

## Integrative Neurophysiological Perspectives on Autogenic Relaxation and Lavender Aromatherapy for Hypertension Management: A Narrative Literature Review

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### ABSTRACT

**Background:** Hypertension remains a major global health concern and is strongly linked to autonomic nervous system imbalance and chronic psychological stress. Complementary interventions such as autogenic relaxation and lavender aromatherapy have been increasingly explored as supportive strategies for blood pressure control.

**Objective:** This review aims to analyze the neurophysiological mechanisms and clinical effectiveness of combining autogenic relaxation and lavender aromatherapy in the management of hypertension.

**Methods:** A narrative literature review was conducted on articles published between 2021 and 2026. Searches were performed in PubMed, Google Scholar, DOAJ, Garuda, and ScienceDirect using relevant keywords. A total of 18 articles were reviewed and synthesized descriptively based on relevance and full-text availability.

**Results:** The evidence suggests that autogenic relaxation enhances parasympathetic activity and reduces sympathetic dominance, while lavender aromatherapy modulates limbic and hypothalamic responses, lowering stress-related neuroendocrine activation. Several studies reported reductions in both systolic and diastolic blood pressure following these interventions.

**Discussion:** The combined approach may produce synergistic effects through autonomic regulation and stress-reduction pathways.

**Conclusion:** Autogenic relaxation and lavender aromatherapy show promise as complementary strategies for hypertension management, though further controlled trials are warranted.

**KEYWORDS:** Autogenic relaxation; Lavender aromatherapy; Neurophysiological mechanisms; Autonomic nervous system modulation; Hypertension management

### ARTICLE DETAILS

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### INTRODUCTION

Hypertension remains a leading cause of cardiovascular morbidity and premature mortality worldwide, contributing substantially to stroke, coronary artery disease, and renal complications [1,2]. The pathophysiology of hypertension is strongly linked to autonomic nervous system imbalance, particularly persistent sympathetic overactivity and diminished parasympathetic modulation [3]. Emerging evidence also indicates that chronic psychological stress plays a central role in sustaining elevated blood pressure through neuroendocrine and vascular mechanisms [4].

Given these mechanisms, non-pharmacological strategies targeting autonomic regulation have gained increasing attention as complementary approaches in hypertension management [5]. Relaxation-based interventions have demonstrated measurable improvements in heart rate variability and baroreflex sensitivity, reflecting enhanced parasympathetic activity [6,7]. Autogenic relaxation, a structured self-suggestion technique, has been associated with significant reductions in systolic and diastolic blood pressure in adults with primary hypertension [8]. Similar findings were reported in an Indonesian clinical study

# Integrative Neurophysiological Perspectives on Autogenic Relaxation and Lavender Aromatherapy for Hypertension Management: A Narrative Literature Review

showing improved hemodynamic stability following guided relaxation therapy [9]. A randomized controlled trial further confirmed that structured relaxation interventions contribute to meaningful blood pressure reductions when practiced consistently [10].

Lavender aromatherapy has also demonstrated beneficial physiological and psychological effects. Experimental evidence suggests that lavender essential oil modulates limbic system activity and reduces *Hypothalamic-Pituitary-Adrenal* (HPA) axis activation [11]. Clinical findings indicate that lavender inhalation may reduce anxiety scores and produce modest but significant decreases in systolic and diastolic blood pressure [12,13]. A recent quasi-experimental study in Indonesia reported significant blood pressure reductions among hypertensive patients receiving lavender aromatherapy sessions [14]. These effects are thought to be mediated through decreased cortisol secretion and improved autonomic balance [15].

Although autogenic relaxation and lavender aromatherapy independently demonstrate promising outcomes, limited literature discusses their integrative neurophysiological interaction. Considering that both interventions act on stress modulation, autonomic balance, and neuroendocrine regulation, examining their combined potential may offer a more comprehensive complementary strategy for hypertension management. Therefore, this narrative literature review aims to analyze current evidence regarding the integrative neurophysiological mechanisms and clinical implications of combining autogenic relaxation and lavender aromatherapy in individuals with hypertension.

## METHOD

This study used a narrative literature review design to examine the neurophysiological mechanisms and clinical effects of autogenic relaxation combined with lavender aromatherapy in hypertension management. A structured search was conducted in PubMed, Google Scholar, ScienceDirect, DOAJ, and Garuda for articles published between 2021 and 2026. The keywords included “autogenic relaxation,” “lavender aromatherapy,” “hypertension,” “blood pressure,” and “autonomic nervous system,” combined using Boolean operators.

