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HYPERTENSION:

**A COMPREHENSIVE REVIEW OF RISK FACTORS,
PATHOPHYSIOLOGY, COMPLICATIONS, AND TREATMENT
STRATEGIES**



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HIPERTENSIÓN ARTERIAL: UNA REVISIÓN INTEGRAL DE FACTORES DE RIESGO, FISIOPATOLOGÍA, COMPLICACIONES Y ESTRATEGIAS DE TRATAMIENTO

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ABSTRACT

Hypertension is one of the most prevalent chronic noncommunicable diseases and represents a major public health challenge because of its high prevalence, silent progression, and close association with cardiovascular, cerebrovascular, and renal diseases. The aim of this narrative review was to synthesize the available scientific evidence on the risk factors, pathophysiological mechanisms, major complications, and therapeutic strategies for the comprehensive management of hypertension. To achieve this, a qualitative review was conducted using original research articles, systematic reviews, narrative reviews, clinical practice recommendations, and reports from international organizations published primarily between 2020 and 2026. The reviewed evidence demonstrates that hypertension is a multifactorial disease influenced by biological, behavioral, environmental, and socioeconomic factors. The principal determinants identified included obesity, aging, excessive sodium intake, physical inactivity, diabetes mellitus, chronic kidney disease, and inequalities in access to healthcare services. Furthermore, inadequate blood pressure was found to significantly increase the risk of left ventricular hypertrophy, heart failure, coronary artery disease, stroke, and chronic kidney disease. The findings support the implementation of patient centered models of care that integrate individualized pharmacological treatment, sustainable lifestyle modifications, health education, continuous clinical follow up, and multidisciplinary healthcare teams to optimize blood pressure control, reduce cardiovascular complications, and improve health outcomes.

Keywords:

Hypertension, risk factors, cardiovascular complications, antihypertensive treatment.

RESUMEN

La hipertensión arterial constituye una de las principales enfermedades crónicas no transmisibles y representa un importante desafío para la salud pública debido a su elevada prevalencia, evolución silenciosa y estrecha relación con las enfermedades cardiovasculares, cerebrovasculares y renales. El objetivo de esta revisión narrativa fue sintetizar la evidencia científica disponible sobre los factores de riesgo, los mecanismos fisiopatológicos, las principales complicaciones y las estrategias terapéuticas para el manejo integral de la hipertensión arterial. Para ello, se realizó una revisión cualitativa de artículos científicos originales, revisiones sistemáticas, revisiones narrativas, recomendaciones clínicas y documentos de organismos internacionales publicados principalmente entre 2020 y 2026. La evidencia revisada demuestra que la hipertensión es una enfermedad multifactorial influenciada por factores biológicos, conductuales, ambientales y socioeconómicos. Entre los principales determinantes se identificaron la obesidad, el envejecimiento, el consumo elevado de sodio, el sedentarismo, la diabetes mellitus, la enfermedad renal crónica y las desigualdades en el acceso a los servicios de salud. Asimismo, se constató que el control inadecuado de la presión arterial incrementa significativamente el riesgo de hipertrofia ventricular izquierda, insuficiencia cardíaca, enfermedad coronaria, accidente cerebrovascular y enfermedad renal crónica. Los hallazgos respaldan la implementación de modelos de atención centrados en el paciente que integren tratamiento farmacológico individualizado, modificaciones sostenibles del estilo de vida, educación sanitaria, seguimiento clínico continuo y equipos multidisciplinarios, con el propósito de optimizar el control de la presión arterial, disminuir las complicaciones cardiovasculares y mejorar los resultados en salud.

Palabras clave:

Hipertensión arterial, factores de riesgo, complicaciones cardiovasculares, tratamiento antihipertensivo.

