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Relationship Between Behaviour and Lifestyle Patterns and The Risk of Hypertension: A Scoping Review

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Abstract
Hypertension is an increasingly common health problem worldwide and poses a significant risk for various cardiovascular conditions. To prevent an increase in the incidence and mortality rates, preventive measures are needed to identify the risks associated with hypertension. Behavioral and Lifestyle changes are the primary foundation in the prevention and treatment of hypertension. Changing behavior is a key factor that can influence the lifestyle of individuals with hypertension. This scoping review aims to examine the relationship between lifestyle patterns, behavior, and the risk of hypertension. A scoping review was conducted using a comprehensive literature search across PubMed, ScienceDirect, and Taylor & Francis, focusing on original studies involving human participants, Behavior and lifestyle outcomes reported, and studies published between 2020 and 2025. Article analysis uses the PRISMA-ScR Checklist**.** A total of 7 studies were analyzed. Findings show that Individuals who are obese or have other diseases (ex, diabetes mellitus) and do not adopt a healthy lifestyle have a higher risk of complications such as hypertension. Lifestyle patterns and Behaviors such as abstaining from smoking, limiting alcohol consumption, maintaining a balanced diet (DASH diet), and engaging in regular physical activity have consistently been associated with reduced risk of hypertension and cardiometabolic comorbidities. Patients who combine physical activity and a healthy lifestyle have a lower risk of death**.** The integration of lifestyle modifications (such as not smoking, exercising, maintaining sleep quality, and not consuming alcohol) with medication adherence helps in the sustainable management of hypertension.

Keywords: *Behavioural, Hypertension, Lifestyle, Risk Factor*

Background

Hypertension is a major non-communicable disease that greatly affects global mortality and morbidity (Daba et al., 2025). Globally, about 33% of the 8 billion individuals live with hypertension. The increasing prevalence of hypertension in both developed and developing countries is influenced by various factors, such as population ageing, changes in diet, lack of physical activity, increasing body mass index (BMI), and excessive alcohol consumption. Hypertension is also a significant risk factor for various chronic conditions, including kidney disease, stroke, intracranial hemorrhage, heart failure, premature birth, and cardiovascular disease (Daidone et al., 2025; Hung et al., 2025; Vay-Demouy et al., 2025). Approximately 70%–80% of patients with chronic

cardiovascular disease and chronic kidney disease (CKD) also suffer from hypertension.

Hypertension is acknowledge as mayor modifiable risk factor for every cause of mortality and illness (Ibrahim et al., 2024) Risk factors for hypertension can be divided into two categories: modifiable factors, including diet, exercise, alcohol and tobacco use, and being overweight or obese (Deepshikha et al., 2025; Han et al., 2025; Hung et al., 2025; Putri et al., 2021) and non-modifiable factors, like a family history of hypertension, being over 65 years of age, and other condition, like diabetes and CKD (Han et al., 2025). Therefore, the most straightforward and affordable treatment strategy is to focus on modifying these risk factors and seeking prompt and effective interventions (Ojangba et al., 2023)

Mortality and morbidity that occur in people with hypertension can be minimized or prevented by implementing a healthy lifestyle. Lifestyle changes are the primary foundation in the prevention and treatment of hypertension. In addition to contributing to blood pressure control, lifestyle changes also offer additional benefits, including improved cardiovascular health and overall well-being (Charchar et al., 2024; Daba et al., 2025). This approach encompasses a low-fat, plant-based diet such as the DASH or Mediterranean diet, regular physical activity, effective stress management, adequate sleep, and the cultivation of healthy social relationships (Elmakki, 2025). Lifestyle-based interventions have been shown to have a significant impact on the incidence of hypertension (Zhen et al., 2023), particularly when delivered through flexible methods such as telehealth (Aman & Bidwell, 2024).

This study uniquely explores the integration of patient behavior and lifestyle patterns as a primary strategy for managing hypertension, a topic that has not been widely explored in previous literature. The problem examined in this article is the low implementation of lifestyle strategies and behavioural changes in daily clinical practice despite scientific evidence showing their benefits. This raises questions about how behavioral and lifestyle patterns can be barriers and opportunities for these strategies for managing healthcare at both the individual and healthcare system levels.

Methods

This scoping review was written by the PRISMA-ScR guidelines. The article selection process was conducted in four stages: identification, screening, and inclusion, as illustrated employing the PRISMA-ScR flow diagram (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews). The design was used to investigate the Relationship Between Behavior and Lifestyle Patterns and The Risk of Hypertension. Therefore, the review question is: How do behavior and lifestyle patterns decrease the risk of hypertension?. The overall methods quality of each included study was evaluated using the PRISMA-SCR Checklist. There were no registered protocols for this review.

