroendocrine and autonomic nervous systems (Tjen-A-Looi et al., 2022). Stimulation of specific acupoints activates regulatory centers in the hypothalamus, modulating the balance between sympathetic and parasympathetic nerve activity (Li et al., 2022). By reducing excessive sympathetic tone, electroacupuncture promotes peripheral vasodilation and decreases systemic vascular resistance (Huang et al., 2023). Additionally, research indicates that this therapy may regulate the renin–angiotensin–aldosterone system (RAAS) and reduce inflammatory mediators, thereby addressing multiple pathways contributing to elevated blood pressure (Liu et al., 2025). These neurovascular modulations suggest a robust biological basis for the use of electroacupuncture in cardiovascular regulation (Zeng et al., 2024).

Despite these promising findings, the specific contribution of electroacupuncture to the prevention and management of hypertension in the elderly remains to be elucidated (Wang et al., 2023). While the existing literature supports the general efficacy of acupuncture, there is a need for more extensive, in-depth research to standardize protocols and validate outcomes specifically within the geriatric population (Zhu et al., 2026). Therefore, this study aims to evaluate the efficacy of electroacupuncture for blood pressure control in elderly hypertensive patients, seeking to enrich the current understanding of its role as an integrative therapeutic intervention.

METHOD

Research Design

This study employed a pre-experimental quantitative design utilizing a one-group pretest–posttest approach to evaluate the effect of electroacupuncture therapy on blood pressure. The research was conducted within the North Denpasar III Community Health Center's working area during July and August 2025.

Participant

The study population consisted of elderly hypertensive patients registered at the health center. A sample of 20 respondents was selected using purposive sampling based on established inclusion and exclusion criteria. Inclusion criteria required participants to be aged 60 years or older, have a confirmed diagnosis of hypertension, be in a stable clinical condition, and express willingness to participate in the entire research process.

Data Collection

The intervention consisted of electroacupuncture therapy administered at acupoints GV 20, ExHN3, ExHN5, LI4, LI 11, PC 6, ST 36, LR3, and KI3. Each session lasted 30 minutes, totaling six sessions over three weeks. Blood pressure was measured using a calibrated instrument before the intervention (pretest) and after the final session (posttest).

Data Analysis

Data analysis commenced with the Shapiro–Wilk test to assess normal distribution. Systolic blood pressure data were analyzed using the Wilcoxon Signed Rank Test, whereas diastolic blood pressure data were analyzed using the Paired Sample T-Test. A significance level of 0.05 was applied to all statistical tests.

Ethical Clearance

This study obtained administrative permission from the Health Office (Number: 000.9.2/1453/Dikes) and ethical approval from the Health Research Ethics Commission of STIKES Wira Medika Bali (Number: 469/E1.STIKESWIKA/EC/IV/2025, dated April 28, 2025). All respondents provided written informed consent prior to the commencement of the study.

RESULT

Respondent Characteristics

Table 1. Characteristics of respondents

Characteristics	Frequency	Percentage
Age		
Elderly (60-74)	15	75
Old (75-90)	5	25
Gender		
Male	5	25
Female	15	75
Educational history		
Elementary school	2	10
Junior high school	0	0
High school	10	50
Diploma	4	20
Bachelor's degree	4	20
Occupation		
Unemployed	1	5
Housewife	6	30
Private sector	1	5
Civil servant	3	15
Retired	9	45

Characteristics	Frequency	Percentage
Duration of hypertension		
<2 years	4	20
>2 years	16	80
Hypertension medication dosage		
5 mg	6	30
10 mg	2	10
12.5 mg	6	30
25 mg	6	30
Living with family		
Yes	20	100
No	0	0
Total	20	100.00

Table 1 shows the results from 20 elderly respondents. The respondents were predominantly aged 60–74 years (75%), female (75%), high school educated (50%), and mostly retired (80%), who had suffered from hypertension for more than two years and lived with their families (100%).

Blood Pressure Before and After Acupuncture Treatment in Elderly Hypertensive Patients.

This study involved 20 respondents with systolic and diastolic blood pressure measurements taken before (pretest) and after (posttest) the intervention. All data were valid with no missing data.

