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Exploring auricular acupuncture as an adjunctive therapy for hypertension; a narrative review of clinical applications and evidence

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ABSTRACT

Auricular acupuncture has emerged as a promising adjunctive therapy for hypertension, a condition that remains a major global health challenge despite advances in pharmacological management. This narrative review aimed to evaluate the current state of evidence regarding auricular acupuncture as an adjunctive therapy for hypertension, exploring its clinical applications, underlying mechanisms, safety profile, and future research directions. In this study, a comprehensive narrative review was conducted of existing literature on auricular acupuncture for hypertension management, analyzing systematic reviews, meta-analyses, randomized controlled trials, and mechanistic studies to synthesize current evidence and identify knowledge gaps. The results report significant reductions in both systolic and diastolic blood pressure when auricular acupuncture is used in combination with standard medications, with observed effects likely mediated by modulation of the autonomic nervous system, cardiovascular regulation, and potential influences on the renin-angiotensin-aldosterone system (RAAS). The safety profile of auricular acupuncture is favorable, with most adverse events being mild and transient. However, limitations such as small sample sizes, short follow-up periods, and lack of standardized protocols in existing studies highlight the need for larger, high-quality randomized controlled trials to confirm efficacy and establish evidence-based clinical guidelines. In conclusion, evidence indicates that auricular acupuncture, in case of proper implementation as part of a comprehensive treatment strategy, may provide patients a safe, cost-effective, and accessible adjunctive option to manage hypertension and potentially reduce reliance on pharmacological therapies.

Implication for health policy/practice/research/medical education:
The review of literature highlights that auricular acupuncture, when used alongside standard antihypertensive medications, is associated with significant reductions in blood pressure. This technique also demonstrated a favorable safety profile, with most adverse events being mild and transient. Collectively, the evidence suggests that auricular acupuncture is a safe, accessible, and cost-effective adjunctive therapy that may enhance blood pressure control and help reduce dependence on medication in hypertension management..

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Review

Introduction

Hypertension affects approximately one billion individuals worldwide and represents a significant global public health challenge (1). The condition stands as a major risk factor for cardiovascular and kidney disease, imposing substantial medical and economic burdens on healthcare systems (2). While pharmacological interventions remain the cornerstone of hypertension management, these treatments often present limitations, including adverse side effects, poor patient compliance, and economic constraints (3). Consequently, there has been growing interest in complementary and integrative therapeutic

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approaches, particularly auricular acupuncture, as adjunctive treatments for blood pressure management. Auricular acupuncture, a specialized form of traditional Chinese medicine, involves the stimulation of specific points on the external ear to treat various health conditions (4). This therapeutic modality has emerged as a promising non-pharmacological intervention for hypertension management, with accumulating clinical evidence supporting its efficacy when used alongside conventional antihypertensive medications (1). This narrative review study evaluates the current state of evidence regarding auricular acupuncture as an adjunctive therapy for hypertension, exploring its clinical applications, underlying mechanisms, and safety profile.

Search strategy

The literature search for this narrative review was conducted across multiple electronic databases, including PubMed, Scopus, Embase, Cochrane Library, Web of Science, China National Knowledge Infrastructure (CNKI), and Google Scholar search engine from inception through June 2025. The search combined Medical Subject Headings (MeSH) and free-text terms related to auricular acupuncture (auricular acupuncture, auriculotherapy, ear acupoint, acupressure, electroacupuncture) and hypertension (hypertension, high blood pressure, essential hypertension). Reference lists of relevant articles and reviews were also screened for additional studies. No language or publication year restrictions were applied to maximize the inclusivity of the search. The search strategy adhered to established guidelines for narrative reviews (5), focusing on studies reporting clinical applications, efficacy, or safety of auricular acupuncture as an adjunctive therapy for hypertension.

