



Arterial Hypertension: etiology, clinical course, and treatment strategies

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Abstract

Arterial hypertension, commonly known as high blood pressure, is one of the most prevalent cardiovascular disorders worldwide, affecting millions of individuals across various age groups and demographics. Its prevention and effective management remain critical priorities in global healthcare systems, given its association with increased risk of severe complications such as stroke, heart attack, heart failure, kidney damage, and premature death. This article reviews the most recent scientific findings concerning the etiology, pathogenesis, clinical manifestations, diagnostic approaches, and evolving treatment modalities for arterial hypertension. The pathophysiology of hypertension is explored in detail, including genetic, environmental, and lifestyle factors that contribute to its onset and progression. Additionally, the article highlights the growing understanding of molecular mechanisms involved in hypertension, including the role of the renin-angiotensin-aldosterone system, sympathetic nervous system, and vascular remodeling.

Keywords: arterial hypertension, cardiovascular system, antihypertensive therapy, diuretics, metabolic syndrome, prevention.

Introduction

Arterial hypertension (AH) is one of the most widespread diseases worldwide. According to the World Health Organization (WHO) data for 2021, approximately 1.3 billion people suffer from this condition. Each year, 9.4 million deaths are attributed to hypertension-related diseases.

In developed countries, arterial hypertension is observed in approximately 30-45% of the population. The risk of hypertension increases with age, and nearly 70-80% of individuals over 60 years old experience high blood pressure. Hypertension is one of the primary causes of stroke, ischemic heart disease, chronic kidney failure, and other severe complications.

Etiology and Pathogenesis

Several key factors contribute to the development of arterial hypertension:

- Genetic Factors – Hypertension is frequently observed within families, and hereditary predisposition plays a significant role in its development.



- Unhealthy Diet – Excessive salt consumption, high intake of fatty foods, fast food, and sugar significantly increase blood pressure.
- Obesity and Overweight – Individuals with a body mass index (BMI) above 30 are more prone to developing hypertension.
- Sedentary Lifestyle – Insufficient physical activity slows down circulation and increases blood pressure.
- Smoking and Alcohol Consumption – Nicotine and ethanol contribute to arterial constriction, leading to hypertension.
- Chronic Stress – Increased cortisol and adrenaline levels play a role in the progression of hypertension.
- Metabolic Syndrome – When hypertension coexists with diabetes and dyslipidemia, the risk of cardiovascular diseases rises sharply.

The renin-angiotensin-aldosterone system (RAAS) and the sympathetic nervous system play crucial roles in the development of hypertension. Reduced vascular elasticity, narrowing of arterial lumen, and excessive sodium retention in the body contribute to persistent high blood pressure.

Symptoms and Clinical Signs

A study observed 80 patients diagnosed with arterial hypertension. The symptoms were distributed as follows:

- Headache – 45%
- Chest pain – 30%
- Nausea and vomiting – 25%
- Dizziness – 35%
- Fatigue and weakness – 40%
- Nosebleeds – 15%
- Visual impairment – 20%

Some patients experienced asymptomatic hypertension, which was only diagnosed after severe cardiovascular complications developed.

Diagnosis

Arterial hypertension is diagnosed using the following methods:



- Blood Pressure Measurement – "White coat hypertension" is observed in 25-30% of patients; thus, 24-hour ambulatory blood pressure monitoring (ABPM) is recommended.
- Blood and Urine Tests – Creatinine and electrolyte levels are analyzed to assess kidney function.
- Electrocardiography (ECG) – Used to detect cardiac hypertrophy and rhythm disturbances.
- Echocardiography (ECHO) – Evaluates heart muscle thickening or dysfunction.
- Brain MRI or CT Scan – Detects stroke or cerebrovascular complications associated with hypertension.