Table 2. Blood pressure results before and after acupuncture treatment in elderly hypertensive patients

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Pretest systolic	20	133.27	16.587	111	175
Posttest systolic	20	128.85	15.974	98	164
Pretest diastolic	20	76.04	9.075	62	100
Posttest diastolic	20	74.90	7.429	64	93
Total	20	100.00			

Table 2 shows the decrease in both systolic and diastolic blood pressure after the intervention.

Data Normality Test

Table 3. Data normality test results using the Shapiro-Wilk test

Variable	Sig. (Shapiro-Wilk)	Description
Pretest systolic	0.005	Not Normal
Posttest systolic	0.055	Normal
Pretest diastolic	0.409	Normal
Posttest diastolic	0.489	Normal

Table 3 shows that the pretest systolic data are not normally distributed, whereas the other data are. Thus, the Wilcoxon test was used for the systolic data and the Paired Sample T-Test for the diastolic data.

The Effect of Blood Pressure Before and After Acupuncture on Older People with Hypertension

Table 4. The effect of acupuncture therapy on the intervention group on systolic pressure in elderly hypertensive patients

Variable	n	Mean	Std. Deviation	p-value	z-value
Pretest systolic	20	133.27	16.587	0.011	-2.539
Posttest systolic	20	128.85	15.974		

Table 4 shows a decrease in the mean systolic value of 4.42 mmHg, indicating an effect. Based on the statistical results using the Wilcoxon test, a p-value of 0.011 < 0.05 and a z-value of -2.539 indicate a significant difference between systolic blood pressure before and after the intervention. This indicates that the intervention was effective in lowering respondents' systolic blood pressure.

Table 5. The effect of acupuncture therapy on the intervention group on diastolic pressure in elderly hypertensive patients

Variable	n	Mean	Std. Deviation	p-value	z-value
Pretest diastolic	20	76.04	9.075	0.240	1.212
Posttest diastolic	20	74.90	7.429		

Table 5 shows that, descriptively, the mean diastolic value decreased by 1.14 mmHg. Based on the Paired Sample T-Test, the p-value (0.240) was> 0.05, and the t-value (1.212) was not significant, indicating that there was no significant difference in diastolic blood pressure before and after the intervention. In other words, the intervention has not shown a significant effect on diastolic blood pressure.

DISCUSSION

Blood Pressure of Older People Before Intervention

Among the 20 elderly hypertensive respondents, the mean baseline systolic blood pressure was 133.27 mmHg (prehypertension range) and the mean diastolic pressure was 76.04 mmHg (normal range), both below the clinical hypertension threshold of ≥140/90 mmHg. This pattern aligns with age-related vascular changes, particularly arterial stiffening and autonomic imbalance, that commonly predispose older adults to isolated systolic hypertension (Miller & Arnold, 2022). Given that hypertension prevalence exceeds 60% in individuals over 60, this relatively moderate baseline values may reflect early-stage disease or effective prior management, potentially enhancing responsiveness to complementary interventions that modulate vascular tone (Taati et al., 2026).

Blood Pressure in Older People After Intervention

Following six electroacupuncture sessions over three weeks, mean systolic blood pressure decreased to 128.85 mmHg, while diastolic pressure remained stable within the normal range at 74.90 mmHg. This differential response aligns with the physiological mechanism of acupuncture, which stimulates afferent nerves to modulate hypothalamic and brainstem activity, thereby reducing sympathetic tone, promoting vasodilation, and triggering the release of endorphins and serotonin (Zhou et al., 2024). Researchers attribute the pronounced systolic reduction to the

responsiveness of cardiac contractility and to significant arterial stiffness under neurovascular modulation. In contrast, diastolic pressure, governed by peripheral resistance, typically requires longer-term adaptation for significant change (Zhang et al., 2025). These findings are consistent with Wang et al. (2023), who reported that electroacupuncture significantly lowers blood pressure in elderly hypertensive patients through autonomic regulation and reduced plasma renin levels.

Analysis of the Effect of Acupuncture Therapy on Blood Pressure in Older People with Hypertension

Electroacupuncture intervention significantly reduced systolic blood pressure by 4.42 mmHg ($p = 0.011$, $z = -2.539$), while the 1.14 mmHg reduction in diastolic pressure did not reach statistical significance ($p = 0.240$). This differential response reflects the pathophysiology of aging, as systolic pressure is more sensitive to changes in cardiac contractility and large-artery stiffness (Pierce et al., 2022). Consequently, systolic values respond more readily to neurovascular modulation, whereas diastolic pressure—governed by peripheral resistance and small-artery elasticity—typically requires longer-term adaptation for meaningful change (Herzog et al., 2025).