Auricular acupuncture definition

Auricular acupuncture, also known as ear acupuncture or auriculotherapy, represents a specialized form of acupuncture that involves the stimulation of specific points on the external ear (auricle) to diagnose and treat various medical conditions (6). On the other word, this method is a technique in which specific points on the outer ear (the auricle) are stimulated, most commonly with thin needles, to influence health and alleviate symptoms (7). This therapeutic modality is based on the theoretical framework that the ear functions as a microsystem containing a somatotopic representation of the entire body, where each auricular point corresponds to specific anatomical structures and physiological functions (4,6). The theoretical foundation derives from the concept that the ear reflects the entire body through a systematic mapping arrangement, where individual acupoints maintain reflex connections to specific body regions representing distant neural reflex zones (6,8). This definition encompasses both traditional Chinese medicine approaches and Western biomedical perspectives, with traditional practices rooted in thousands of years of clinical experience and modern applications incorporating neurophysiological understanding of auricular nerve pathways (4, 9). The intervention involves various stimulation techniques, including needle insertion, manual pressure, seed or bead placement, magnetic pearls, and low-level laser therapy, all targeting specific auricular points to achieve therapeutic effects (6,10). The anatomical basis for auricular acupuncture lies in the complex neurovascular network of the external ear, particularly the auricular branch of the vagus nerve and its projections to the nucleus of the solitary tract, which forms the neurological foundation for the "auriculovagal afferent pathway" that enables both autonomic and central nervous system modulation (9,11). Contemporary research has validated the microsystem mapping concept through detailed anatomical studies revealing extensive distributions of nerve fibers, blood vessels, and lymphatic vessels throughout the auricular skin, providing the structural basis for therapeutic responses to auricular stimulation (11). The definition has been further refined through standardization efforts by organizations, including the World Health Organization (WHO), which has worked to establish an internationally accepted nomenclature for auricular acupuncture points and treatment protocols (12,13).

Auricular acupuncture history

Auricular acupuncture has a documented history spanning approximately 2500 years, with the earliest recorded applications found in ancient Chinese and European medical traditions; the oldest Chinese record appears in the Huang Di Nei Jing (The Yellow Emperor's Classic of Internal Medicine), dating to approximately 100 years before Christ, which described therapeutic interventions such as blowing air into the ear to revive unconscious patients and phlebotomy for treating various ailments (14). Ancient European practices similarly employed ear-based therapies, with Hippocrates (around 460 years before Christ) documenting phlebotomy of the ear for treating impotence and facilitating ejaculation (15). However, the modern systematic development of auricular acupuncture began in 1957 when French physician Dr. Paul Nogier presented his revolutionary concept of the "inverted fetus map" at the Congress of the Mediterranéenne Association in Marseille, establishing the somatotopic correspondence of body parts represented on the auricle (14,16). Nogier's work, which originated from observing patients who had been successfully treated for sciatica through ear cauterization by a healer named Madame Barrin, led to the identification of 37 specific auricular acupuncture points and the discovery of the vascular autonomic signal in 1966 (16). The international dissemination of Nogier's findings occurred when his work was translated into German and subsequently published in Chinese journals in 1958-1959, prompting extensive clinical research by the Nanjing Army Ear Acupuncture research team involving

over 2000 patients (14). The standardization of auricular acupuncture gained international recognition when the WHO's Western-Pacific regional office convened conferences beginning in 1982, ultimately releasing the "Scheme of Standardization of Auricular Acupoints" in 1987, with further refinements published by Chinese researchers in 1993 and confirmed in 2008 (14,16).