Three databases are used in this scoping review: PubMed, ScienceDirect, and Taylor & Francis, focusing on studies published between 2020 and 2025. Keywords were determined based on the PICO framework to ensure relevance to the topic. The keywords used in the search process were “Hypertension” or “Blood Pressure” or “High Blood Pressure” AND “Lifestyle” or “Lifestyle Pattern” AND

"Risk Factor" AND "Behavior" or "Health Behavior" based on Medical Subject Headings (MeSH terms) to ensure accuracy in identifying appropriate articles. All keywords were searched for in the title, abstract, and field. Boolean operators were used in the search. For keywords and subjects identified in the same concept, "OR" was used, while "AND" was used to link key concepts.

The inclusion criteria were original studies involving human participants, Behavior and lifestyle outcomes reported, Published between 2020 and 2025 , Written in English, and available in full-text PDF format. The exclusion criteria were review articles, conference abstracts, or editorials, pharmacological or combined interventions, not reported: Behavior and lifestyle outcomes.

All search records were downloaded from three databases (PubMed, ScienceDirect, and Taylor & Francis). The search results were checked for duplication using the Rayyan software. Six reviewers (F, FNP, MN, REA, RNA, and TP) independently screened the search results based on identified titles and abstracts. After obtaining the full-text versions of all identified studies, one of the reviewers collected relevant full-text. The six reviewers also independently assessed the full text for inclusion using predefined criteria. When there was a discrepancy in the assessments of the six reviewers, the other reviewer (TP) was included in the assessment to resolve the discrepancy.

Six reviewers (F, FNP, MN, REA, RNA, and TP) independently extracted data from the study results using Excel, with high agreement between the five reviewers (≥ 95%). Any disagreement was resolved by consensus with another reviewer (FNP). One reviewer (TP) extracted data from all the included studies. The extracted data are shown in the form of tables including Demographic characteristics: (1) first author name and year of publication, (2) sex, (3) age, (4) weight, and (5) method of analysis, and key findings of the study: (1) first author's name and year of publication, (2) studied variables, and (3) results.

Results

The reviewers identified 334 studies from three databases, namely PubMed, ScienceDirect, and Taylor & Francis. All studies were loaded into the Rayyan software. Before the screening stage, 214 records were excluded for several reasons: 67 were duplicates, 34 were deemed ineligible for automation, and 7 were eliminated for other unspecified reasons. As a result, 12 records proceeded to the initial screening phase. During the screening process, 2 records were declined based on title and abstract review. However, 10 full-text articles were evaluated for eligibility. Additionally, 3 articles were removed because they didn't focus on lifestyle interventions in the context of hypertension. Ultimately, 7 studies that satisfied the selection criteria were added to the final review. Specific details of the selection process are better illustrated in the PRISMA flow diagram (Figure 1).

