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ADVANCES IN EARLY DIAGNOSTIC TECHNIQUES AND TREATMENT PLANNING FOR ACUTE CORONARY SYNDROME

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Annotation. Acute coronary syndrome (ACS) with or without ST-elevation is a diagnosis established at the stage of initial contact with the patient based on the clinical picture, electrocardiogram (ECG) data and the level of markers of myocardial necrosis. and is usually accompanied by complete thrombotic occlusion of the coronary artery requiring emergency care, including thrombolytic therapy. ACS without ST elevation may be accompanied by unstable angina and also requires observation and treatment, especially in patients with atypical symptoms characteristic of the elderly, women, and those with chronic diseases.

Key words: Acute coronary syndrome, myocardial necrosis, unstable angina, thrombolytic therapy, thrombotic occlusion, angina attack, atypical symptoms.

Introduction

Acute coronary syndrome (ACS) is one of the most pressing issues in modern cardiology, as it is a leading cause of cardiovascular morbidity and mortality. ACS presents in various clinical forms, which complicates its diagnosis and treatment. In clinical practice, accurate identification of ACS—particularly distinguishing between ST-segment elevation (STEMI) and non-ST-segment elevation (NSTEMI)—is crucial for preventing severe complications. Diagnostic and treatment methods for ACS are constantly evolving, given the highly individualized nature of each patient's condition. Therefore, comprehensive medical evaluation—including electrocardiography (ECG), blood tests, and other diagnostic procedures—is essential for accurately determining the type of ACS. This, in turn, ensures the delivery of the most effective treatment.It is well established that ST-elevation ACS (STEMI) and non-ST-elevation ACS (NSTEMI) have different clinical presentations and outcomes. Consequently, the diagnostic and therapeutic approaches must be tailored to the specific features of each patient's condition. The aim of this analysis is to review the various forms of ACS and the key considerations necessary for their management.

Objective of the Study:
To conduct early diagnosis of ST-segment elevation acute coronary syndrome (STEMI) in order to restore coronary blood flow and reduce the risk of death.

Materials and Methods:

Clinical, laboratory, and instrumental studies were conducted on patients with acute coronary syndrome at the Bukhara branch of the Republican Scientific Center for

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Emergency Medical Care. The study included patients who sought emergency medical assistance or were admitted for hospitalization.

To prevent complications of acute myocardial infarction (AMI) and sudden coronary death, patients with clinical signs of AMI in the pre-hospital stage received thrombolytic therapy during the first hours after diagnosis confirmation of ST-segment elevation ACS (based on ECG data within 3–6 hours). This intervention aimed to restore coronary artery function by resolving thrombotic obstruction.

Using the above methods, clinical indicators and treatment effectiveness rates were compared between two groups of 60 patients each in Bukhara region:

- One group received pre-hospital treatment (via reomobile or shock room);
- The other group was treated in intensive care and cardio-therapeutic resuscitation units of an emergency hospital.

Study Results

Patients with suspected acute coronary syndrome were immediately hospitalized in the intensive care unit by specialized cardiology emergency teams.

Table 1

NUMBER OF PATIENTS WITH ACUTE CORONARY SYNDROME HOSPITALIZED AT THE BUKHARA BRANCH OF THE REPUBLICAN SCIENTIFIC CENTER FOR EMERGENCY MEDICAL CARE

- **Control group (n=20)**
  Self-admitted, by personal visit – 25%
  Admitted by emergency medical service (EMS) physicians – 75%
- **Main group (n=60)**
  Self-admitted, by personal visit – 25%
  Admitted by emergency medical service (EMS) physicians – 75%

Legend:
Self-admitted (by personal request)
By EMS physicians

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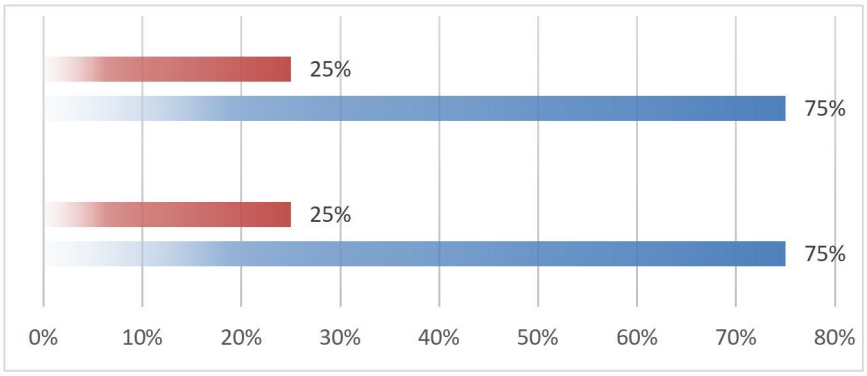