Safety profile of auricular acupuncture

The safety profile of auricular acupuncture remains favorable, with reported adverse events primarily consisting of minor reactions such as mild skin irritation, nausea, or drowsiness, and no serious complications documented in clinical trials (17,18). This intervention is generally considered a low-risk intervention, with most prospective studies and systematic reviews reporting only transient, mild adverse events such as localized tenderness, erythema, minor bleeding, dizziness, nausea, or drowsiness that resolve spontaneously without treatment (19,20). Large real-world audits reinforce this finding: over 2,285 treatments delivered to breast-cancer survivors using the NADA protocol yielded just two non-serious events (both self-limited ear irritation), giving an incidence of 0.09% per treatment (17). Randomized controlled trials in diverse settings, from perioperative pain management to primary dysmenorrhea, likewise note no withdrawals due to therapy-related harms and document only mild insertion-site discomfort or pruritus (21). Battlefield acupuncture studies, including a review of 11 RCTs enrolling 1232 participants, identified no severe adverse events, with occasional reports of brief lightheadedness or ear soreness (18). A narrative synthesis of 19 case reports and nine safety reviews highlights that the principal serious risks, perichondritis and chondritis, are rare and almost exclusively linked to indwelling or embedded needles left in situ for prolonged periods, a practice now discouraged in favor of safer seed or magnetic press-stud methods (22). Collectively, current evidence indicates that when performed with sterile technique, single-use needles, and appropriate follow-up, auricular acupuncture exhibits an excellent safety profile, with serious complications occurring well below 0.1% of treatments and manageable through standard infection-control precautions (19,22).

Clinical applications of auricular acupuncture

The technique demonstrates particular effectiveness in pain management, with battlefield acupuncture protocols showing rapid analgesic effects, often providing 4-7 days of pain relief with minimal adverse effects (18,23). Neurologically, auricular acupuncture operates through multiple mechanisms, including activation of the autonomic nervous system and neuroendocrine pathways, with particular emphasis on vagal nerve stimulation through auricular branches (24, 25). The most commonly utilized auricular points include shenmen (TF4), sympathetic, lung (MA-IC1), and kidney points, with standardized protocols such as the national acupuncture detoxification association (NADA) protocol employing five specific points (shenmen, kidney, liver, lung, and sympathetic) for addiction treatment (26,27). Clinical applications extend beyond pain management to include addiction treatment, anxiety and depression management, weight reduction, and sleep disorders, with studies demonstrating significant improvements in body mass index and weight reduction in obesity management (28). The safety profile remains favorable, with reported adverse events primarily consisting of minor reactions such as mild skin irritation, nausea, or drowsiness, and no serious complications documented in clinical trials. Despite ongoing efforts by the WHO to establish a standardized nomenclature for auricular acupuncture points, international consensus remains incomplete, with variations between Chinese traditional medicine approaches and Western somatotopic mapping systems.

The applications of auricular acupuncture in hypertension management

Auricular acupuncture has emerged as a promising complementary therapeutic approach for hypertension management, with clinical evidence demonstrating its efficacy across diverse patient populations and clinical scenarios (1). Additionally, auricular acupuncture has shown promise in perioperative blood pressure management, with clinical trials indicating significant reductions in preoperative blood pressure elevation, particularly in patients aged 60-75 years (29). These findings support the integration of auricular acupuncture as an adjunctive therapy in comprehensive hypertension management protocols, offering patients a safe, non-pharmacological option that may enhance blood pressure control while potentially reducing reliance on conventional antihypertensive medications.

Mechanisms of auricular acupuncture in hypertension

Autonomic nervous system modulation

The primary mechanism underlying auricular acupuncture's antihypertensive effects appears to involve modulation of the autonomic nervous system, particularly through vagal stimulation (9). The auricular branch of the vagus nerve innervates multiple areas of the ear, including the concha, cymba concha, and inner tragus; stimulation of these areas through auricular acupuncture can provide vagal regulation, impacting both the autonomic and central nervous systems (30). Research has demonstrated that auricular acupuncture significantly increases heart rate variability (HRV), an indicator of improved autonomic balance favoring parasympathetic tone (9, 31). Specifically, acupuncture at the auricular branch of the vagus nerve led to significant heart rate reduction (approximately 4%-6%) and increased overall HRV, as demonstrated by increased standard deviation of normal-

to-normal intervals of approximately 19% (32).