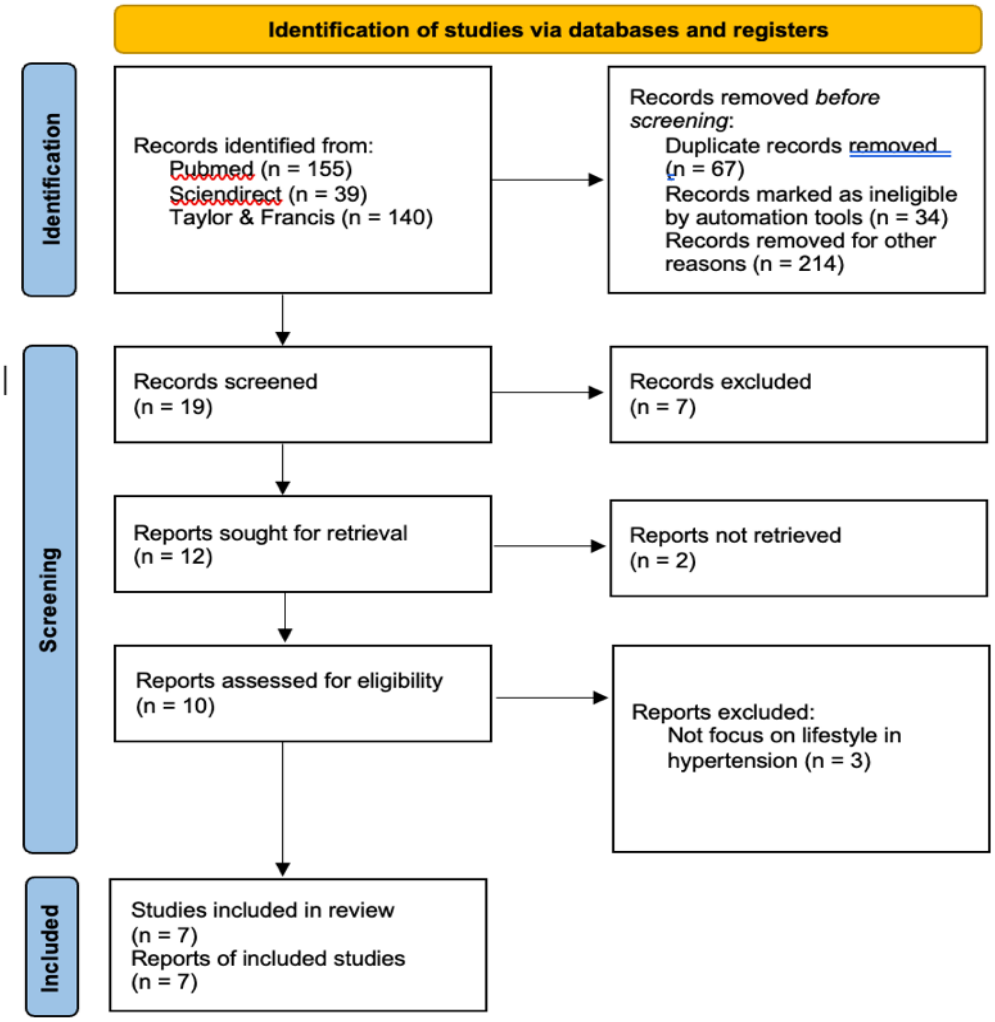

Figure 1. The scoping review PRISMA ScR-2020

From this pool, seven high-quality studies were selected for in-depth analysis based on their alignment with the study objectives. These articles served as the primary references for assessing the relationship between behavioural and lifestyle factors and the risk of developing hypertension. The PRISMA-Scr Checklist was used to evaluate the methodological quality of each included study. This appraisal was conducted to ensure that all selected articles met the minimum criteria for methodological rigour. The appraisal results are summarised in the Table.

Table 1. Characteristics and Main Results of the article

	Author	Country	Study desain	Sample	Respondents	Results	Themes
1.	Xie, et al., (2022)	United Kingdom (UK) Biobank	Prospective cohort study	Patients with hypertension	Biobank data (53,397 hypertensive patients, aged 37–74 years)	Individuals with a very healthy lifestyle experienced a 41% lower risk of disease compared to those with an unhealthy lifestyle. The lifestyle components that contributed most to the reduction in risk were not smoking, followed by regular physical activity and a balanced diet. This study confirms that a healthy lifestyle affects not only blood pressure alone but also the spectrum of other metabolic diseases that often accompany hypertension.	Healthty lifestyle - Regular physical activity - Not currently smoking - Healthy diet - Non-excessive drinking
2.	Shamsi, et al., (2021)	Iran	RCT	Patients with hypertension	50 patients who were hypertensive (experimental and control)	Chronic Care Model (CCM) in educational intervention of hypertension patients and evaluated its impact on dietary	Healthty lifestyle - Dietary restrictions

	Author	Country	Study desain	Sample	Respondents	Results	Themes
						behaviour change, especially salt intake. The results showed a significant decrease in sodium consumption, accompanied by a statistically significant decrease in systolic and diastolic blood pressure after the implementation of the model. This education-based intervention demonstrates that a comprehensive understanding of hypertension and the role of diet in its management can foster positive behavioural changes.	
3.	Zhang, et al., (2022)	China	Cohort study	Participants with hypertension	14 392 participants	Hypertensive patients who underwent a combination of antihypertensive therapy with lifestyle modification experienced a higher reduction in the risk of death from cardiovascul	Lifestyle factors: - Body mass index - Smoking status - Diet - Physical activity - Sleep duration

	Author	Country	Study desain	Sample	Respondents	Results	Themes
						ar disease compared to patients who only relied on pharmacological treatment alone. They reported a reduction in the risk of total death by 68% in patients who took both approaches. This shows that drugs alone are not enough to optimally manage hypertension without being accompanied by changes in the patient's lifestyle behaviour.	
4.	Gao, et al., (2022)	China	Cross-sectional study	Students, parents, or guardians as research objects	6446 study participants	Genetic factors associated with healthy lifestyles, such as regular physical activity and a balanced diet, directly reduce the risk of high blood pressure. These findings strengthen the evidence that lifestyle changes are not only correlative but have a causal effect	Lifestyle components - Drinking - Smoking - Body Mass Index (BMI) - Activities

