EURASIAN JOURNAL OF ACADEMIC RESEARCH
Innovative Academy Research Support Center
IF = 7.899 www.in-academy.uz

"THE RELATIONSHIP BETWEEN DIABETES MELLITUS AND ARTERIAL HYPERTENSION: CLINICAL APPROACHES"

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https://doi.org/10.5281/zenodo.15797815

ARTICLE INFO

Received: 24th June 2025
Accepted: 29th June 2025
Online: 30th June 2025

KEYWORDS

Diabetes mellitus, arterial hypertension, cardiovascular diseases, pathophysiology, clinical approach.

ABSTRACT

This article thoroughly analyzes the complex interrelationship between diabetes mellitus (DM) and arterial hypertension (AH). Epidemiological data indicate that 60–80% of patients with diabetes also suffer from hypertension. The coexistence of these two chronic conditions significantly increases the risk of cardiovascular complications such as stroke, myocardial infarction, and chronic kidney disease by 1.5-2 times. The study specifically focuses on common pathophysiological mechanisms, including insulin resistance, endothelial dysfunction, activation of the renin-angiotensin-aldosterone system (RAAS), and the accumulation of advanced glycation end-products (AGEs). The article emphasizes the importance of early diagnosis and comprehensive management of DM and AH. Diagnostic criteria encompass regular blood pressure monitoring, glycemic control assessment (HbA1c), and renal function tests (serum creatinine levels, glomerular filtration rate [GFR], and microalbuminuria). Notably, hypertension affects over 70% of patients with diabetic nephropathy, further escalating the risk of cardiac and renal failure. Treatment strategies aim to normalize blood pressure and ensure glycemic control, involving both pharmacological interventions (RAAS inhibitors like ACE inhibitors and ARBs, thiazide diuretics, and calcium channel blockers) and lifestyle modifications (limiting sodium intake to

1. Introduction

Diabetes mellitus (DM) and arterial hypertension (AH) are among the most pressing health concerns in modern medicine, posing a serious threat to global public health. In recent years, the prevalence of both conditions has been increasing, and their coexistence significantly raises the risk of severe complications such as cardiovascular diseases, nephropathy, and retinopathy. According to global statistics, one in ten adults is diagnosed with diabetes, and among them, 60–80% also suffer from hypertension. This indicates a strong pathophysiological link between the two conditions. Impaired cellular glucose utilization, insulin resistance, and hyperinsulinemia play key roles in the development of hypertension. Conversely, AH also contributes to the progression of diabetic complications

through its effects on the kidneys, eyes, and nervous system. This article explores the complex interactions between diabetes mellitus and arterial hypertension, highlighting their combined clinical features, diagnostic strategies, treatment methods, and preventive approaches. The goal is to develop effective strategies aimed at improving the quality of life for affected patients and minimizing the risk of complications.

2. General Overview of the Relationship Between

Diabetes Mellitus and Arterial Hypertension Diabetes mellitus (DM) and arterial hypertension (AH) are interrelated chronic conditions that frequently co-exist. According to statistics, hypertension is found in 60–80% of patients with diabetes (American Diabetes Association, 2022). The coexistence of these diseases significantly increases the risk of cardiovascular complications such as stroke, myocardial infarction, and chronic kidney disease (Williams et al., 2018).

3. Pathophysiological Mechanisms

The development of DM and AH is closely linked through several mechanisms, most notably insulin resistance and endothelial dysfunction. Insulin resistance activates the sympathetic nervous system, resulting in elevated blood pressure. In addition, the activation of the renin-angiotensin-aldosterone system (RAAS) leads to increased vascular tone (Reaven, 1988). Advanced glycation end-products (AGEs) reduce vascular elasticity and contribute to the progression of hypertension (Tabit et al., 2010).

4. Clinical Manifestations and Diagnosis

Hypertension in diabetic patients often remains latent for a long time. Among individuals with diabetic nephropathy, the likelihood of developing hypertension exceeds 70%, significantly increasing the risks of both cardiac and renal complications (National Kidney Foundation, 2021). For diagnostic purposes, regular monitoring of blood pressure, glycemic control (e.g., HbA1c), and assessment of renal function (creatinine levels, glomerular filtration rate [GFR], and microalbuminuria) are essential.

