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Original Research/Systematic Review

Optimization of Hypertension and Diabetes Management through Complementary Therapy

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ABSTRACT

Background: *This literature review examines the role of complementary therapy in the management of hypertension and type 2 diabetes mellitus. These two chronic diseases remain major health problems that often require long-term pharmacological therapy with potential side effects. The aim of this study is to identify and analyze various non-pharmacological interventions that can support safe and affordable disease management.*

Methods: *The method used was a systematic review of nine scientific articles published between 2021 and 2025, covering herbal therapy, relaxation, hydrotherapy, and physical exercise on the control of blood glucose levels and blood pressure.*

Results: *The review results indicate that therapies such as warm foot baths, hypertension exercises, butterfly pea tea, garlic infusions, boiled bay leaves (Syzygium polyanthum), moringa leaves (Moringa oleifera), celery leaves (Apium graveolens), diabetes foot exercises, progressive muscle relaxation, and reduced sitting time have been shown to be effective in improving metabolic parameters and patients' quality of life.*

Conclusion: *It can be concluded that complementary therapy is an effective and holistic supportive approach in the care of chronic diseases, but further research with randomized controlled trials (RCTs) is still needed to ensure long-term effectiveness and clinical safety under the supervision of healthcare professionals.*

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INTRODUCTION

Hypertension and diabetes mellitus are among the most prevalent non-communicable diseases (NCDs) and represent major contributors to global morbidity and mortality. Both conditions are chronic and frequently coexist, thereby substantially increasing the risk of cardiovascular disease, renal dysfunction, and metabolic complications. The World Health Organization (WHO) estimates that approximately 22% of the global population is affected by hypertension, with prevalence continuing to rise annually (Anugerah et al., 2022).

Similarly, the global burden of diabetes mellitus has increased markedly, from 151 million cases in 2000 to more than 463 million cases in 2019, and is projected to reach 700 million cases by 2045 (Almalki et al., 2024). In Indonesia, national health surveys (Riskesdas) have consistently reported a rising prevalence of both hypertension and diabetes, driven largely by lifestyle transitions, dietary changes, and reduced physical activity (Helmi & Veri, 2024).

The management of hypertension and diabetes typically involves pharmacological and non-pharmacological strategies. While pharmacological therapies are effective in controlling blood pressure and glycemic levels, their long-term use is frequently associated with adverse effects, including gastrointestinal disturbances and impaired hepatic or cardiovascular function (Helmi & Veri, 2024). Consequently, complementary therapies have attracted increasing interest as adjunctive, non-pharmacological interventions due to their favorable safety profiles, accessibility, and minimal side effects (Sari Mahaji Putri & Mazarina Devi, 2022).

Accumulating evidence indicates that complementary therapies may play a significant role in optimizing the management of hypertension and diabetes. In hypertensive patients, interventions such as meditation, cupping therapy, music therapy, and progressive muscle relaxation have been shown to significantly reduce blood pressure (Anugerah et al., 2022; Sari Mahaji Putri & Mazarina Devi, 2022). Likewise, among individuals with diabetes mellitus, complementary approaches—including herbal consumption of bay leaf and red ginger tea, structured physical exercise, and relaxation techniques—have demonstrated efficacy in lowering blood glucose levels (Helmi & Veri, 2024; Pratama & Darsini, 2023). These findings underscore the potential of complementary therapies as integrative strategies that may enhance the effectiveness of conventional treatments in chronic disease management.

Given the escalating prevalence of hypertension and diabetes and the limitations associated with pharmacological therapy alone, optimizing disease management through complementary therapeutic approaches warrants further investigation. This literature review aims to critically evaluate evidence-based complementary therapies that have demonstrated effectiveness in controlling blood pressure and glycemic levels, thereby providing a scientific basis for healthcare professionals to implement safe and integrative care models.

MATERIALS AND METHOD

This study employed a descriptive literature review design aimed at examining and synthesizing existing evidence on the effectiveness of complementary therapies in the management of hypertension and diabetes mellitus. A systematic literature search was conducted using PubMed, Google Scholar, and ScienceDirect, covering publications from 2013 to 2024. The search strategy utilized the following keywords: *"complementary therapy," "nonpharmacological treatment," "herbal medicine," "hypertension,"* and *"diabetes mellitus."* Eligible studies met predefined inclusion criteria, namely original research articles that investigated the use of complementary or non-pharmacological interventions among patients with hypertension and type 2 diabetes mellitus and reported outcomes related to blood pressure or blood glucose levels.