	Author	Country	Study desain	Sample	Respondents	Results	Themes
						on reducing hypertension. This approach emphasizes the importance of lifestyle interventions as a primary prevention strategy.	
5.	Vamvakis, et al., (2020)	Greece	RCT	Patients with stage 1 Essential Hypertension (EH)	76 adults with stage 1 Essential Hypertension (EH)	HINTreat by Vamvakis et al. evaluated the effects of intensive lifestyle treatment combining diet and exercise for 6 months in patients with stage 1 hypertension. This intervention included intensive nutrition education and exercise, accompanied by monthly visits. The results showed significant reductions in blood pressure, urinary sodium excretion, and improvements in lipid profiles, including LDL cholesterol and triglycerides. Additionally, there was an	- Diet - Exercise

	Author	Country	Study desain	Sample	Respondents	Results	Themes
						increase in the consumption of anti-inflammatory nutrients, along with improvements in endothelial function and a decrease in arterial stiffness. Although physical activity did not change significantly, these results confirm the great benefits of intensive lifestyle treatment guided by a dietitian in improving the cardiovascular status of early-stage hypertensive patients.	
6.	Van Oort, et al., (2020)	Swedish	The 2-sample Mendelian randomization method	Genetic variants ($P<5\times10^{-8}$) associations with hypertension	The FinnGen Study (15 870 cases and 74 345 controls) and UK Biobank (54 358 cases and 408 652 controls)	Lifestyle modifications contribute significantly to reducing the risk of hypertension in the general population, especially in individuals with a genetic predisposition to cardiovascular disease. This study also emphasizes the importance	Factor associate - Diabetes mellitus - Cholesterol - Obesity - Smoking - Alcohol - Physical activity - Sleep duration - Educational

	Author	Country	Study desain	Sample	Respondents	Results	Themes
						of population-based prevention strategies that focus on healthy behaviour changes.	
7.	Blumenthal (2021)	United state	RCT	140 participants	Patients with resistant hypertension (RH)	The group that underwent intensive lifestyle intervention experienced significant reductions in systolic and diastolic blood pressure compared to the group that received only standard education. In addition, the intervention group also experienced increases in aerobic capacity, daily physical activity, weight loss, and improved dietary habits. These findings confirm that a structured, center-based intensive lifestyle program is highly effective in managing resistant hypertension without having to	- Exercise - Dietary - Treatment

Author	Country	Study desain	Sample	Respondents	Results	Themes
					change medication doses.	

Discussion

This scoping review highlights the consistent association between healthy lifestyle behaviors and reduced risk of hypertension across diverse populations and settings. A synthesis of 7 selected studies demonstrates that multidimensional lifestyle interventions—particularly those involving dietary changes, physical activity, smoking cessation, and patient education were linked to a significant decrease in blood pressure and improved clinical outcomes. These findings reinforce the position of lifestyle modification as a central, rather than an adjunct, strategy for hypertension.

Health education plays a critical role in improving medication adherence among patients with hypertension. Educational interventions have been demonstrated to increase patient knowledge and positively influence attitudes toward hypertension management, thereby promoting greater adherence to antihypertensive regimens (Xie et al., 2022). Poor adherence to medication remains the primary barrier to achieving target blood pressure levels within the expected timeframe for these patients. Multiple factors, such as the quality of the patient-doctor relationship and adverse medication side effects, can negatively impact adherence. To address this issue, a range of strategies have been recommended, with educational programs, self-blood pressure monitoring, and adherence tracking identified as particularly effective interventions. These approaches underscore the necessity of providing comprehensive information on hypertension prevention (Ashraf et al., 2024). Educational components have been shown to facilitate positive behavioural changes in individuals with hypertension (Sjattar & Arafat, 2022).