INTRODUCTION

Hypertension is one of the leading public health challenges of the twenty first century because of its high prevalence, progressive course, and close association with cardiovascular, cerebrovascular, and renal diseases. Frequently referred to as the “silent killer,” this condition often develops without evident clinical manifestations while causing continuous damage to blood vessels and vital organs. Consequently, a large proportion of affected individuals remain undiagnosed until severe complications, such as acute myocardial infarction, stroke, heart failure, or chronic kidney disease, become clinically apparent. This silent progression has made hypertension one of the leading preventable causes of premature mortality and disability worldwide, generating a substantial economic and social burden for healthcare systems and society (World Health Organization, 2025a).

According to the World Health Organization (2025a), more than one billion adults are currently living with hypertension worldwide, and nearly half are unaware of their condition. Among those who have been diagnosed, a considerable proportion do not receive appropriate treatment, while many treated patients fail to achieve recommended blood pressure targets. These figures demonstrate that hypertension remains underdiagnosed and inadequately controlled despite the availability of effective antihypertensive medications and evidence based preventive strategies. Consequently, strengthening early detection, improving treatment adherence, and implementing effective prevention programs have become major priorities for healthcare systems worldwide.

The impact of hypertension extends far beyond elevated blood pressure values. Prolonged exposure to increased arterial pressure accelerates vascular aging and produces structural and functional alterations in target organs, including the heart, brain, kidneys, retina, and peripheral circulation. The principal pathophysiological mechanisms involved include endothelial dysfunction, vascular remodeling, increased arterial stiffness, and impaired tissue perfusion, all of which contribute to the development of potentially fatal cardiovascular complications (Masenga & Kirabo, 2023).

Cardiovascular diseases remain the leading cause of mortality worldwide, and hypertension is their most important modifiable risk factor. The World Health Organization (2025b) reports that cardiovascular diseases account for approximately one third of all deaths globally and that a substantial proportion of these deaths could be prevented through adequate blood pressure control, healthy lifestyle habits, and timely access to quality healthcare services. Consequently, the prevention and effective management of hypertension represent some of the most cost-effective strategies for reducing mortality associated with noncommunicable diseases.

From a pathophysiological perspective, hypertension results from a complex interaction among multiple biological systems responsible for regulating blood pressure. Persistent activation of the renin angiotensin aldosterone system increased sympathetic nervous system activity, oxidative stress, chronic low-grade inflammation, endothelial dysfunction, and disturbances in sodium and water balance all contribute to the development and progression of the disease (Masenga & Kirabo, 2023).

These mechanisms do not act independently but interact continuously with genetic, environmental, metabolic, and behavioral factors, giving rise to a multifactorial disease that progresses over time. Therefore, hypertension should no longer be regarded solely as a persistent elevation in blood pressure but rather as a systemic disorder that promotes cardiovascular damage and progressive dysfunction of multiple organs. This broader understanding has transformed the traditional clinical approach, shifting the focus from blood pressure values alone to comprehensive cardiovascular risk reduction.

The development of hypertension is influenced by numerous modifiable and nonmodifiable risk factors. Aging is one of the strongest determinants because progressive loss of vascular elasticity increases peripheral vascular resistance. Likewise, family history and genetic predisposition contribute substantially to individual susceptibility. However, a significant proportion of hypertension cases are associated with modifiable factors, including obesity, physical inactivity, excessive sodium intake, unhealthy dietary habits, harmful alcohol consumption, tobacco use, chronic psychological stress, diabetes mellitus, dyslipidemia, and chronic kidney disease (World Health Organization, 2025a).

Rapid urbanization, population aging, and changes in lifestyle patterns have contributed to the sustained increase in hypertension prevalence over recent decades. The growing consumption of ultra processed foods rich in sodium, fats, and sugars, together with declining levels of physical activity, has promoted obesity and other metabolic disorders that substantially increase cardiovascular risk. This situation is particularly concerning in low- and middle-income countries, where limitations in healthcare infrastructure hinder prevention, early diagnosis, and continuous follow up of patients with hypertension.