Cardiovascular regulation mechanisms

Animal studies have provided valuable insights into the cardiovascular regulatory mechanisms of auricular acupuncture. Research in spontaneously hypertensive rats demonstrated that auricular electroacupuncture at specific points (CO15 and TEF3) significantly reduced both systolic and diastolic blood pressure. The study revealed that the blood pressure-lowering effects were mediated through the gamma-aminobutyric acid (GABA) system, with increased GABA levels in the adrenal gland and reduced serum catecholamine levels (33). Furthermore, studies have shown that acupuncture at the auricular heart point activates baroreceptor-sensitive neurons in the nucleus tractus solitarius, regulating cardiovascular function through mechanisms similar to the baroreceptor reflex. This activation leads to cardiovascular inhibition via cholinergic pathways, as evidenced by the attenuation of effects following atropine administration (34).

Renin-angiotensin-aldosterone system

Emerging research suggests that auricular acupuncture may influence the renin-angiotensin-aldosterone system (RAAS), a critical pathway in blood pressure regulation (35, 36). Studies have demonstrated that electroacupuncture treatment can significantly reduce plasma concentrations of norepinephrine (by 41%), renin (by 67%), and aldosterone (by 22%). These findings suggest that the long-lasting antihypertensive effects of auricular acupuncture may be mediated through the modulation of both sympathetic activity and the RAAS (37).

Points selection and treatment protocols of auricular acupuncture for hypertension

Commonly used auricular points

Analysis of clinical literature reveals specific patterns in auricular point selection for hypertension treatment. According to a comprehensive analysis of 117 clinical studies, the most frequently used auricular points for hypertension (in descending order of frequency) include: Jiangyagou (Hypertension Groove), Shenmen (TF4), Gan (CO12), Xin (CO15), Shen (CO10), Jiaogan (AH6a), Pizhixia (AT4), Jiangyadian, and Neifenmi (38). The Hypertension Groove (HG) auricular acupoint has received particular attention in research, with studies demonstrating its specific effects on cardiovascular parameters. Research has shown that manual acupuncture of the HG point significantly increases pulse transit time in healthy subjects, with differential effects depending on whether the left or right ear is stimulated (39).

Treatment protocols and techniques

Various auricular acupuncture techniques have been employed in hypertension research, including manual acupuncture, electroacupuncture, acupressure, and auricular bloodletting; the most commonly studied approach involves auricular acupressure using seeds or pellets, which allows for continuous stimulation over extended periods (1). Treatment protocols typically involve bilateral point selection, with sessions conducted 2-3 times per week for 4-8 weeks (2). Some protocols utilize alternating ear treatment, starting with one ear and switching to the contralateral ear during subsequent sessions to maximize therapeutic effects while minimizing local tissue irritation (39).

Clinical evidence for auricular acupuncture in hypertension

Systematic reviews and meta-analysis studies

The most comprehensive evidence for auricular acupuncture in hypertension comes from systematic reviews and meta-analyses. A landmark systematic review by Gao et al analyzed 44 randomized controlled trials involving 5,022 patients and found significant blood pressure reductions when auricular therapy was used as an adjunct to conventional antihypertensive medications. Specifically, auricular acupressure combined with antihypertensive drugs demonstrated superior efficacy compared to drugs alone, reducing systolic blood pressure by 5.06 mmHg (95% CI: -6.76 to -3.36) and diastolic blood pressure by 5.30 mm Hg (95% CI: -6.27 to -4.33) (1). Similarly, a meta-analysis focusing on auricular acupressure for patients with hypertension and insomnia demonstrated favorable effects, with auricular acupressure significantly improving systolic blood pressure (MD = -15.05, 95% CI: -18.49, -11.61) (40). These findings consistently demonstrate that auricular therapy could be provided to patients with hypertension as an adjunct to antihypertensive drugs for lowering blood pressure values and achieving blood pressure targets (1).