The observed systolic reduction is physiologically plausible: electroacupuncture stimulates afferent nerves at specific acupoints (GV20, ExHN3, ExHN5, LI4, LI11, PC6, ST36, LR3, KI3), transmitting signals to cardiovascular regulatory centers in the brainstem and hypothalamus. This activation suppresses sympathetic premotor output via GABA, endorphins, and serotonin while enhancing parasympathetic tone, promoting peripheral vasodilation, and reducing systemic pressure (Liu et al., 2024). Additionally, electroacupuncture modulates the renin–angiotensin–aldosterone system (RAAS) and increases nitric oxide bioavailability, further supporting vasorelaxation and blood pressure control (Sun et al., 2025).

The acupoints selected in this study—LI11 (Quchi), ST36 (Zusanli), and GV20 (Baihui)—reflect evidence-based practice, as these locations are frequently utilized in hypertension trials due to their high innervation density and proven efficacy in autonomic regulation. The intervention protocol, consisting of 30-minute sessions administered six times over three weeks, aligns with effective ranges reported in randomized controlled trials. Notably, adjunctive electroacupuncture combined with conventional antihypertensives has demonstrated superior systolic outcomes compared to pharmacotherapy alone ($p < 0.05$) (Wang et al., 2023).

Beyond hemodynamic effects, participants reported improvements in comorbid symptoms such as knee pain, headaches, and paresthesia by sessions 4–6, suggesting that electroacupuncture offers multisystem benefits relevant to geriatric care (Peng et al., 2024). These findings support electroacupuncture as a safe, economical, and integrative non-pharmacological intervention for managing hypertension and enhancing quality of life in older adults (Emara et al., 2025). Future studies with larger samples and longer follow-up are warranted to confirm durability and optimize dosing protocols.

CONCLUSION

Electroacupuncture therapy is effective in lowering systolic blood pressure in elderly hypertensive patients but has not yet shown a significant effect on diastolic blood pressure. These findings suggest that electroacupuncture stimulation is more responsive to the systolic component of vascular tone modulation and to the autonomic nervous system. This study strengthens the scientific evidence regarding the potential of electroacupuncture as a complementary therapy in controlling hypertension in older people in primary health care. Further

studies with controlled designs and larger samples are needed to confirm long-term effectiveness and evaluate its impact on diastolic blood pressure.

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CONFLICT OF INTEREST

The author declares that there are no conflicts of interest in this research, either financial or non-financial. This research was conducted independently, without any party intervening to influence the results.

REFERENCES

Dinarvand, D., Panthakey, J., Heidari, A., Hassan, A., & Ahmed, M. H. (2024). The Intersection between Frailty, Diabetes, and Hypertension: The Critical Role of Community Geriatricians and Pharmacists in Deprescribing. *Journal of Personalized Medicine, 14*(9), 924. https://doi.org/10.3390/jpm14090924

Elendu, C., Amaechi, D. C., Elendu, T. C., Amaechi, E. C., & Elendu, I. D. (2024). Dependable approaches to hypertension management: A review. *Medicine, 103*(24), e38560. https://doi.org/10.1097/MD.0000000000038560

Emara, T., Helmy, Z., Abdelatief, A., & Felaya, E. S. E. E. S. (2025). Effect of electroacupuncture on blood pressure and quality of life in patients with primary hypertension: a randomised controlled trial. *Advances in Rehabilitation, 39*(2), 1-14. https://doi.org/10.5114/areh.2025.149192

Goorani, S., Zangene, S., & Imig, J. D. (2024). Hypertension: A Continuing Public Healthcare Issue. *International Journal of Molecular Sciences, 26*(1), 123. https://doi.org/10.3390/ijms26010123

Hao, X., Zhang, L., Gong, Y., Wang, J., Qin, W., Zhang, X., ... & Liu, Q. (2025). A Clinical Study on the Efficacy of Acupuncture Treatment in Essential Hypertension: Protocol for Randomized Controlled Trial. *JMIR Research Protocols, 14*(1), e71850. https://doi.org/10.2196/71850

