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THE IMPACT OF DIABETES AND OBESITY ON ARTERIAL HYPERTENSION

Mavlonov Namoz Xalimovich

Associate Professor, Department of Internal Medicine in Family Medicine, Bukhara State Medical Institute named after Abu Ali Ibn Sina, PhD

namoz_mavlonov@bsmi.uz

ORCID ID: 0000-0003-0348-9860

Abstract: Type 2 diabetes and obesity are among the most pressing global public health concerns today. Both conditions play a significant role in the development of arterial hypertension and significantly increase the risk of cardiovascular diseases. This article discusses the role of diabetes and obesity in the pathogenesis of hypertension, their interrelation, and modern therapeutic approaches.

Keywords: arterial hypertension, diabetes mellitus, obesity, insulin resistance, cardiovascular risk

Introduction

Arterial hypertension (AH) is one of the main risk factors for cardiovascular diseases, and its development is influenced by numerous metabolic factors. Among these, diabetes mellitus and obesity are considered the most crucial. According to statistics, 60–80% of patients with type 2 diabetes also suffer from hypertension. Likewise, individuals with excessive body weight are 2–3 times more likely to develop hypertension compared to those with normal weight.

Recent Research and New Approaches

1. Gut Microbiota and Hypertension Connection

Recent studies have shown that **imbalances in the gut microbiota (dysbiosis)** play a significant role in the development of hypertension. In patients with diabetes and obesity, alterations in the gut flora lead to increased inflammatory processes, which directly affect vascular tone and blood pressure regulation.

2. A New Perspective on Visceral Fat Tissue

In recent years, **visceral fat tissue** has been redefined not just as a passive fat storage site, but as an **active endocrine organ**. This tissue secretes hormones and mediators such as **leptin**, **resistin**, **TNF-α**, and **IL-6**, which negatively impact the cardiovascular system. Particularly, **leptin resistance** plays a key role in the pathogenesis of chronic hypertension in obese individuals.

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3. **SGLT-2 Inhibitors – A New Era in Treatment**

Sodium-glucose co-transporter 2 (SGLT-2) inhibitors, such as **dapagliflozin**, used in the treatment of diabetes, not only lower blood glucose levels but also **reduce blood pressure** by promoting diuresis and helping prevent heart failure. These drugs provide **dual benefits** in managing both diabetes and hypertension.

Relationship Between Diabetes and Arterial Hypertension

Type 2 diabetes significantly contributes to the development of arterial hypertension through the following mechanisms:

Insulin resistance: This condition disrupts endothelial function, reducing the production of nitric oxide (NO), a vasodilator. Consequently, blood vessels fail to dilate properly, leading to increased vascular tone and elevated blood pressure.

Hyperinsulinemia: Excess insulin in the blood enhances renal sodium reabsorption, leading to fluid retention and increased blood volume, which in turn elevates blood pressure.

Advanced glycation end products (AGEs): These molecules damage the vascular walls, promoting atherosclerosis and hypertension.

The Impact of Obesity on Arterial Hypertension

Obesity, especially central (abdominal) obesity, has a direct impact on blood pressure regulation:

Imbalance in adipokines: Increased leptin and decreased adiponectin levels influence vascular tone. Leptin activates the sympathetic nervous system, leading to tachycardia and vasoconstriction.

Proinflammatory markers: In obesity, the levels of cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) are elevated, which enhances vascular inflammation and contributes to persistent hypertension.

Increased blood volume: Excess body weight places additional workload on the heart, increasing cardiac output and blood pressure.

Pathogenetic Scheme

Pathogenetic factor	**Mechanism of action**
Insulin resistance	Endothelial dysfunction → vasoconstriction → hypertension
Leptin excess	Activation of sympathetic nervous system → increased heart rate and vasoconstriction
Adiponectin deficiency	Loss of vascular protective effects
Renal sodium	Increased blood volume → elevated blood pressure

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Pathogenetic factor Mechanism of action
retention

Prevention and Treatment Approaches

A. Lifestyle modifications:

Weight reduction (target BMI <25 kg/m²)

Low-salt, balanced diet

Regular physical activity (at least 150 minutes/week of aerobic exercise)

B. Pharmacotherapy:

Antihypertensive therapy: ACE inhibitors, ARBs, diuretics

Diabetes management: Metformin, SGLT-2 inhibitors, GLP-1 receptor agonists

Lipid control: Statins

Anti-obesity therapy: Orlistat, GLP-1 receptor agonists (if BMI >30)

Conclusion

Diabetes mellitus and obesity are major contributors to the development and progression of arterial hypertension. Their interconnected pathogenic mechanisms exacerbate hypertension and increase the risk of cardiovascular complications. Early diagnosis, comprehensive treatment, and promoting a healthy lifestyle are key strategies in preventing and managing these conditions.

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