Experimental studies, randomized controlled trials, quasi-experimental studies, and relevant systematic reviews involving adults with hypertension were included. Articles not available in full text, non-empirical publications, and duplicate records were excluded. After screening titles, abstracts, and full texts, 18 articles met the eligibility criteria and were analyzed descriptively to identify emerging themes related to autonomic regulation and blood pressure control.

## LITERATURE SEARCH CRITERIA

A systematic search of electronic databases published from 2021 to 2026 was conducted using PubMed, Google Scholar,

DOAJ, Garuda, and ScienceDirect. The keywords applied were “autogenic relaxation,” “autogenic training,” “lavender aromatherapy,” “lavender essential oil,” “hypertension,” “blood pressure,” and “autonomic nervous system.” The search process was limited to articles published in English and Indonesian.

Studies were selected based on the following inclusion criteria: adult patients with hypertension or elevated blood pressure, interventions involving autogenic relaxation and/or lavender aromatherapy, and experimental or quasi-experimental research designs reporting blood pressure outcomes. Randomized controlled trials and controlled clinical studies were prioritized.

Studies published in languages other than English or Indonesian and non-empirical publications (such as narrative reviews, case reports, books, book chapters, commentaries, conference abstracts, and dissertations) were excluded. The reference lists of the selected articles were also manually screened to identify additional relevant studies that met the eligibility criteria.

## Study Selection

The screening process was conducted in three stages. First, 236 potentially relevant articles were identified using a focused research question: Does the combination of autogenic relaxation and lavender aromatherapy reduce blood pressure through neurophysiological mechanisms in patients with hypertension?

In the second stage, titles and abstracts were reviewed to eliminate studies that were not aligned with the objectives of the review. Articles that did not involve hypertensive populations, did not evaluate the specified interventions, or did not report blood pressure outcomes were excluded at this stage. This process resulted in 64 journal articles considered potentially relevant.

The third stage involved a full-text assessment to determine eligibility based on the predefined inclusion and exclusion criteria. After careful evaluation, 18 articles were considered appropriate and met all criteria. These studies were included in the final synthesis to provide a comprehensive overview of the neurophysiological basis and clinical effectiveness of the combined interventions in hypertension management.

**Table 1: Data Search Based**

| Database | Keyword                                                                       | Number of Articles Found |
|----------|-------------------------------------------------------------------------------|--------------------------|
| PubMed   | Autogenic relaxation, hypertension, lavender aromatherapy, and blood pressure | 7                        |

# Integrative Neurophysiological Perspectives on Autogenic Relaxation and Lavender Aromatherapy for Hypertension Management: A Narrative Literature Review

|                |                                                           |   |
|----------------|-----------------------------------------------------------|---|
| ScienceDirect  | Lavender<br>essential oil,<br>autonomic<br>nervous system | 3 |
| Google Scholar | Autogenic<br>training, blood<br>pressure                  | 4 |
| DOAJ           | Complementary<br>therapy,<br>hypertension                 | 2 |

|              |                                                            |           |
|--------------|------------------------------------------------------------|-----------|
| Garuda       | Relaksasi<br>autogenik,<br>essential oil,<br>tekanan darah | 2         |
| <b>Total</b> |                                                            | <b>18</b> |