5. Treatment and Prevention

When DM and AH coexist, treatment strategies should be comprehensive and individualized. The primary goal is to normalize blood pressure and maintain glycemic control to reduce the risk of cardiovascular and renal complications. RAAS inhibitors—such as angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARBs)—play a key role in lowering blood pressure and protecting kidney function. These agents also slow the progression of diabetic nephropathy and reduce the risk of heart failure (Jameson et al., Harrison's Principles of Internal Medicine, 2020, p. 1456). Thiazide diuretics are commonly used as adjunctive therapy due to their effectiveness in reducing blood pressure. Calcium channel blockers are also effective, and unlike some antihypertensive drugs, they do not negatively affect glucose metabolism (Harrison's, 2020, p. 1458). Lifestyle modifications are crucial: limiting daily salt intake to <5 grams, engaging in at least 150 minutes of physical activity per week, and reducing excess body weight all help in managing hypertension among diabetic patients (American Heart Association, 2017). Metformin remains a first-line therapy for glycemic control. New classes of antidiabetic medications, such as SGLT2 inhibitors and GLP-1 receptor agonists, are particularly beneficial in reducing cardiovascular risk and mortality in patients with both DM and AH (ADA Standards of Medical

Care in Diabetes, 2022, S60). Treatment regimens should be tailored to each patient's clinical profile, considering comorbidities and individual responses to pharmacotherapy.

6. "Review of Current Evidence on DM-AH Comorbidity"

According to the study results, 65-75% of patients with diabetes mellitus also had arterial hypertension (American Diabetes Association, 2022). This figure corresponds to previously reported data ranging from 60% to 80%. In patients with hypertension, the risk of cardiovascular diseases such as myocardial infarction and stroke was observed to increase by 1.5 to 2 times (Williams et al., 2018). Pathophysiologically, insulin resistance activates the renin-angiotensin aldosterone system, resulting in increased arterial tone and persistently elevated blood pressure (Reaven, 1988). Advanced glycation end-products (AGEs) cause endothelial dysfunction, leading to reduced elasticity of blood vessels (Tabit et al., 2010). Approximately 70% of patients develop hypertension alongside diabetic nephropathy, which increases the risk of renal failure and heart failure (National Kidney Foundation, 2021).

7. Discussion

Our review confirms a strong association between diabetes mellitus and arterial hypertension, consistent with previous scientific studies (American Diabetes Association, 2022; Williams et al., 2018). Insulin resistance and activation of the renin-angiotensin system have been identified as key mechanisms in the development of hypertension (Reaven, 1988). Endothelial dysfunction impairs the mechanical properties of blood vessels, exacerbating hypertension and increasing the risk of cardiovascular complications frequently observed in diabetes mellitus (Tabit et al., 2010). Blood pressure control is especially critical in patients with diabetic nephropathy, as hypertension accelerates the decline of renal function (National Kidney Foundation, 2021). Furthermore, the use of renin-angiotensin system blockers such as ACE inhibitors and angiotensin receptor blockers, along with lifestyle modifications (reduced salt intake, increased physical activity), have been shown to be effective preventive and therapeutic approaches for patients with diabetes and hypertension (Jameson et al., 2020).

8. Conclusion

Diabetes mellitus (DM) and arterial hypertension (AH) are closely interrelated chronic conditions that share common pathophysiological mechanisms, including insulin resistance, endothelial dysfunction, and activation of the renin-angiotensin-aldosterone system. Their coexistence significantly elevates the risk of severe cardiovascular complications such as stroke, myocardial infarction, and renal failure, often increasing this risk by 1.5 to 2 times. Notably, hypertension is prevalent in 60–80% of diabetic patients, and its incidence exceeds 70% in those with diabetic nephropathy, greatly increasing the risk of cardiac and renal complications. Effective management of these comorbidities requires a multidisciplinary and integrated clinical approach. This approach involves early detection through regular blood pressure monitoring, stringent blood pressure control (e.g., maintaining below 130/80 mmHg as per current guidelines), and individualized pharmacological strategies. Key pharmacological interventions include RAAS inhibitors (ACE inhibitors and ARBs) for both blood pressure reduction and renal protection, alongside thiazide diuretics and calcium channel blockers. Consistent monitoring of metabolic (e.g., HbA1c) and renal parameters (creatinine, GFR, microalbuminuria) is also crucial. Beyond pharmacotherapy, lifestyle interventions play a crucial role in mitigating the progression and complications of both

diseases. These include limiting sodium intake to less than 5 grams per day, engaging in at least 150 minutes of moderate physical activity weekly, and effective weight management. Educating patients about medication adherence and promoting healthy lifestyle choices remain cornerstones of effective disease management. Overall, an in-depth understanding of the pathophysiological connection between DM and AH, coupled with the implementation of evidence-based clinical strategies, is paramount to improving patient outcomes and preventing long-term complications associated with this pervasive comorbidity.

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