Randomized clinical trial studies

Several well-designed randomized controlled trials have provided additional evidence supporting the efficacy of auricular acupuncture for blood pressure management. Kim et al designed a pilot multicenter randomized controlled trial specifically targeting patients with prehypertension and stage 1 hypertension. This study utilized 24-hour ambulatory blood pressure monitoring as the primary outcome measure, representing a significant methodological advancement in auricular acupuncture research (2). A recent study by Zhang et al examined the effects of auricular acupuncture on preoperative blood pressure elevation in different age groups, involving 120 patients aged 45-75 years. The results demonstrated significant reductions in both systolic blood pressure (7.88 mm Hg; 95% CI: 2.94 to 12.81) and diastolic blood pressure (5.85 mm Hg; 95% CI: 3.05 to 8.64) following auricular acupuncture intervention. Interestingly, the study revealed age-related differences in treatment response, with participants aged 60-75 years showing

greater blood pressure reductions compared to those aged 45-59 years (29).

Animal studies

Animal studies investigating auricular acupuncture for hypertension have provided significant insights into its antihypertensive mechanisms and physiological effects. In spontaneously hypertensive rats, auricular electroacupuncture at specific points such as the auricular Heart (CO15) and Shenmen (TEF3) has been shown to significantly lower both systolic and diastolic blood pressure, as well as reduce heart rate, with these effects mediated in part by increased GABA levels in the adrenal gland and decreased serum catecholamines, suggesting involvement of the autonomic nervous system and adrenal modulation (33). Manual acupuncture at the auricular Heart point also demonstrated a more pronounced inhibitory effect on arterial pressure and heart rate compared to body acupuncture points, with cardiovascular regulation linked to activation of baroreceptor-sensitive neurons in the nucleus tractus solitarius, mimicking the baroreceptor reflex (34). Additionally, auricular acupuncture has been found to increase HRV in anesthetized rats, indicating improved autonomic balance, although heart rate itself may not change significantly during stimulation (41). These findings collectively support the hypothesis that auricular acupuncture exerts antihypertensive effects through central and peripheral neurohumoral pathways, particularly by modulating autonomic and cardiovascular regulatory mechanisms in animal models of hypertension.

Conclusion

In conclusion, the evidence indicates that auricular acupuncture is a promising adjunctive therapy for managing hypertension, with studies demonstrating significant reductions in blood pressure when combined with conventional antihypertensive medications. These therapeutic effects are believed to arise from multiple mechanisms, including modulation of the autonomic nervous system, cardiovascular regulation, and possible influence on the RAAS. The safety profile of auricular acupuncture is generally favorable, as most adverse events are mild, transient, and well-tolerated; nevertheless, adherence to appropriate safety protocols and careful screening for contraindications remains essential for clinical use. Overall, the growing body of evidence suggests that auricular acupuncture, when properly implemented as part of a comprehensive treatment strategy, may offer patients a safe, cost-effective, and accessible adjunctive option to enhance blood pressure control and potentially reduce reliance on pharmacological therapies alone.

Authors' contribution

Conceptualization: Rahim Firouzi Boston Abad and Hoda Azizi.
Data curation: Hoda Azizi and Haideh Mosleh.
Investigation: Rahim Firouzi Boston Abad and Zahra Abbasi.
Supervision: Hoda Azizi.
Validation: Sahar Kavand and Zahra Abbasi
Visualization: Sahar Kavand.
Writing–original draft: All authors.
Writing–review and editing: All authors.

Conflicts of interest

The authors declare that they have no competing interests.

Declaration of generative artificial intelligence (AI) and AI-assisted technologies in the writing process

During the preparation of this work, the authors utilized AI (Perplexity.ai and Grammarly.com) to refine grammar points and language style in writing. Subsequently, the authors thoroughly reviewed and edited the content as necessary, assuming full responsibility for the accuracy and content of the publication.