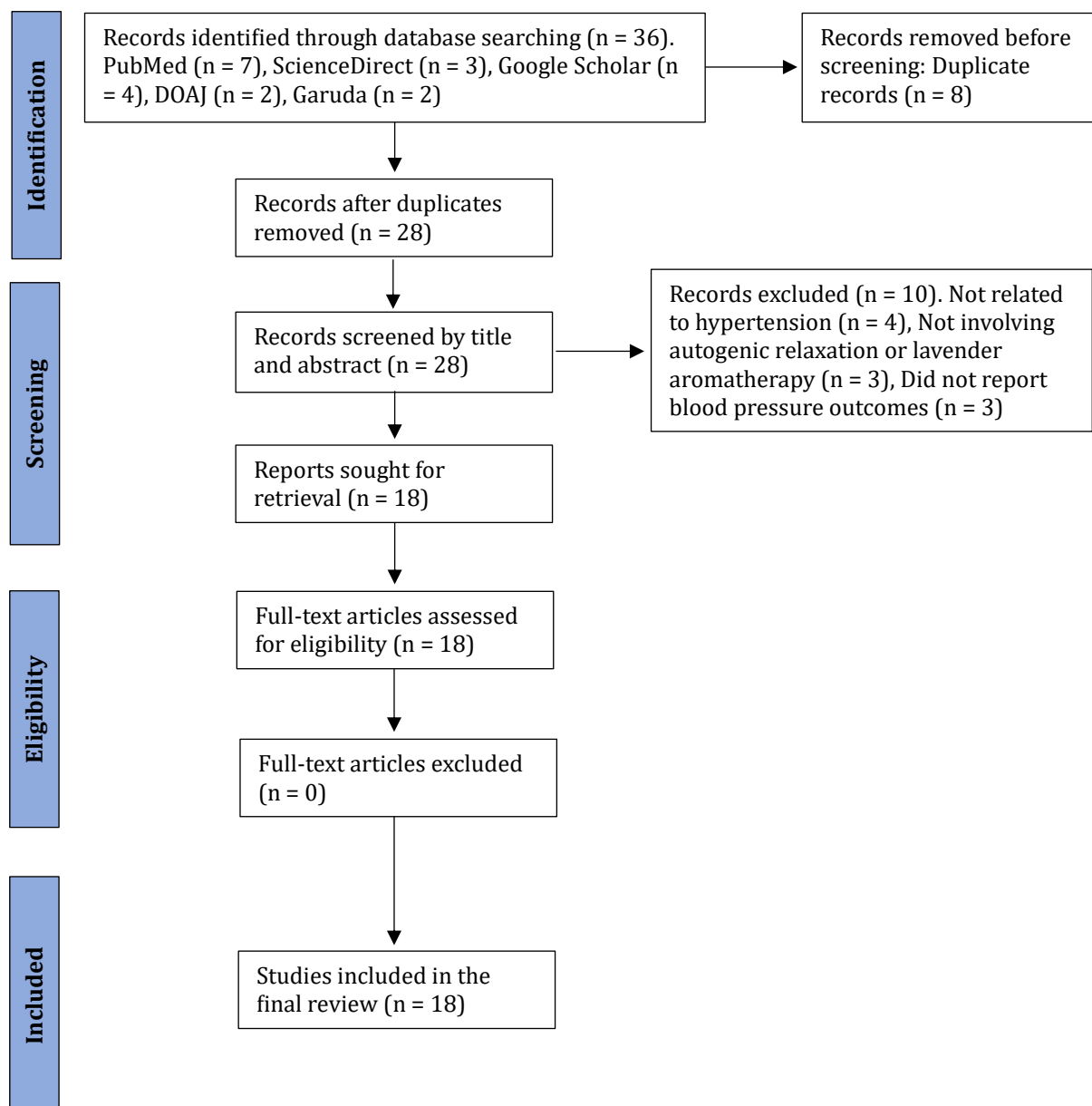


**Figure 1: PRISMA Flowchart of the Literature Selection Process**

# Integrative Neurophysiological Perspectives on Autogenic Relaxation and Lavender Aromatherapy for Hypertension Management: A Narrative Literature Review