Herzog, M. J., Müller, P., Lechner, K., Stiebler, M., Arndt, P., Kunz, M., Ahrens, D., Schmeißer, A., Schreiber, S., & Braun-Dullaeus, R. C. (2025). Arterial stiffness and vascular aging: Mechanisms, prevention, and therapy. *Signal Transduction and Targeted Therapy, 10*(1), 282. https://doi.org/10.1038/s41392-025-02346-0

Huang, P. Y., Liu, H. M., Ko, Y. R., Chang, Z. Y., & Lee, T. Y. (2023). Electroacupuncture relieves portal hypertension by improving vascular angiogenesis and linking gut microbiota in bile duct ligation rats. *Frontiers in Microbiology, 14,* 1207137. https://doi.org/10.3389/fmicb.2023.1207137

Kandil, H., Soliman, A., Alghamdi, N. S., Jennings, J. R., & El-Baz, A. (2023). Using Mean Arterial Pressure in Hypertension Diagnosis versus Using Either Systolic or Diastolic Blood Pressure Measurements. *Biomedicines, 11*(3), 849. https://doi.org/10.3390/biomedicines11030849

Li, Y. W., Li, W., Wang, S. T., Gong, Y. N., Dou, B. M., Lyu, Z. X., Ulloa, L., Wang, S. J., Xu, Z. F., & Guo, Y. (2022). The autonomic nervous system: A potential link to the efficacy of acupuncture. *Frontiers in Neuroscience, 16,* 1038945. https://doi.org/10.3389/fnins.2022.1038945

Lien, C., Lee, Y., Lu, C., Chang, Y., Lin, Y., Cheng, H., Yu-Chih Chen, M., Lee, L., Huang, C., Lin, Y., Yeh, C., & Cheng, S. (2025). Definition, prevalence, and economic impacts of hypertension on the elderly

population. *Journal of the Formosan Medical Association, 124,* S4-S9. https://doi.org/10.1016/j.jfma.2025.02.020

Litscher, G. (2025). The Global Economics of Acupuncture and Traditional Chinese Medicine—A Strategic and Financial Perspective. *Sci, 7*(1), 4. https://doi.org/10.3390/sci7010004

Liu, Y., Xu, T., Yu, Z., & Xu, B. (2024). Neurophysiological Basis of Electroacupuncture Stimulation in the Treatment of Cardiovascular-Related Diseases: Vagal Interoceptive Loops. *Brain and Behavior, 14*(10), e70076. https://doi.org/10.1002/brb3.70076

Liu, J. P., Tu, L. T., Yang, K. Z., Li, Y. Y., Gong, Y., Han, B. X., Liu, C., Xia, T. Q., Liu, Y., Hao, X. M., Yue, B. N., Zhang, J., Wang, B. H., Luo, G. R., Liu, Q. G., & Xu, M. (2025). Differential effects of electroacupuncture and manual acupuncture on spontaneously hypertensive rats: Insights from intestinal microbiota and metabolomics. *Frontiers in Molecular Biosciences, 12,* 1619356. https://doi.org/10.3389/fmolb.2025.1619356

Man, T. M., Wu, L., Zhang, J. Y., Dong, Y. T., Sun, Y. T., & Luo, L. (2022). Research trends of acupuncture therapy for hypertension over the past two decades: A bibliometric analysis. *Cardiovascular Diagnosis and Therapy, 13*(1), 67. https://doi.org/10.21037/cdt-22-480

Masenga, S. K., & Kirabo, A. (2023). Hypertensive heart disease: Risk factors, complications and mechanisms. *Frontiers in Cardiovascular Medicine, 10,* 1205475. https://doi.org/10.3389/fcvm.2023.1205475

Miller, A. J., & Arnold, A. C. (2022). The renin-angiotensin system and cardiovascular autonomic control in aging. *Peptides, 150,* 170733. https://doi.org/10.1016/j.peptides.2021.170733

Mogi, M., Ikegawa, Y., Haga, S., Hoshide, S., & Kario, K. (2024). Hypertension facilitates age-related diseases. ~ Is hypertension associated with a wide variety of diseases? *Hypertension Research, 47*(5), 1246-1259. https://doi.org/10.1038/s41440-024-01642-6