Study selection was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, encompassing the stages of identification, screening, and eligibility assessment, which resulted in a final set of relevant articles for analysis. Data extracted from the included studies were synthesized narratively by categorizing findings according to the type of complementary therapy, including herbal interventions, yoga, physical exercise, relaxation techniques, and progressive muscle relaxation. The results were presented descriptively to illustrate the role of complementary therapies as adjunctive interventions to pharmacological treatment in optimizing the management of hypertension and diabetes mellitus

RESULTS

The results of this literature review synthesize findings from twelve selected studies that examined the effectiveness of complementary therapies in the management of hypertension and type 2 diabetes mellitus. Overall, the included studies consistently reported significant reductions in blood pressure and blood glucose levels following the implementation of various non-pharmacological interventions, including herbal therapies, physical exercise, relaxation techniques, hydrotherapy, and behavioral modification.

Table 1. Summary of Complementary Therapy Interventions for Hypertension and Type 2 Diabetes Mellitus

No.	Authors & Year	Study Title	Study Objective	Method/Design	Key Findings	Conclusion
1	Arifah et al. (2024)	The Effect of Warm Water Foot Soaking Therapy on Blood Pressure Reduction in Elderly Patients with Hypertension	To determine the effect of warm water foot soaking on blood pressure in elderly patients with hypertension	Quasi-experimental, one-group pretest–posttest (n=20)	Mean systolic BP decreased by 12 mmHg and diastolic BP by 8 mmHg after intervention	Warm water foot soaking therapy is effective in reducing blood pressure in elderly patients with hypertension
2	Widhawati et al. (2022)	Effect of Garlic Infusion on Blood Pressure in Elderly Patients with Hypertension	To assess the effect of garlic infusion on blood pressure	Quasi-experimental, one-group pretest–posttest	Systolic BP decreased from 158 mmHg to 127.5 mmHg; diastolic BP from 98.5 mmHg to 85.5 mmHg	Garlic infusion significantly reduces blood pressure in elderly patients with hypertension
3	Unja et al. (2024)	Effect of Butterfly Pea Flower Tea on Blood Pressure Changes in Patients with Hypertension	To analyze the effectiveness of butterfly pea flower tea in reducing blood pressure	Pre-experimental, one-group pretest–posttest (n=18)	Significant reduction in blood pressure ($p < 0.05$) after intervention	Butterfly pea flower tea is effective as a complementary therapy for hypertension
4	Waruwu et al. (2021)	Effect of Celery Leaf Decoction (*Apium graveolens*) on Blood Pressure Reduction in Elderly Patients with Hypertension	To determine the effect of celery leaf decoction on blood pressure	Pre-experimental, one-group pretest–posttest	Significant reduction in blood pressure ($p = 0.000 < 0.05$)	Celery leaf decoction is effective as a natural non-pharmacological therapy
5	Priliana et al. (2024)	Implementation of Hypertension Exercise to Reduce Blood Pressure in Elderly Patients	To apply hypertension exercise as an effort to reduce blood pressure	Observational intervention (community service), n=15	Mean systolic BP decreased by 7.5 mmHg; diastolic BP by 3.5 mmHg	Hypertension exercise is effective and easy to perform independently
6	Rosenberg et al. (2024)	Sitting Time Reduction and Blood Pressure in Older Adults: A Randomized Clinical Trial	To evaluate the effect of reducing sitting time on blood pressure	Randomized clinical trial, n=283	Sitting time reduced by 31.85 min/day; systolic BP decreased by 3.48 mmHg ($p = 0.03$)	Reducing sedentary behavior significantly lowers systolic blood pressure
7	Kresnapati et al. (2024)	Antihyperglycemic Effect of Bay Leaf (*Syzygium*	To determine the antihyperglycemic	One-group pretest–posttest, n=41	Significant reduction in blood	Bay leaf decoction effectively