Ethical issues

Ethical issues (including plagiarism, data fabrication, and duplicate publication) have been fully addressed by the authors.

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References

1. Gao J, Chen G, He H, Liu C, He Q, Li J, et al. The effect of auricular therapy on blood pressure: A systematic review and meta-analysis. Eur J Cardiovasc Nurs. 2020;19:20–30. doi: 10.1177/1474515119876778.
2. Kim JH, Jung HJ, Kim TH, Lee S, Kim JE, Kang KW, et al. Auricular acupuncture for prehypertension and stage 1 hypertension: study protocol for a pilot multicentre randomised controlled trial. Trials. 2013;14:303. doi: 10.1186/1745-6215-14-303.
3. Flachskampf FA, Gallasch J, Gefeller O, Gan J, Mao J, Pfahlberg AB, et al. Randomized trial of acupuncture to lower blood pressure. Circulation. 2007;115:3121–9. doi: 10.1161/circulationaha.106.661140.
4. Guo K, Lu Y, Wang X, Duan Y, Li H, Gao F, et al. Multi-level exploration of auricular acupuncture: from traditional Chinese medicine theory to modern medical application. Front Neurosci. 2024;18:1426618. doi: 10.3389/fnins.2024.1426618.
5. Bramer WM, de Jonge GB, Rethlefsen ML, Mast F, Kleijnen J. A systematic approach to searching: an efficient and complete method to develop literature searches. J Med Libr Assoc. 2018;106:531–41. doi: 10.5195/jmla.2018.283.
6. Petermann U. Auricular Medicine in Horses and Dogs: A Review and Technique Update. Am J Trad Chin Vet Med. 2024;19:67–83. doi: 10.59565/001c.121507.
7. Usichenko T, Hacker H, Lotze M. Transcutaneous auricular vagal nerve stimulation (taVNS) might be a mechanism behind the analgesic effects of auricular acupuncture. Brain Stimul. 2017;10:1042–4. doi: 10.1016/j.brs.2017.07.013.