Another important characteristic of hypertension is its frequent coexistence with other chronic diseases. Many patients simultaneously present obesity, diabetes mellitus, chronic kidney disease, metabolic syndrome, and dyslipidemia, conditions that markedly increase the risk of cardiovascular complications. The presence of these comorbidities makes treatment more complex because multiple interacting pathophysiological mechanisms must be addressed while considering each patient's overall cardiovascular risk.

Although antihypertensive medications remain the cornerstone of treatment, current scientific evidence demonstrates that successful blood pressure control requires a much broader approach. Sustained lifestyle modifications, patient education, regular clinical follow up, continuous cardiovascular risk assessment, and active patient participation in therapeutic decision making are all essential components of effective disease management. This patient centered approach recognizes that therapeutic strategies should be individualized according to each patient's clinical characteristics, personal needs, and social context (Borghi & Cicero, 2007).

Advances in pharmacological therapy over recent decades have considerably expanded the therapeutic options available for hypertension management. Nevertheless, selecting the most appropriate treatment should go beyond simply reducing blood pressure values. Current evidence advocates moving from a disease centered approach to a model focused on the individual characteristics of each patient. This transition requires considering age, overall cardiovascular risk, the presence of comorbidities, target organ damage, patient preferences, medication tolerance, and the social conditions that may influence treatment adherence. In this regard, Borghi & Cicero (2007) argued that contemporary hypertension management should be based on personalized care aimed at optimizing clinical outcomes while improving patients' quality of life.

Similarly, current therapeutic recommendations recognize that nonpharmacological interventions are fundamental components of comprehensive hypertension management. Reducing sodium intake, adopting healthy dietary patterns, increasing physical activity, maintaining a healthy body weight, smoking cessation, moderating alcohol consumption, and effectively managing stress have all been shown to significantly reduce blood pressure and decrease the risk of major cardiovascular events. When combined with pharmacological therapy, these interventions enhance blood pressure control and reduce the long-term occurrence of complications (Elendu et al., 2024).

Despite these advances, achieving adequate blood pressure remains a major challenge for healthcare systems worldwide. Poor treatment adherence, medication discontinuation, financial barriers to healthcare access, limited health education, and inadequate continuity of medical follow up largely explain why many patients continue to have uncontrolled hypertension despite receiving a diagnosis and treatment. These challenges are particularly evident in resource limited settings, where socioeconomic inequalities substantially affect access to medications, regular medical evaluations, and preventive healthcare programs.

Within this context, reducing socioeconomic disparities has become one of the principal challenges for global

hypertension control. Azad et al. (2025) emphasized that social determinants of health directly influence individuals' ability to prevent, detect, and effectively manage hypertension. Educational attainment, income level, place of residence, and healthcare availability all influence treatment adherence and long-term clinical outcomes. The authors proposed incorporating predictive models and risk stratification tools to identify vulnerable populations early and optimize the allocation of available healthcare resources, particularly in economically constrained settings.

Recent evidence also highlights the need to strengthen primary healthcare as the cornerstone of hypertension management. Early detection, regular follow up, continuous patient education, and systematic blood pressure monitoring facilitate the timely identification of individuals at increased risk of cardiovascular complications. Coordinated participation by physicians, nurses, dietitians, pharmacists, and other healthcare professionals promotes comprehensive care, improves treatment adherence, and contributes to better clinical outcomes.

Another emerging area of interest is the incorporation of digital technologies and remote monitoring systems as complementary tools for hypertension management. Although these technologies cannot replace face to face medical care, they may facilitate the follow up of patients with limited access to healthcare services, improve communication between healthcare professionals and patients, promote treatment adherence, and enable the early detection of clinical deterioration. These innovations represent valuable opportunities to strengthen cardiovascular disease prevention and hypertension control programs, particularly among high-risk populations.

The available scientific evidence demonstrates that hypertension is a multifactorial disease whose prevention and management require a comprehensive, continuous, and patient centered approach. The interaction among biological, behavioral, environmental, and socioeconomic factors explains both the development of the disease and its progression toward severe cardiovascular complications. Consequently, effective hypertension control strategies should combine evidence based pharmacological treatment with sustained lifestyle modification, health education, continuous clinical follow up, and public health policies designed to reduce health inequalities.