Adopting a healthy lifestyle is a key strategy for increasing knowledge and improving outcomes among patients with hypertension. Lifestyle patterns with modification also reduce the risk of cardiovascular and renal disease (Shamsi et al., 2021a). This is consistent with research by Van Oort et al. (2020) showing the impact of hypertension on unhealthy diets on type 2 diabetes (T2D), where the risk of T2D is higher in younger individuals and those who are obese when adopting Diet Pattern 1 (EP1). Therefore, Behaviours such as abstaining from smoking, limiting alcohol consumption, maintaining a balanced diet, and engaging in regular physical activity have consistently been associated with reduced risk of hypertension and cardiometabolic comorbidities. Studies have demonstrated that individuals adhering to a very healthy lifestyle experience up to a 41% reduction in cardiometabolic multimorbidity and a 32–50% decrease in the incidence of coronary heart disease, stroke, and diabetes (Vamvakis et al., 2020; Xie et al., 2022). Additionally, the integration of these healthy lifestyle components significantly lowers the prevalence of hypertension and dyslipidaemia (Gao et al., 2022). Intensive lifestyle interventions targeting multiple factors simultaneously, including smoking cessation, alcohol restriction, healthy eating, and increased

physical activity, are effective in reducing both blood pressure and cardiometabolic risk (Xie et al., 2022).

In addition, Other studies support that an anti-inflammatory diet and intensive physical activity improve blood pressure, lipid profile, and endothelial function (Shamsi et al., 2021a), while the DASH diet and regular exercise are effective even in persistent hypertension (Blumenthal et al., 2021). One dietary program that can be applied to hypertensive patients is a personalized nutrition education program and six months of intensive physical activity, which significantly reduces systolic blood pressure and arterial stiffness compared to standard care (Vamvakis et al., 2020). The C-LIFE initiative led to a decrease in clinical systolic blood pressure by as much as –12.5 mmHg and enhanced cardiovascular biomarkers (Blumenthal et al., 2021). Furthermore, Genetic factors such as ideal body weight and quality of sleep play a protective role. Genetic evidence from *Mendelian randomization* supports that weight loss, alcohol restriction, and improved sleep causally reduce the risk of hypertension (Van Oort et al., 2020).

Adherence to antihypertensive medication remains crucial, but combining it with a healthy lifestyle provides optimal protection against comorbid risks (Blumenthal et al., 2021; Shamsi et al., 2021; Xie et al., 2022). During the intervention, drug therapy is maintained as an adjunct, with adherence closely monitored (Blumenthal et al., 2021; Shamsi et al., 2021). Patients who combine medication adherence and a healthy lifestyle have a lower risk of mortality from all causes, including cardiovascular disease and cancer (Lu et al., 2022). Studies in China emphasize the importance of integrating a healthy lifestyle and medical therapy for the management of hypertension and dyslipidemia (Gao et al., 2022). Intensive lifestyle changes (such as reducing sodium intake, increasing physical activity, and adhering to medication) are an integral part of hypertension therapy and may even delay pharmacological treatment in low-risk patients (Shamsi et al., 2021). Therefore, an intervention-based approach is needed to maximize diet and physical activity in hypertensive patients. Patient-centered intervention approaches, such as the Continuum of Care Model (CCM), are viable models for clinical implementation. This allows interventions to focus on primary prevention by targeting modifiable risk factors (e.g., obesity, alcohol use). Furthermore, given the high disease burden in low- to middle-income countries, policies should support the development and implementation of targeted education programs for primary healthcare workers to improve standards of care at the community level (Blumenthal et al., 2021; Elmakki, 2025).

Therefore, a multifaceted approach combining medication, behavior and lifestyle patterns is highly recommended. Demonstrates differences in effects depending on the intervention method and the characteristics of the patients being studied. A limitation of this review is the restriction to English-language articles and the availability of open-access full texts. No funding was received for this scoping review. Despite general agreement on the benefits of lifestyle modification, several inconsistencies were identified across the studies. For example, while most studies reported positive outcomes from increased physical activity, one study (Vamvakis et al., 2020)found significant reductions in blood pressure despite no measurable change in activity levels. Furthermore, the comparative effectiveness of single-component versus multimodal interventions remains unclear. These

inconsistencies underscore the need for more targeted, long-term, and comparative research, particularly among high-risk populations and within the context of digital health interventions. Unlike most previous studies that treat lifestyle as adjunct therapy, this review positions behaviour modification and patient education as central, primary strategies in hypertension management.

Conclusion

Patients with early hypertension who adopt a healthy lifestyle can delay the need for medication or increase the effectiveness of therapy. A healthy lifestyle not only acts as a protective factor against increased blood pressure but also supports the development of consistent therapeutic behavior, including adherence to pharmacological regimens. The integration of lifestyle modifications (such as not smoking, exercising, maintaining sleep quality, and not consuming alcohol) with medication adherence helps in the sustainable management of hypertension. Therefore, maintaining healthy lifestyle behaviors is the cornerstone of blood pressure control and the prevention of long-term complications.

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