		polyanthum) Decoction Based on Occupational Profile	effect of bay leaf decoction		glucose levels (p = 0.001)	reduces blood glucose levels
8	Anggarini et al. (2025)	Effect of Foot Massage Therapy on Blood Glucose Levels in Type 2 Diabetes Mellitus Patients	To assess the effect of foot massage on blood glucose levels	Quasi-experimental, pretest–posttest control group design, n=40	Mean blood glucose decreased by 14.90 mg/dL (p = 0.042)	Foot massage significantly reduces blood glucose levels
9	Safitri et al. (2023)	Effect of *Moringa oleifera* Leaf Decoction on Blood Glucose Levels in Elderly Patients with Type 2 Diabetes Mellitus	To determine the effect of moringa leaf decoction on blood glucose levels	Quasi-experimental, pretest–posttest with control group, n=32	Significant reduction in blood glucose levels (p = 0.000)	Moringa leaf decoction is effective as an adjunct herbal therapy
10	Ariyanti et al. (2025)	Effect of Hydrotherapy on Blood Glucose Reduction in Patients with Type 2 Diabetes Mellitus	To evaluate the effect of hydrotherapy on blood glucose levels	Quasi-experimental with control group, n=30	Significant reduction in blood glucose levels (p < 0.001)	Hydrotherapy is effective as a complementary non-pharmacological therapy
11	Baihaqi et al. (2025)	Application of Progressive Muscle Relaxation Therapy to Reduce Blood Glucose Levels in Type 2 Diabetes Mellitus Patients	To describe the effect of progressive muscle relaxation	Descriptive case study (n=2)	Blood glucose decreased by 24–38 mg/dL after 7 days	Progressive muscle relaxation effectively lowers blood glucose levels
12	Badrujamaludin et al. (2023)	Effect of Diabetic Foot Exercise on Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus	To assess the effect of diabetic foot exercise	Quasi-experimental, time-series design, n=19	Gradual reduction in blood glucose levels (p = 0.001)	Diabetic foot exercise is effective when performed regularly

DISCUSSION

The findings synthesized from twelve reviewed studies indicate that complementary therapies play a significant role in reducing blood pressure among patients with hypertension and lowering blood glucose levels in individuals with diabetes mellitus. These approaches offer safe, cost-effective, and easily applicable alternatives, particularly for older adults who often experience physical limitations or adverse effects associated with long-term pharmacological treatment.

A study conducted by Arifah et al. (2023) demonstrated that warm water foot soaking therapy significantly reduced both systolic and diastolic blood pressure in elderly patients with hypertension. This effect is attributed to peripheral vasodilation induced by warm water exposure, which enhances blood circulation and decreases vascular resistance. Similar findings were reported by Unja et al. (2024), who showed that butterfly pea flower tea (*Clitoria ternatea*) effectively reduced blood pressure through its flavonoid and anthocyanin content, which function as natural antioxidants and vasorelaxants. These results support the potential of plant-based herbal therapies as non-pharmacological strategies for hypertension management.

Further evidence of herbal efficacy was provided by Widhawati et al. (2022), who reported that garlic infusion exerted a significant antihypertensive effect in older adults. The antihypertensive mechanism of garlic is largely attributed to allicin, which inhibits angiotensin-converting enzyme (ACE) activity involved in blood pressure regulation. Accordingly, garlic infusion may serve as a safe complementary therapy for elderly patients with hypertension.

Physical activity–based interventions also demonstrated favorable outcomes. Priliana et al. (2024) reported that the implementation of hypertension exercise programs resulted in an average reduction of 7.5 mmHg in systolic blood pressure and 3.5 mmHg in diastolic pressure. Regular physical exercise improves vascular elasticity, enhances endothelial function, and reduces physiological stress associated with elevated blood pressure. These findings are consistent with previous evidence indicating that light aerobic exercise performed routinely can lower blood pressure and improve quality of life among older adults with hypertension.

Additionally, Waruwu et al. (2021) found that consumption of celery leaf decoction (*Apium graveolens*) significantly reduced blood pressure in elderly hypertensive patients ($p = 0.000 < 0.05$). Bioactive compounds such as apigenin and luteolin exhibit natural diuretic and vasodilatory effects, contributing to reduced peripheral resistance. This herbal approach offers a safe alternative to minimize reliance on synthetic antihypertensive medications, particularly in geriatric populations.

Regarding diabetes mellitus management, Badrujamaludin et al. (2023) demonstrated that diabetic foot exercise significantly reduced blood glucose levels in patients with type 2 diabetes mellitus. Wilcoxon test results indicated a statistically significant effect ($p = 0.001$). The reduction in glucose levels is associated with improved peripheral circulation and enhanced insulin sensitivity, facilitating glucose uptake by muscle tissues. These findings align with recommendations from the American Diabetes Association (ADA), which emphasize the importance of light physical activity as part of non-pharmacological diabetes management.