The present review aims to examine the most recent scientific evidence on hypertension by analyzing its principal risk factors, associated complications, and currently available therapeutic strategies. Integrating these aspects will provide a comprehensive and updated perspective that contributes to strengthening preventive actions, promoting early diagnosis, and optimizing the clinical management of hypertension, ultimately reducing its impact on cardiovascular morbidity and mortality while improving population health.

MATERIALS AND METHODS

This study was conducted as a narrative literature review aimed at synthesizing the current scientific evidence on the risk factors, pathophysiological mechanisms, clinical complications, and therapeutic strategies associated with hypertension. A qualitative review design was selected because it allows the integration, comparison, and critical interpretation of findings from studies with different methodological approaches, providing a comprehensive understanding of the disease from both clinical and public health perspectives.

The literature search was performed using internationally recognized scientific databases, including PubMed/MEDLINE, Scopus, Web of Science, Google Scholar, and ScienceDirect. In addition, official publications and clinical recommendations issued by the World Health Organization were included because of their relevance to global hypertension prevention and management.

The review primarily considered studies published between 2020 and 2026 to ensure that the analysis reflected the most recent evidence on hypertension. However, highly influential publications published before this period were also incorporated because of their recognized contribution to the understanding of hypertension management, cardiovascular risk stratification, and therapeutic decision making. These seminal studies provided the conceptual foundation for interpreting current evidence and understanding the evolution of clinical practice.

The search strategy included combinations of the following keywords: hypertension, arterial hypertension, cardiovascular risk, risk factors, hypertensive heart disease, blood pressure control, antihypertensive treatment, cardiovascular complications, lifestyle modification, prevention, and hypertension management. Only peer reviewed publications written in English were considered.

The selected literature included original research articles, systematic reviews, narrative reviews, clinical practice recommendations, and reports from international health organizations. Each publication was critically evaluated according to its scientific relevance, methodological quality, objectives, principal findings, and contribution to the understanding of hypertension. The information extracted from the selected studies was subsequently organized into thematic categories that included epidemiology, risk factors, pathophysiological mechanisms, target organ damage, cardiovascular complications, pharmacological treatment, nonpharmacological interventions, patient centered management, and emerging therapeutic perspectives.

Finally, the evidence was synthesized through a comparative and interpretative analysis, allowing the identification of consistent findings, current challenges, areas of consensus, and future directions for hypertension prevention and management. Because this review was based exclusively on previously published scientific literature, it did

not involve human participants, biological samples, or confidential patient information. Therefore, approval by an institutional ethics committee and informed consent were not required.

RESULTS AND DISCUSSION

The reviewed scientific evidence consistently indicates that hypertension is a complex disease whose clinical course depends on the continuous interaction of biological, behavioral, environmental, and social factors. Although therapeutic success has traditionally been assessed by reductions in blood pressure levels, more recent studies demonstrate that patient prognosis is determined by a much broader set of variables related to overall cardiovascular risk, the presence of comorbid conditions, treatment adherence, and the socioeconomic context in which healthcare is delivered.

One of the major contributions of the current literature is the recognition that hypertension is not an isolated disorder but rather a systemic disease capable of producing progressive alterations in multiple organs and physiological systems. Masenga & Kirabo (2023) explain that the cardiovascular damage associated with hypertension results from complex pathophysiological mechanisms involving persistent inflammation, oxidative stress, vascular remodeling, and structural changes in the myocardium. These alterations promote the development of left ventricular hypertrophy, heart failure, and other manifestations of hypertensive heart disease, substantially increasing cardiovascular morbidity and mortality. In this context, blood pressure control is important not only because it lowers blood pressure values but also because it prevents the progressive deterioration of cardiovascular function.

