



**THE RELATIONSHIP BETWEEN DIABETES MELLITUS AND ISCHEMIC HEART DISEASE**

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**Annotation:** This article analyzes the relationship between diabetes mellitus (DM) and ischemic heart disease (IHD) from clinical, epidemiological, and pathophysiological perspectives. The study results show that patients with diabetes have a 2–4 times higher risk of developing cardiovascular complications, particularly ischemic heart disease. Dyslipidemia, hyperglycemia, insulin resistance, endothelial dysfunction, and oxidative stress are the main pathogenetic mechanisms of this process.

**Keywords:** diabetes mellitus, ischemic heart disease, atherosclerosis, insulin resistance, hyperglycemia, dyslipidemia.

**Introduction**

Diabetes mellitus has become a global public health problem in the 21st century. According to WHO data, more than 530 million people worldwide were living with diabetes in 2024. In the Republic of Uzbekistan, more than 400,000 patients are officially registered, but the actual number is estimated to be twice as high.

Ischemic heart disease is the most common cause of death worldwide. The risk of developing IHD is significantly higher in patients with diabetes, which is the result of complex interactions between metabolic and vascular systems.

**Epidemiology**

Recent studies indicate that the risk of developing ischemic heart disease is 2–4 times higher in patients with diabetes mellitus. According to the World Health Organization (WHO), IHD is the

<b>Count</b>	<b>Percentage of people with diabetes (%)</b>	<b>Percentage of people with ischemic heart disease (%)</b>
Uzbekistan	9.8	6.5
USA	10.5	8.2
India	11.3	9.0
Russia	8.9	7.1

leading cause of death among patients with diabetes.



## **Main Part**

### **1. Pathophysiological mechanisms**

#### **1.1. Insulin resistance and endothelial dysfunction.**

As a result of insulin resistance, the production of nitric oxide (NO) in the vascular wall decreases, leading to vasoconstriction, increased blood pressure, and reduced blood flow. Consequently, the heart muscle receives insufficient blood supply, and ischemic changes begin to develop.

#### **1.2. Oxidative stress and glycation end products.**

Under hyperglycemic conditions, Advanced Glycation End Products (AGEs) are formed, which reduce the elasticity of the vascular wall. They also enhance the oxidation of LDL cholesterol and accelerate the development of atherosclerosis.

#### **1.3. Dyslipidemia and inflammation.**

In diabetes, HDL decreases while LDL and triglycerides increase. At the same time, inflammatory markers such as C-reactive protein (CRP), IL-6, and TNF- $\alpha$  rise — leading to damage of the coronary arteries.

## **2. Materials and Methods**

In 2023–2024, 300 patients were examined at the Department of Cardiology, Kokand University Andijan Branch.

150 patients had type 2 diabetes; 150 patients were selected as a healthy control group.

The following parameters were measured in all participants: blood glucose level, HbA1c, lipid profile, ECG results, blood pressure, and BMI (body mass index).

## **3. Research Results**

**Analysis:** In the diabetic group, abnormalities in lipid levels, elevated glucose, and high blood pressure were detected. These factors form a strong basis for the development of ischemic heart disease.



### 3.1 Incidence of ischemic heart symptoms

	Type of cardiac pathology	Patients with diabetes%	Control group (%)
1	Angina pectoris	58	27
2	Myocardial infarction	34	12
3	Heart failure	41	18
4	Arrhythmia	29	14
5	Silent ischemia (detected by ECG)	19	3

#### Conclusion:

The symptoms of ischemic heart disease occur 2–3 times more frequently in patients with diabetes. “Silent ischemia” is especially common.

#### 4. Clinical Case (Case Samples)

Patient: **62-year-old woman with diabetes, obesity, and heart failure.**

Complaints: **leg swelling, palpitations, chest pain.**

Laboratory findings: **HbA1c – 9.5%, Triglycerides – 2.7 mmol/L, HDL – 0.8 mmol/L.**

ECG: **low-amplitude T waves, prolonged QT interval.**

Treatment: **GLP-1 agonist (liraglutide) + statin + diuretics.**

Outcome: **After 4 months, clinical improvement in heart failure symptoms was observed.**

#### 5. Discussion

Studies show that ischemic heart disease develops at an earlier age in patients with diabetes. More than 60% of diabetic patients die from cardiovascular complications. Improving glycemic control (HbA1c < 7%) reduces the risk of IHD by 30–35%.

Diabetes-related “silent ischemia” is dangerous because the patient does not feel pain, leading to delayed diagnosis.



Direction	Recommendations	Implementation Methods
Glycemic control	HbA1c < 7%	Metformin, SGLT2 inhibitors, GLP-1 agonists
Normalization of lipid levels	LDL < 2.6 mmol/L	Statins, fibrates
Maintaining normal blood pressure	<130/80 mmHg	ACE inhibitors, ARBs
Healthy lifestyle	Balanced diet, physical activity	150 minutes/week of exercise
Reducing stress and smoking	Cognitive psychological support	therapy, Regular follow-up care

**6. Prevention and Modern Treatment Approaches**

Glycemic control – HbA1c < 7% – Metformin, SGLT2 inhibitors, GLP-1 agonists

Normalization of lipid levels – LDL < 2.6 mmol/L – Statins, fibrates

Maintaining normal blood pressure – <130/80 mmHg – ACE inhibitors, ARBs

Promoting a healthy lifestyle – Balanced diet, physical activity – 150 minutes of exercise per week

Reducing stress and smoking – Cognitive therapy, psychological support – Under regular medical supervision

**Conclusion:**

1. Diabetes mellitus is a major risk factor for ischemic heart disease.
2. Dysregulation of lipid metabolism, blood pressure, and glycemia in diabetic patients accelerates the development of IHD.
3. Controlling diabetes and normalizing the lipid profile can reduce the risk of IHD by up to 40%.
4. Regular ECG and stress tests are required for early detection of “silent ischemia.”
5. SGLT2 inhibitors and GLP-1 agonists are considered promising cardioprotective medications.



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