Herbal interventions also contributed substantially to glycemic control. Safitri et al. (2023) reported that *Moringa oleifera* leaf decoction effectively reduced blood glucose levels in elderly patients with type 2 diabetes mellitus. The flavonoids, polyphenols, and antioxidant compounds present in moringa leaves are known to improve pancreatic β-cell function and enhance insulin sensitivity. Consistent results were reported by Kresnapati et al. (2024), who found that bay leaf (*Syzygium polyanthum*) decoction exhibited significant antihyperglycemic effects, with a statistically meaningful reduction in blood glucose levels ($p = 0.001$). These effects are associated with polyphenol and eugenol activity, which may delay glucose absorption and improve carbohydrate metabolism.

Moreover, Ariyanti et al. (2024) investigated hydrotherapy as a non-pharmacological intervention for patients with type 2 diabetes mellitus and observed a significant reduction in blood glucose levels following warm water therapy ($p < 0.001$). Increased body temperature during hydrotherapy promotes peripheral vasodilation and enhances glucose uptake by skeletal muscles, reinforcing the potential of warm water–based interventions as safe and natural adjunctive therapies for glycemic control.

Relaxation-based interventions were also examined. Baihaqi et al. (2025) reported that progressive muscle relaxation therapy resulted in a reduction of blood glucose levels ranging from 24 to 38 mg/dL over a seven-day intervention period. This technique effectively reduces stress hormone levels, particularly cortisol, which is known to contribute to hyperglycemia, while improving autonomic nervous system balance. Thus, relaxation techniques represent accessible strategies for both glycemic control and psychological well-being.

Large-scale evidence was provided by Rosenberg et al. (2024) in a randomized clinical trial published in *JAMA Network Open*. The I-STAND program, which focused on reducing sedentary behavior among 283 obese older adults, achieved an average reduction in sitting time of 31.85 minutes per day and a decrease in systolic blood pressure of 3.48 mmHg ($p = 0.03$). These findings highlight that simple behavioral modifications, such as standing more frequently, can improve cardiovascular health and reduce hypertension risk without

requiring strenuous physical activity.

Nevertheless, long-term effectiveness and interactions with pharmacological treatments require further investigation through large-scale randomized controlled trials (RCTs). Integration of complementary therapies should be conducted under professional healthcare supervision to ensure safety, appropriate dosage, and avoidance of adverse effects or contraindications (Ariyanti et al., 2024; Rosenberg et al., 2024; Waruwu et al., 2021).

Beyond physiological benefits, complementary approaches also offer psychosocial advantages. Group-based activities such as diabetes exercise programs and self-managed herbal therapy enhance motivation, strengthen social support, and promote patient autonomy in disease management. Therefore, healthcare professionals should educate patients on the structured use of complementary therapies as part of community-based health promotion strategies (Badrujamaludin et al., 2023; Baihaqi et al., 2025). In conclusion, complementary therapies and healthy lifestyle modifications represent effective and holistic strategies for supporting blood pressure and glycemic control. These approaches not only reinforce the outcomes of medical treatment but also improve patients' quality of life through safe, affordable, and sustainable natural mechanisms.

CONCLUSION

Complementary therapies demonstrated consistent effectiveness in supporting the management of hypertension and type 2 diabetes mellitus by contributing to reductions in blood pressure and blood glucose levels. Interventions such as herbal therapies, light physical exercise, relaxation techniques, hydrotherapy, and lifestyle modification were shown to be safe, accessible, and feasible, particularly for older adults who are vulnerable to the adverse effects of long-term pharmacological treatment. These findings suggest that complementary therapies may be integrated as adjunctive approaches alongside standard medical care to enhance disease control and improve patient quality of life. Nevertheless, the evidence remains limited by the predominance of quasi-experimental designs and relatively small sample sizes. Therefore, future research is recommended to employ large-scale randomized controlled trials with standardized intervention protocols and longer follow-up periods to confirm long-term effectiveness, assess safety, and evaluate interactions with pharmacological therapies, while healthcare professionals should ensure appropriate supervision when implementing complementary interventions in clinical and community-based settings.

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