8. Litscher G. Long-Term Effects of Auricular Medicine–A Key to the Future of Preventive Medicine? : LIDSEN Publishing Inc; 2024. p. 1–5.
9. He W, Wang X, Shi H, Shang H, Li L, Jing X, et al. Auricular acupuncture and vagal regulation. Evid Based Complement Alternat Med. 2012;2012:786839. doi: 10.1155/2012/786839.
10. Ferreira LA, Grossmann E, Januzzi E, Gonçalves RT, Mares FA, de Paula MV, et al. Ear Acupuncture Therapy for Masticatory Myofascial and Temporomandibular Pain: A Controlled Clinical Trial. Evid Based Complement Alternat Med. 2015;2015:342507. doi: 10.1155/2015/342507.
11. Wang Y, Su Y, Wang J, Zhang K, Zhang W, Cui J, et al. Networks of Nerve Fibers, and Blood and Lymphatic Vessels in the Mouse Auricle: The Structural Basis of Ear Acupuncture. Med Acupunct. 2024;36:79–86. doi: 10.1089/acu.2023.0077.
12. Oleson T. Standardized ear acupuncture nomenclature utilizing auricular landmarks and 3-D graphic imaging for delineating different auricular zones. Med Acupunct. 2014;26:103–17. doi: 10.1089/acu.2014.1040.
13. Viel E, Truong D, Rambach L, Guinet F, Vanoli A, Schipman B, et al. Efficacy of Auricular Acupuncture in Chemotherapy-Induced Peripheral Neuropathy: A Case Series of 73 Cases. Med Acupunct. 2021;33:212–8. doi: 10.1089/acu.2020.1506.
14. Hou PW, Hsu HC, Lin YW, Tang NY, Cheng CY, Hsieh CL. The History, Mechanism, and Clinical Application of Auricular Therapy in Traditional Chinese Medicine. Evid Based Complement Alternat Med. 2015;2015:495684. doi: 10.1155/2015/495684.
15. Gori L, Firenzuoli F. Ear acupuncture in European traditional medicine. Evid Based Complement Alternat Med. 2007;4:13–6. doi: 10.1093/ecam/nem106.
16. Nogier R. History of Auriculotherapy: Additional Information and New Developments. Med Acupunct. 2021;33:410–9. doi: 10.1089/acu.2021.0075.
17. Zhou Y, Bao Q, Yang C, Li S, Yin Z, Xiong J, et al. Auricular Acupuncture for Perioperative Pain Management: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Pain Res. 2025;18:441–54. doi: 10.2147/jpr.S488525.
18. Dai N, Liu X, Wan H. Practical Applications and Safety of Battlefield Acupuncture for Pain Management: A Systematic Literature Review. J Multidiscip Healthc. 2025;18:2749–69. doi: 10.2147/jmdh.S517946.
19. Tan JY, Molassiotis A, Wang T, Suen LK. Adverse events of auricular therapy: a systematic review. Evid Based Complement Alternat Med. 2014;2014:506758. doi: 10.1155/2014/506758.
20. Wang XQ, Xiao L, Duan PB, Xu Q, Yang LH, Wang AQ, et al. The feasibility and efficacy of perioperative auricular acupuncture technique via intradermal needle buried for postoperative movement-evoked pain after open radical gastrectomy: A randomized controlled pilot trial. Explore (NY). 2022;18:36–43. doi: 10.1016/j.explore.2021.09.007.
21. Oliver JD, Rodriguez D, Scott D, Santosa KB, Hu MS. Alloplastic Auricular Reconstruction: Review of Implant Types, Adverse Events, and Aesthetic Outcomes. J Craniofac Surg. 2020;31:1593–6. doi: 10.1097/scs.0000000000006481.
22. Nielsen A, Gereau S, Tick H. Risks and Safety of Extended Auricular Therapy: A Review of Reviews and Case Reports of Adverse Events. Pain Med. 2020;21:1276–93. doi: 10.1093/pm/pnz379.
23. Chiwandamira F. Using Battlefield Acupuncture (BFA or Auricular Acupuncture) to Treat Primary Headaches in the Emergency Department. Adv Emerg Nurs J. 2023;45:321–6. doi: 10.1097/tme.0000000000000487.
24. Zhu HH, Rong PJ, Chen Y, Song XK, Wang JY. [Possible mechanisms of auricular acupoint stimulation in the treatment of migraine by activating auricular vagus nerve]. Zhen Ci Yan Jiu. 2024;49:403–8. doi: 10.13702/j.1000-0607.20221262.
25. Elliott T, Merlano Gomez M, Morris D, Wilson C, Pilitsis JG. A scoping review of mechanisms of auricular acupuncture for treatment of pain. Postgrad Med. 2024;136:255–65. doi: 10.1080/00325481.2024.2333232.
26. Stuyt EB, Voyles CA, Bursac S. NADA Protocol for Behavioral Health. Putting Tools in the Hands of Behavioral Health Providers: The Case for Auricular Detoxification Specialists. Medicines (Basel). 2018;5. doi: 10.3390/medicines5010020.
27. Ahlberg R, Skårberg K, Brus O, Kjellin L. Auricular acupuncture for substance use: a randomized controlled trial of effects on anxiety, sleep, drug use and use of addiction treatment services. Subst Abuse Treat Prev Policy. 2016;11:24. doi: 10.1186/s13011-016-0068-z.
28. Hua K, Usichenko T, Cummings M, Bernatik M, Willich SN, Brinkhaus B, et al. Effects of auricular stimulation on weight- and obesity-related parameters: a systematic review and meta-analysis of randomized controlled clinical trials. Front Neurosci. 2024;18:1393826. doi: 10.3389/fnins.2024.1393826.
29. Ma J, Zhang Y, Ge Q, Wu K. The effect of auricular acupuncture on preoperative blood pressure across age groups: a prospective randomized controlled trial. Clin Exp Hypertens. 2023;45:2169452. doi: 10.1080/10641963.2023.2169452.
30. Kreisberg E, Esmaeilpour Z, Adair D, Khadka N, Datta A, Badran BW, et al. High-resolution computational modeling of the current flow in the outer ear during transcutaneous auricular Vagus Nerve Stimulation (taVNS). Brain Stimul. 2021;14:1419–30. doi: 10.1016/j.brs.2021.09.001.
31. Kurono Y, Minagawa M, Ishigami T, Yamada A, Kakamu T, Hayano J. Acupuncture to Danzhong but not to Zhongting increases the cardiac vagal component of heart rate variability. Auton Neurosci. 2011;161:116–20. doi: 10.1016/j.autneu.2010.12.003.
32. Boehmer AA, Georgopoulos S, Nagel J, Rostock T, Bauer A, Ehrlich JR. Acupuncture at the auricular branch of the vagus nerve enhances heart rate variability in humans: An exploratory study. Heart Rhythm O2. 2020;1:215–21. doi: 10.1016/j.hroo.2020.06.001.
33. Thi Mai Nguyen H, Lee DY, Wu HM, Hsieh CL. Auricular Acupuncture to Lower Blood Pressure Involves the Adrenal Gland in Spontaneously Hypertensive Rats. Evid Based Complement Alternat Med. 2020;2020:3720184. doi: 10.1155/2020/3720184.
34. Gao XY, Li YH, Liu K, Rong PJ, Ben H, Li L, et al. Acupuncture-like stimulation at auricular point Heart evokes cardiovascular inhibition via activating the cardiac-related neurons in the nucleus tractus solitarius. Brain Res.