Peng, Y., Wei, X., Sun, L., Wang, K., & Zhou, J. (2024). Electroacupuncture and Transcutaneous Electrical Acupoint Stimulation for Perioperative Neurocognitive Disorder in Older Patients Undergoing Cardiac Surgery: Protocol for Systematic Review and Meta-Analysis. *JMIR Research Protocols, 13*(1), e55996. https://doi.org/10.2196/55996

Pierce, G. L., Coutinho, T. A., DuBose, L. E., & Donato, A. J. (2022). Is It Good to Have a Stiff Aorta with Aging? Causes and Consequences. *Physiology.* https://doi.org/Y-00035-2021

Redon, J., & Carmena, R. (2024). Present and future of drug therapy in hypertension: an overview. *Blood Pressure, 33*(1). https://doi.org/10.1080/08037051.2024.2320401

Sun, J., Wang, Y., Lyu, J., Liu, X., Yue, B., Li, Y., Liu, J., Sun, Y., Liu, Q., & Yan, L. (2025). Effect of electroacupuncture on hypertensive and sympathetic excitability mechanism mediated by the paraventricular nucleus of the hypothalamus in spontaneous hypertensive rats. *Journal of Traditional Chinese Medicine, 45*(3), 586. https://doi.org/10.19852/j.cnki.jtcm.2025.03.013

Taati, B., Badicu, G., & Vveinhardt, J. (2026). Therapeutic Potential and Mechanistic Pathways of Plant-Based Supplements and Exercise Training in Blood Pressure Management: An Evidence-Based Review and Research Agenda. *Nutrients, 18*(4), 700. https://doi.org/10.3390/nu18040700

Timsina, Y. P., Pandey, P., Mondal, I. H., & Dar, A. H. (2023). Non-pharmacological management of hypertension: A systematic review. *Food Chemistry Advances, 3,* 100406. https://doi.org/10.1016/j.focha.2023.100406

Tjen-A-Looi, S. C., Fu, L. W., Nguyen, A. T., Gong, Y., & Malik, S. (2022). Autonomic Function and Electroacupuncture. In *Advanced Acupuncture Research: From Bench to Bedside* (pp. 345-360). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-96221-0_9

Wang, T., Li, H., Feng, S., Wang, J., Qin, W., Zhang, Y., Sun, W., Wang, C., Cai, X., Han, D., Liu, J., & Liu, Y. (2023). Efficacy of acupuncture for hypertension in the elderly: A systematic review and meta-analysis. *Frontiers in Cardiovascular Medicine, 10,* 1147135. https://doi.org/10.3389/fcvm.2023.1147135

Zeng, J., Cao, J., Yang, H., Wang, X., Liu, T., Chen, Z., Shi, F., Xu, Z., & Lin, X. (2024). Overview of mechanism of electroacupuncture pretreatment for prevention and treatment of cardiovascular and

cerebrovascular diseases. *CNS Neuroscience & Therapeutics, 30*(10), e14920. https://doi.org/10.1111/cns.14920

Zhang, Q., Zhou, M., Huo, M., Si, Y., Zhang, Y., Fang, Y., & Zhang, D. (2023). Mechanisms of acupuncture–electroacupuncture on inflammatory pain. *Molecular Pain.* https://doi.org/10.1177_17448069231202882

Zhang, M., Li, P., & Sheng, Y. (2025). Innovative Device-Based Treatments for Hypertension. *American Journal of Hypertension.* https://doi.org/10.1093/ajh/hpaf235

Zhou, X., Zhou, J., Zhang, F., Shu, Q., Wu, Y., Chang, H., Zhang, B., Cai, R., & Yu, Q. (2024). Key targets of signal transduction neural mechanisms in acupuncture treatment of cardiovascular diseases: Hypothalamus and autonomic nervous system. *Heliyon, 10*(19), e38197. https://doi.org/10.1016/j.heliyon.2024.e38197

Zhu, J., Ying, X., Huang, T., Zhang, Y., He, K., & Ma, R. (2026). Efficacy and safety of electroacupuncture in the treatment of post-stroke cognitive impairment: A systematic review and meta-analysis. *Frontiers in Neurology, 16,* 1715658. https://doi.org/10.3389/fneur.2025.1715658