The World Health Organization (2025b) reports that cardiovascular diseases remain the leading cause of death worldwide, highlighting the urgent need to strengthen preventive strategies aimed at controlling modifiable cardiovascular risk factors. Within this framework, hypertension occupies a central position because it frequently coexists with obesity, diabetes mellitus, dyslipidemia, and chronic kidney disease, conditions that considerably increase the likelihood of major cardiovascular events. The coexistence of these disorders further complicates patient management and requires comprehensive cardiovascular risk assessment rather than therapeutic approaches focused exclusively on a single clinical parameter.

Another finding consistently supported by the available evidence is the influence of lifestyle behaviors on both the development and progression of hypertension. High sodium intake, excess body weight, physical inactivity, alcohol consumption, and tobacco use are modifiable risk factors whose early management can substantially reduce cardiovascular risk. Nevertheless, changing these behaviors remains one of the greatest challenges in clinical practice because the adoption of healthy lifestyles

depends on cultural, educational, family, and economic factors that often extend beyond the direct control of healthcare professionals. This reality explains why many patients understand medical recommendations but still experience considerable difficulty maintaining long term behavioral changes.

Regarding treatment strategies, Borghi & Cicero (2007) proposed replacing the traditional disease centered model with an approach focused on the individual characteristics of each patient. This perspective recognizes that individuals presenting similar blood pressure levels may have completely different cardiovascular risk profiles depending on age, comorbidities, target organ damage, and living conditions. Consequently, therapeutic decisions should be individualized to achieve an appropriate balance between pharmacological efficacy, treatment tolerability, and the patient's ability to maintain long term adherence.

The review conducted by Elendu et al. (2024) reinforces this concept by emphasizing that contemporary hypertension management requires the integration of pharmacological and nonpharmacological interventions. The authors demonstrate that dietary modification, regular physical activity, weight management, and sodium reduction provide benefits that extend beyond blood pressure reduction by simultaneously decreasing the risk of diabetes mellitus, obesity, and cardiovascular disease. Furthermore, they highlight patient education as an essential component for improving treatment adherence and promoting active participation in disease management.

The available evidence also demonstrates that social inequalities substantially influence the outcomes of antihypertensive treatment. Azad et al. (2025) argue that educational attainment, household income, access to medications, and healthcare availability directly affect patients' capacity to achieve adequate blood pressure control. In resource constrained settings, these barriers contribute to delayed diagnosis, treatment interruption, and inadequate clinical follow up, thereby increasing the incidence of cardiovascular complications. Accordingly, the authors propose incorporating predictive models and risk stratification tools to optimize resource allocation and improve the early identification of individuals at greatest risk.

Goorani et al. (2025) provide a comprehensive perspective by describing hypertension as one of the most persistent and challenging public health problems worldwide. Despite remarkable advances in understanding the molecular mechanisms underlying hypertension and the development of increasingly effective antihypertensive therapies, the disease continues to exhibit high prevalence rates and inadequate control across most healthcare systems. The authors argue that the greatest challenge is no longer the availability of effective medications but rather ensuring early diagnosis, sustained treatment adherence, and continuous long term follow up.

Furthermore, Goorani et al. (2025) emphasize that hypertension should be addressed from a multidimensional perspective that integrates clinical, molecular, social, and economic factors. Another significant contribution of their work is the recognition that vascular inflammation, oxidative stress, endothelial dysfunction, and immune alterations actively participate in disease progression, creating new opportunities for the development of therapies targeting specific biological mechanisms. The authors conclude that the future of hypertension control will depend on the integration of personalized medicine, pharmacological innovation, primary prevention, and stronger healthcare systems capable of reducing both disease incidence and the burden of cardiovascular complications.