2011;1397:19–27. doi: 10.1016/j.brainres.2011.04.034.
35. Li J, Sun M, Ye J, Li Y, Jin R, Zheng H, et al. The Mechanism of Acupuncture in Treating Essential Hypertension: A Narrative Review. Int J Hypertens. 2019;2019:8676490. doi: 10.1155/2019/8676490.
36. Zhu Q, Mu T, Dong D, Chen L, Xu J, Shen C. Renin-angiotensin system mechanism underlying the effect of auricular acupuncture on blood pressure in hypertensive patients with phlegm-dampness constitution: Study protocol for a randomized controlled trial. PLoS One. 2024;19:e0294306. doi: 10.1371/journal.pone.0294306.
37. Li P, Tjen ALSC, Cheng L, Liu D, Painovich J, Vinjamury S, et al. Long-Lasting Reduction of Blood Pressure by Electroacupuncture in Patients with Hypertension: Randomized Controlled Trial. Med Acupunct. 2015;27:253–66. doi: 10.1089/acu.2015.1106.
38. Lu Y, Li C, Du Y, Chen A, Jin J, Zhao Q. [Characteristics and principles of acupoint selection in auricular plaster therapy for hypertension based on literature analysis]. Zhongguo Zhen Jiu. 2017;37:779–83. doi: 10.13703/j.0255-2930.2017.07.024.
39. Rivas-Vilchis JF, Castañeda-Ramírez MS. The hypertension groove auricular acupoint modifies pulse transit time in healthy subjects. Rev Int Acup. 2019;13:89–95. doi: 10.1016/j.acu.2019.10.005.
40. Zhao ZH, Zhou Y, Li WH, Tang ZH, Xia TW, Han L. Auricular Acupressure in Patients with Hypertension and Insomnia: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2020;2020:7279486. doi: 10.1155/2020/7279486.
41. Gao XY, Liu K, Zhu B, Litscher G. Sino-European transcontinental basic and clinical high-tech acupuncture studies-part 1: auricular acupuncture increases heart rate variability in anesthetized rats. Evid Based Complement Alternat Med. 2012;2012:817378. doi: 10.1155/2012/817378.

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