## RESULT

**Table 2: Summary of Included Studies**

| No  | Authors                      | Country / Population                                            | Main Finding                                                                                                                              | Themes                                                                               |
|-----|------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1.  | Sutrisno & Nursalam (2022)   | Indonesia / Hypertensive patients                               | Benson and autogenic relaxation improved sleep quality, reduced anxiety, and lowered blood pressure                                       | Autogenic relaxation; Blood Pressure reduction                                       |
| 2.  | Grassi (2021)                | Italy / Hypertension review                                     | Sympathetic overactivity plays a central role in hypertension pathophysiology                                                             | Sympathetic nervous system                                                           |
| 3.  | Marwaha (2022)               | South Korea / Review                                            | Psychosocial stress contributes significantly to elevated blood pressure                                                                  | Stress-hypertension link                                                             |
| 4.  | Nugroho et al. (2022)        | International guideline analysis                                | WHO and ISH emphasize lifestyle and non-pharmacological therapy in blood pressure control                                                 | Hypertension management                                                              |
| 5.  | Calderone et al. (2025)      | Italy / Cardiovascular & hypertensive patients                  | Relaxation techniques improved stress control and cardiovascular parameters                                                               | Relaxation therapy effectiveness                                                     |
| 6.  | Listari et al. (2024)        | Indonesia / Hypertensive patients                               | Autogenic relaxation reduced pain and supported BP control                                                                                | Autogenic training                                                                   |
| 7.  | Sahrudin (2024)              | Indonesia / Hypertensive patients                               | Relaxation through music therapy lowered blood pressure levels                                                                            | Non-pharmacological relaxation                                                       |
| 8.  | Liu et al. (2023)            | China / Hypertensive adults                                     | m-Health intervention improved blood pressure self-management                                                                             | Self-management support                                                              |
| 9.  | Sattayakhom et al. (2023)    | Thailand / Review                                               | Essential oils influence autonomic nervous system regulation                                                                              | Essential oil neurophysiology                                                        |
| 10. | Sapeni et al. (2025)         | Indonesia / Hypertensive patients                               | Lavender aromatherapy reduced systolic and diastolic blood pressure                                                                       | Lavender blood pressure effect                                                       |
| 11. | Safaniah & Yuniartika (2024) | Indonesia / Elderly hypertensive                                | Lavender aromatherapy reduced anxiety in hypertensive elderly                                                                             | Lavender & anxiety                                                                   |
| 12. | Sari & Prastikanala (2025)   | Indonesia / Elderly hypertensive                                | Lavender combined with spiritual intervention improved blood pressure control                                                             | Combined therapy                                                                     |
| 13. | Kim et al. (2021)            | South Korea / Systematic review                                 | Lavender significantly reduced anxiety and improved physiological parameters                                                              | Aromatherapy meta-analysis                                                           |
| 14. | Yin et al. (2024)            | China / Adult stroke with hypertension                          | Lavender inhalation significantly reduced depression and improved sleep quality                                                           | Lavender aromatherapy; Psychological relaxation; Complementary therapy               |
| 15. | Liu et al. (2024)            | China / Patients with acute coronary syndrome with hypertension | Aromatherapy significantly reduced anxiety levels and improved selected physiological parameters in patients with acute coronary syndrome | Aromatherapy; Cardiovascular response; Anxiety reduction; Complementary cardiac care |

|     |                          |                                                             |                                                                                                                    |                                                                     |
|-----|--------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 16. | Yumkhaibam et al. (2023) | India / Individuals with hypertension and anxiety disorders | Autogenic training significantly reduced anxiety symptoms across the included studies                              | Autogenic training; Anxiety reduction; Relaxation therapy           |
| 17. | Jenkins et al. (2024)    | United Kingdom / Adults with hypertension                   | Biofeedback interventions demonstrated modest but significant reductions in blood pressure                         | Biofeedback; Blood pressure control; Autonomic regulation           |
| 18. | Wang et al. (2025)       | Taiwan / Middle-aged adults with hypertension               | Inhaled lavender essential oil reduced anxiety and systolic blood pressure in both short- and long-term follow-up. | Lavender aromatherapy; Blood pressure reduction; Anxiety modulation |

DISCUSSION

1. Autogenic Relaxation and Autonomic Regulation

The synthesis of included studies indicates that autogenic relaxation contributes to blood pressure reduction through autonomic modulation. Across the reviewed literature, autogenic techniques appear to enhance parasympathetic activity and reduce sympathetic dominance, resulting in improved hemodynamic stability. This suggests that cognitive self-regulation and structured relaxation practices may influence cardiovascular control through neurovisceral integration pathways.

Despite consistent trends toward blood pressure improvement, the magnitude of reduction varies substantially across studies. Some findings demonstrate clinically meaningful decreases, whereas others show modest or short-term effects. This inconsistency raises questions regarding whether autogenic relaxation directly modifies autonomic tone or whether improvements are secondary to reduced stress perception.

Recent cardiovascular psychophysiology research emphasizes that heart rate variability (HRV) is a reliable marker of parasympathetic activation and blood pressure regulation [16]. However, large-scale hypertension guidelines indicate that behavioral interventions alone often produce smaller blood pressure reductions compared to pharmacological therapy [1]. Furthermore, contemporary neurocardiology frameworks propose that cortical–limbic regulation plays a mediating role between psychological relaxation and autonomic output [17]. These perspectives suggest that autogenic relaxation may act through multi-level mechanisms rather than direct vagal stimulation alone.

2. Lavender Aromatherapy and Neurophysiological Modulation

Another prominent theme emerging from the review is the influence of lavender aromatherapy on psychological and

physiological outcomes. Lavender inhalation is associated with reductions in anxiety, improved sleep quality, and modest decreases in blood pressure. These findings indicate that olfactory stimulation may activate limbic structures involved in emotional processing and stress regulation, thereby influencing cardiovascular responses.

Although clinical outcomes appear promising, debate remains regarding the biological plausibility and sustainability of aromatherapy-induced blood pressure changes. Critics argue that observed effects may be primarily psychological rather than physiological. In addition, inter-individual variability in olfactory sensitivity may limit reproducibility across populations.