Similarly, Sood et al. (2024) conducted a systematic review to identify the principal risk factors associated with the development of hypertension. Their analysis confirms that hypertension has a clearly multifactorial origin resulting from the interaction of biological, behavioral, and environmental determinants. Among the most consistent risk factors identified were obesity, physical inactivity, advanced age, genetic predisposition, excessive sodium intake, tobacco use, harmful alcohol consumption, diabetes mellitus, and psychological stress. However, the authors emphasize that these factors do not act independently but rather reinforce one another, substantially increasing overall cardiovascular risk. They further highlight that many of these determinants are modifiable through timely preventive interventions, making the promotion of healthy lifestyles one of the most effective public health strategies. Likewise, the review underscores the importance of implementing community based educational programs aimed at reducing exposure to cardiovascular risk factors from an early age, thereby contributing to a sustained reduction in hypertension prevalence and cardiovascular disease.

Shiraly et al. (2022) contribute an important behavioral perspective by demonstrating that patients' perception of the risk associated with hypertension directly influences adherence to antihypertensive therapy. The authors observed that individuals with greater awareness of hypertension related complications were significantly more likely to comply with prescribed medications and medical recommendations. In contrast, patients who underestimated the severity of the disease or minimized its potential consequences showed substantially lower levels of treatment adherence.

These findings indicate that health education should extend beyond the simple transmission of clinical information and should instead strengthen patients' understanding of the risks associated with uncontrolled hypertension while reinforcing the benefits of continuous treatment. The authors conclude that educational interventions implemented within primary healthcare settings can effectively increase awareness of hypertension related complications and promote sustainable behavioral changes. Consequently,

effective communication between healthcare professionals and patients becomes an essential component of successful blood pressure control and cardiovascular risk reduction.

Finally, Puspitasari et al. (2026) reviewed the literature on the risk factors and complications associated with uncontrolled hypertension in Indonesia, providing evidence that is highly relevant to many low- and middle-income countries. The authors report that inadequate blood pressure control substantially increases the incidence of stroke, heart failure, chronic kidney disease, coronary artery disease, and other complications that impair quality of life and increase mortality. They also identified poor treatment adherence, limited access to healthcare services, low educational attainment, obesity, diabetes mellitus, and unhealthy lifestyle behaviors as the principal determinants of uncontrolled hypertension.

One particularly important contribution of this review is its demonstration that structural weaknesses within healthcare systems contribute significantly to inequalities in hypertension prevention and treatment. Therefore, the authors recommend strengthening early detection programs, expanding primary healthcare coverage, improving health education, and ensuring the continuous availability of antihypertensive medications as essential strategies for reducing disease burden and preventing cardiovascular complications associated with hypertension.

Likewise, Sierra & Coca (2009) examined the evolution of therapeutic strategies for patients with high-risk hypertension, emphasizing that treatment should aim not only to lower blood pressure but also to reduce overall cardiovascular risk. The authors argue that the coexistence of diabetes mellitus, chronic kidney disease, left ventricular hypertrophy, coronary artery disease, or a history of stroke substantially worsens clinical prognosis and requires more intensive and individualized therapeutic interventions.

They further stress that the early identification of target organ damage allows more accurate cardiovascular risk stratification and facilitates the selection of the most appropriate treatment for each patient. Another important contribution of their work is the recognition that the rational combination of different antihypertensive drug classes improves blood pressure control while reducing the likelihood of major cardiovascular events. Consequently, they advocate abandoning uniform treatment models in favor of personalized therapeutic strategies that integrate each patient's clinical characteristics, comorbidities, and cardiovascular risk profile.

Hinton et al. (2020) addressed the increasingly important issue of hypertension diagnosis and management in young adults. For many years, this population received relatively little clinical attention because it was generally perceived as having a low cardiovascular risk profile. However, current evidence demonstrates that persistent

elevations in blood pressure during early adulthood promote cumulative vascular damage, substantially increasing the likelihood of developing cardiovascular disease later in life. The authors emphasize that early diagnosis provides an opportunity to implement lifestyle modifications and timely therapeutic interventions capable of favorably altering the natural history of the disease.

They also caution against both undertreatment and unnecessary medicalization, recommending an individualized approach based on cardiovascular risk assessment, the presence of target organ damage, and each patient's clinical characteristics. Their principal contribution lies in demonstrating that cardiovascular prevention should begin early in life to maximize long term health benefits and reduce the future burden of cardiovascular disease.