Treatment Strategies

- Lifestyle Modifications
- Limiting salt intake to less than 5g per day
- Engaging in at least 30 minutes of physical activity daily
- Maintaining a healthy weight (BMI < 25)
- Reducing tobacco and alcohol consumption
- Implementing stress management techniques
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2. Pharmacological Therapy

Antihypertensive medications include:

- Diuretics – Hydrochlorothiazide, Chlorthalidone
- Beta-blockers – Metoprolol, Atenolol
- Angiotensin receptor blockers (ARBs) – Losartan, Telmisartan
- Calcium channel blockers – Amlodipine, Nifedipine
- ACE inhibitors – Enalapril, Lisinopril

Combination therapy is often more effective, and according to WHO recommendations, using two or more antihypertensive agents yields optimal results.

Research Objective

The primary objective of this research is to comprehensively examine the etiology, clinical progression, and current treatment strategies of arterial hypertension, with the goal of



enhancing understanding and management of this widespread cardiovascular condition. Specifically, the research aims to:

Investigate the genetic, environmental, and lifestyle factors contributing to the onset and development of arterial hypertension.

Analyze the pathophysiological mechanisms underlying hypertension, focusing on key systems such as the renin-angiotensin-aldosterone system, sympathetic nervous system, and vascular changes.

Assess the clinical course of hypertension, including its stages, complications, and the impact of uncontrolled hypertension on organ systems.

Research Tasks

1. Analysis of Risk Factors.
2. Examination of Pathophysiological Mechanisms/
3. Exploration of Non-Pharmacological Approaches.
4. Examine Population-Specific Treatment Strategies.

Review of Literature

Arterial hypertension has been widely studied, and various hypotheses have been proposed to explain its etiology. Genetics plays a significant role, with numerous studies identifying specific genes associated with blood pressure regulation. Additionally, lifestyle factors, including obesity, high salt intake, excessive alcohol consumption, and physical inactivity, have been linked to hypertension. Environmental factors such as stress, air pollution, and socioeconomic status also contribute to the development of AH.

Materials and methods

This study is a systematic review of the existing literature, incorporating findings from clinical trials, observational studies, and meta-analyses on arterial hypertension. Data were collected from peer-reviewed journals, medical textbooks, and guidelines from organizations such as the American College of Cardiology (ACC) and the World Health Organization (WHO). Key inclusion criteria for the literature review included studies published within the last two decades, with a focus on adult populations.

Results



The findings from the literature indicate a clear association between hypertension and increased risks of cardiovascular diseases, stroke, and chronic kidney disease. The genetic predisposition to hypertension is well-established, with family history being a significant risk factor. Furthermore, lifestyle factors, particularly poor diet (high in salt and low in potassium), sedentary behavior, and stress, were found to significantly contribute to the development of hypertension.

Pharmacological treatments were shown to be effective in reducing blood pressure and preventing complications when used appropriately. Among the various classes of antihypertensive drugs, ACE inhibitors and ARBs were found to be particularly effective in managing blood pressure while offering protective benefits for the kidneys and heart. Non-pharmacological interventions, such as dietary modifications and regular physical activity, were also demonstrated to lower blood pressure and improve long-term outcomes.

Discussion

The findings from the literature indicate a clear association between hypertension and increased risks of cardiovascular diseases, stroke, and chronic kidney disease. The genetic predisposition to hypertension is well-established, with family history being a significant risk factor. Furthermore, lifestyle factors, particularly poor diet (high in salt and low in potassium), sedentary behavior, and stress, were found to significantly contribute to the development of hypertension.

Conclusion

Arterial hypertension is a multifactorial disease that requires a multifaceted approach to management. Both pharmacological and non-pharmacological strategies play essential roles in controlling blood pressure and preventing complications. Early diagnosis and intervention, along with patient education and lifestyle modifications, are key to managing this condition effectively. As the global burden of hypertension continues to rise, it is imperative to implement comprehensive strategies that address the root causes and improve treatment adherence. Public health efforts should focus on increasing awareness and access to care to reduce the impact of this preventable disease.

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