Neuroscientific evidence supports the connection between olfactory pathways and autonomic regulation, demonstrating that scent stimuli can influence hypothalamic activity and stress hormone release [11]. Randomized controlled trials in hypertensive populations also report measurable reductions in systolic blood pressure following lavender inhalation [18]. However, contemporary reviews on complementary hypertension management emphasize that aromatherapy should be positioned as an adjunct rather than a replacement for standard therapy [19]. This indicates the need for long-term trials assessing sustained cardiovascular outcomes.

3. Psychosocial Stress and Hypertension Pathway

The review highlights psychosocial stress as a shared underlying mechanism linking both autogenic relaxation and lavender aromatherapy to blood pressure improvement. Chronic stress activates sympathetic pathways and the hypothalamic–pituitary–adrenal (HPA) axis, contributing to persistent vasoconstriction and elevated cardiovascular load. Not all hypertensive individuals respond to stress-reduction interventions with significant blood pressure changes. This suggests that stress may function as a contributing factor rather than a primary etiological driver in all cases of

# **Integrative Neurophysiological Perspectives on Autogenic Relaxation and Lavender Aromatherapy for Hypertension Management: A Narrative Literature Review**

hypertension. Genetic predisposition, vascular remodeling, and metabolic dysfunction may sustain elevated blood pressure even when psychological stress is reduced.

Recent evidence confirms that chronic psychosocial stress is associated with hypertension incidence and progression [20]. Nevertheless, international hypertension guidelines emphasize multifactorial causation involving renal, vascular, metabolic, and neurogenic components [21]. Neurogenic hypertension models further describe persistent sympathetic activation independent of emotional stress in certain populations [3]. Therefore, stress-targeted interventions may be more effective in stress-responsive hypertension phenotypes rather than structurally advanced disease.

## **4. Integrative and Synergistic Mechanisms**

The synthesis suggests that combining autogenic relaxation and lavender aromatherapy may offer complementary benefits. Autogenic training primarily engages cognitive-autonomic regulation, while lavender provides sensory-limbic modulation. Together, these mechanisms may promote parasympathetic predominance, attenuate sympathetic discharge, and reduce neuroendocrine stress responses.

Despite theoretical synergy, empirical studies directly evaluating combined interventions remain limited. It is unclear whether combined therapy yields additive, synergistic, or merely overlapping effects. Additionally, standardized intervention protocols have not yet been established.

Contemporary behavioral cardiology research suggests that multimodal interventions targeting multiple regulatory systems often produce more stable cardiovascular outcomes [22]. However, adherence challenges may arise when combining multiple behavioral strategies [19]. Thus, future randomized controlled trials should compare single versus combined interventions to determine clinical superiority and sustainability.

The findings of this review suggest that autogenic relaxation and lavender aromatherapy may be feasibly integrated into nursing practice as supportive interventions for hypertension management. Nurses in primary care settings can incorporate guided relaxation sessions and supervised aromatherapy as part of routine non-pharmacological counseling. These techniques are relatively low-cost, non-invasive, and easy to implement, making them suitable for community health centers and outpatient services. In addition, their simplicity allows patients to practice the interventions independently at home, which may enhance self-management and long-term adherence. When applied alongside standard medical treatment, these approaches may strengthen holistic and patient-centered care in hypertension management.

The integration of mind-body and sensory-based interventions represents a promising direction in non-

pharmacological hypertension management, particularly within holistic nursing practice.

## **CONCLUSION**

This review highlights that autogenic relaxation and lavender aromatherapy demonstrate promising potential as complementary interventions in hypertension management. Both approaches appear to influence autonomic balance and stress-related pathways, which are closely associated with blood pressure regulation. Autogenic relaxation primarily supports cardiovascular stability through enhanced parasympathetic activity and improved cognitive-emotional regulation, while lavender aromatherapy contributes to psychological calming and modulation of neuroendocrine responses.

The integration of these two interventions may offer complementary benefits by targeting both cognitive-autonomic and sensory-limbic mechanisms. However, the magnitude and durability of their combined effects remain uncertain due to variations in study design, intervention protocols, and population characteristics. Current evidence supports their role as adjunctive strategies rather than replacements for standard antihypertensive therapy.

Further well-designed randomized controlled trials are needed to clarify the synergistic impact of combined interventions, establish standardized application protocols, and determine their long-term effectiveness in diverse hypertensive populations.

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# Integrative Neurophysiological Perspectives on Autogenic Relaxation and Lavender Aromatherapy for Hypertension Management: A Narrative Literature Review

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