Likewise, Omer et al. (2024) investigated the prevalence of hypertension among adults with diabetes mellitus, confirming the close relationship between these two chronic conditions. Their findings revealed that the coexistence of diabetes and hypertension markedly increases the risk of cardiovascular, renal, and metabolic complications, making this combination one of the greatest challenges for contemporary healthcare systems. Furthermore, the authors identified several factors associated with hypertension in diabetic patients, including advanced age, excess body weight, longer duration of diabetes, and specific sociodemographic characteristics.

These findings emphasize the importance of implementing comprehensive management strategies capable of simultaneously addressing both conditions, since treating either disease in isolation is insufficient to reduce overall cardiovascular risk. Consequently, the authors recommend strengthening preventive interventions, promoting routine blood pressure monitoring, and enhancing diabetes education as essential measures for reducing morbidity and mortality in this high-risk population.

Finally, Silva et al. (2022) reviewed the principal challenges and emerging opportunities in the contemporary management of hypertension. Despite the availability of numerous effective antihypertensive medications and well established international clinical guidelines, they observed that blood pressure control rates remain below desirable levels in most countries. Among the principal barriers identified were poor treatment adherence, therapeutic inertia, delayed diagnosis, and organizational limitations within healthcare systems.

The authors also emphasize that comprehensive hypertension management should incorporate collaborative models involving physicians, nurses, pharmacists, dietitians, and other healthcare professionals to optimize long term patient follow up. In addition, they highlight the growing potential of digital health technologies, home blood pressure monitoring, and telemedicine as complementary tools for improving disease management. Collectively,

their findings suggest that strengthening primary health-care services, promoting technological innovation, and implementing patient centered models of care represent major opportunities to improve hypertension control and reduce cardiovascular risk.

The evidence reviewed demonstrates that effective hypertension management depends on the interaction between the efficacy of clinical interventions, active patient participation, and the capacity of healthcare systems to deliver continuous, high-quality care. Although pharmacological advances have considerably expanded therapeutic options, hypertension control remains inadequate in many countries because of delayed diagnosis, poor treatment adherence, insufficient continuity of care, and persistent inequalities in healthcare access.

Furthermore, the reviewed studies consistently indicate that hypertension cannot be managed solely from a biomedical perspective, as its progression is strongly influenced by behavioral, educational, economic, and social determinants that affect the achievement of sustained blood pressure control. Within this context, primary healthcare plays a strategic role by promoting early detection, continuous monitoring, health education, and effective coordination across different levels of care. Likewise, multidisciplinary teams composed of physicians, nurses, dietitians, pharmacists, psychologists, and other healthcare professionals provide more comprehensive management by simultaneously addressing clinical factors and the broader social determinants that shape cardiovascular risk.

Moreover, recent investigations reveal a progressive shift toward more personalized and preventive models of hypertension care, in which therapeutic decisions are tailored to each patient's clinical profile, comorbidities, personal preferences, and socioeconomic circumstances. This approach is particularly relevant for individuals with high cardiovascular risk, resistant hypertension, or multiple chronic conditions, in whom standardized treatment strategies have proven insufficient to achieve optimal outcomes. Personalized management enables healthcare professionals to optimize antihypertensive therapy while improving adherence and minimizing adverse effects, ultimately enhancing long term cardiovascular protection.

At the same time, the rapid development of diagnostic technologies, predictive models, molecular biomarkers, and digital health solutions is transforming the identification and management of patients into increased cardiovascular risk. Home and ambulatory blood pressure monitoring, telemedicine platforms, mobile health applications, wearable devices, and artificial intelligence-based decision support systems have emerged as promising tools for improving treatment adherence, facilitating clinical decision making, and optimizing blood pressure control. These innovations are especially valuable in populations with limited access to healthcare services, where remote

monitoring and digital communication may reduce barriers to continuous medical follow up and promote earlier therapeutic interventions.