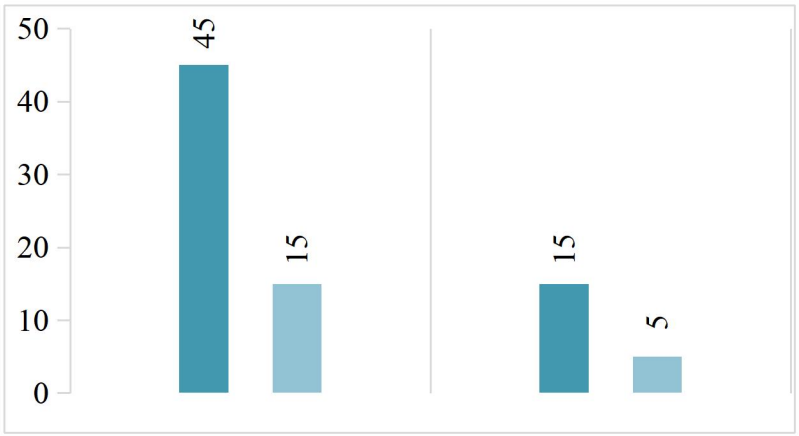

Group	By EMS Physicians	Self-Admitted
Main Group (n=60)	45 patients	15 patients
Control Group (n=20)	15 patients	5 patients

Legend:

- *By EMS physicians*
- *Self-admitted (upon personal request)*

Sixty patients were admitted with a diagnosis of acute coronary syndrome (ACS) by intensive care emergency teams to the shock unit of the Bukhara branch of the Republican Scientific Center for Emergency Medical Care (RSCEMC). Additionally, 20 patients were hospitalized on a self-admission basis after undergoing electrocardiography (ECG) and interpretation of the results.

Emergency measures were focused on relieving pain syndrome, reducing myocardial workload and oxygen demand, limiting the extent of necrosis in cases of myocardial infarction, and treating as well as preventing complications such as cardiogenic shock and life-threatening arrhythmias.

Group	Self-Admitted	Admitted by EMS Physicians
Main group	~15 patients	~45 patients

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Group	Self-Admitted	Admitted by EMS Physicians
Control group	~5 patients	~15 patients

Legend:

Self-admitted

By emergency medical service (EMS) physicians

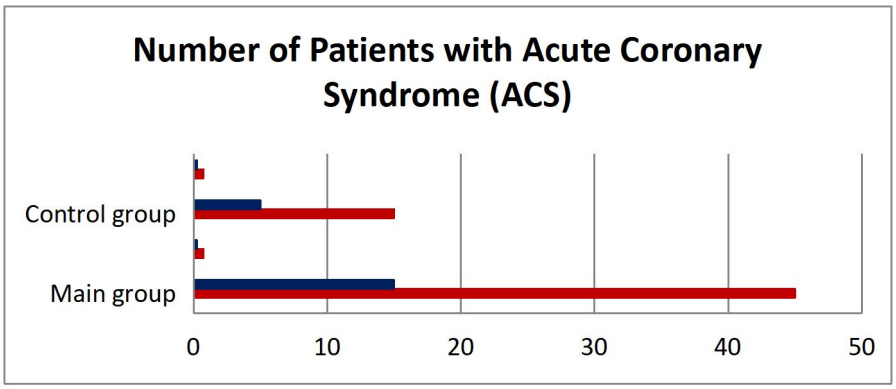

Fig. 1. Number of patients with acute coronary syndrome hospitalized at the Bukhara Branch of the Republican Scientific Center for Emergency Medical Care.

Table 2

Patient Visits by Nature of Chest Pain

Translated Table Of Pain Characteristics

	Pain Indicator	Main Group (n=60)	Control Group (n=20)
1	Pain Location: - Epigastric region - Shoulder - Under scapula - Chest	55 (92%)	17 (85%)
2	Pain Character	60 (100%)	20 (100%)
3	Pain Cause	50 (84%)	15 (75%)
4	Pain Onset Time	60 (100%)	14 (70%)

Based on Table 2 and Figure 2, the patients' reasons for seeking medical attention—specifically pain location, character, cause, and time of onset—indicate the urgency and

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necessity of providing emergency care, including pre-hospital first aid. According to survey data, 100% of respondents accurately described the **character of the pain** and the **time of its onset**.

In terms of **pain location**, 55 patients (92%) reported radiating pain in the **chest area**, **under the scapula**, and **shoulder**, consistent with classic symptoms of acute coronary syndrome. A small proportion of elderly patients—5 individuals (8%)—localized pain in the **epigastric region**, which they associated with gastrointestinal discomfort or eating. The **causes of pain** varied and included stress, physical exertion, general malaise, and heavy lifting—reported by 50 patients (84%).These findings highlight the critical importance of accurate pain assessment during the early, pre-hospital phase in guiding timely emergency intervention.