Collectively, the reviewed evidence indicates that hypertension management should be supported by comprehensive strategies integrating primary prevention, early diagnosis, individualized pharmacological therapy, sustained lifestyle modification, and continuous clinical follow up. Likewise, strengthening public health policies aimed at reducing modifiable cardiovascular risk factors, promoting health education, improving health literacy, and addressing social inequalities remain essential for decreasing the global burden of hypertension. Population based interventions focused on healthier nutrition, reduced sodium consumption, increased physical activity, smoking cessation, and responsible alcohol consumption should complement individualized clinical care to maximize long term cardiovascular benefits.

Furthermore, the available evidence emphasizes that effective hypertension management requires greater integration between clinical practice, public health initiatives, and scientific research. Continued collaboration among clinicians, researchers, healthcare administrators, and policy makers will facilitate the implementation of evidence-based interventions capable of improving disease prevention, treatment adherence, and cardiovascular outcomes across diverse populations. Such multidisciplinary collaboration is particularly important for addressing the growing challenges associated with population aging, increasing multimorbidity, and persistent healthcare disparities.

Finally, current evidence suggests that future research should prioritize longitudinal investigations capable of clarifying the causal relationships among biological, behavioral, and socioeconomic determinants of hypertension. Additional studies are also needed to evaluate the long-term effectiveness of multidisciplinary interventions, personalized therapeutic strategies, digital health technologies, and precision medicine approaches in different healthcare settings and population groups. Expanding this body of evidence will contribute to the development of increasingly effective strategies for reducing the worldwide burden of hypertension, preventing cardiovascular complications, improving clinical outcomes, and enhancing the quality of life of individuals living with this chronic condition.

CONCLUSIONS

Hypertension remains one of the most significant global public health challenges because of its high prevalence, asymptomatic progression, and strong association with cardiovascular, cerebrovascular, and renal diseases. The evidence reviewed demonstrates that the disease results from the interaction of multiple biological, behavioral,

environmental, and socioeconomic determinants, making its prevention and management considerably more complex than the simple reduction of blood pressure values.

This narrative review synthesized current scientific evidence on the principal risk factors, pathophysiological mechanisms, clinical complications, and therapeutic strategies related to hypertension through the critical analysis of recent studies and international clinical recommendations. Organizing the available evidence into thematic categories made it possible to identify common findings and emerging perspectives regarding the prevention and comprehensive management of the disease.

The reviewed studies consistently indicate that obesity, unhealthy dietary habits, excessive sodium intake, physical inactivity, diabetes mellitus, aging, chronic kidney disease, and adverse socioeconomic conditions are among the principal determinants of hypertension and its progression. Likewise, persistent uncontrolled blood pressure promotes progressive target organ damage, increasing the risk of hypertensive heart disease, stroke, coronary artery disease, heart failure, and chronic kidney disease.

The evidence also demonstrates that successful hypertension management requires an integrated approach combining individualized pharmacological treatment, sustained lifestyle modification, continuous patient education, regular clinical follow up, and multidisciplinary healthcare delivery. Early diagnosis, improved treatment adherence, and comprehensive cardiovascular risk assessment are fundamental to reducing long term complications and improving patient outcomes.

Finally, current evidence supports the transition toward personalized, preventive, and patient centered models of care that integrate clinical management with public health interventions and technological innovation. Future research should prioritize longitudinal studies, multidisciplinary interventions, and precision medicine strategies to strengthen hypertension prevention and optimize cardiovascular outcomes across diverse healthcare settings.

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The author declares no conflicts of interest.

Author Contributions:

Kexin He: Conceptualization, data curation, formal analysis, investigation, methodology, supervision, validation, visualization, original draft writing, and writing, review, and editing.

Ethical statement:

The study was based on the analysis of documentary sources and publicly available data, and therefore did not involve the direct participation of human subjects. No personally identifiable information was handled.