Figure 3. Distribution of Chest Pain Characteristics Among Patients with ACS (Main vs. Control Group)

Pain Parameter	Main Group (%)	Control Group (%)
Epigastric Pain	8%	15%
Pain Character	100%	100%
Pain Cause	84%	75%
Pain Onset Time	100%	70%

Legend:

- *Main group*
- *Control group*

Interpretation:
As shown in Fig. 3, both groups demonstrated full awareness (100%) of pain character and onset time, which is crucial for early diagnosis and pre-hospital emergency care. However, epigastric pain was more frequently misattributed by elderly patients in the control group. The main group showed slightly higher recognition of pain causes (84%) compared to the control group (75%).

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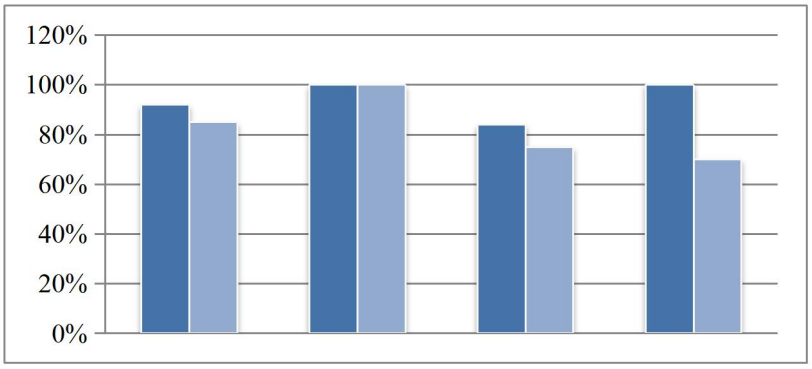
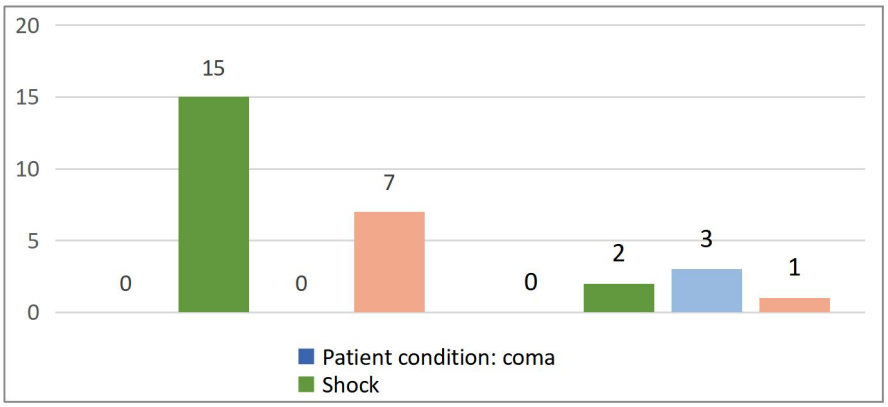
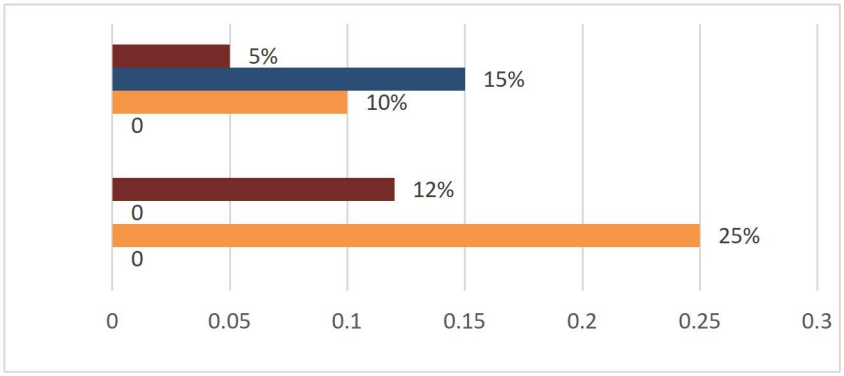


Table 3. Additional Complaints in Patients with Chest Pain
Fig. 2. Reasons for Seeking Medical Attention in Patients with Chest Pain





Previous myocardial infarction

Pain reduced after nitroglycerin use

Shock

- *Patient condition: coma*

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According to Table 3 and patient questionnaires, **15 patients (25%)** in the main group were in a state of **shock**, compared to **2 patients (10%)** in the control group. The use of **nitroglycerin** did **not relieve chest pain** in patients from the main group, which supports the accuracy of the initial diagnosis. In contrast, **3 patients (15%)** in the control group experienced pain relief after nitroglycerin administration. A **history of myocardial infarction** was identified based on interviews with relatives: **7 patients (12%)** in the main group and **1 patient (5%)** in the control group had previously experienced a myocardial infarction.

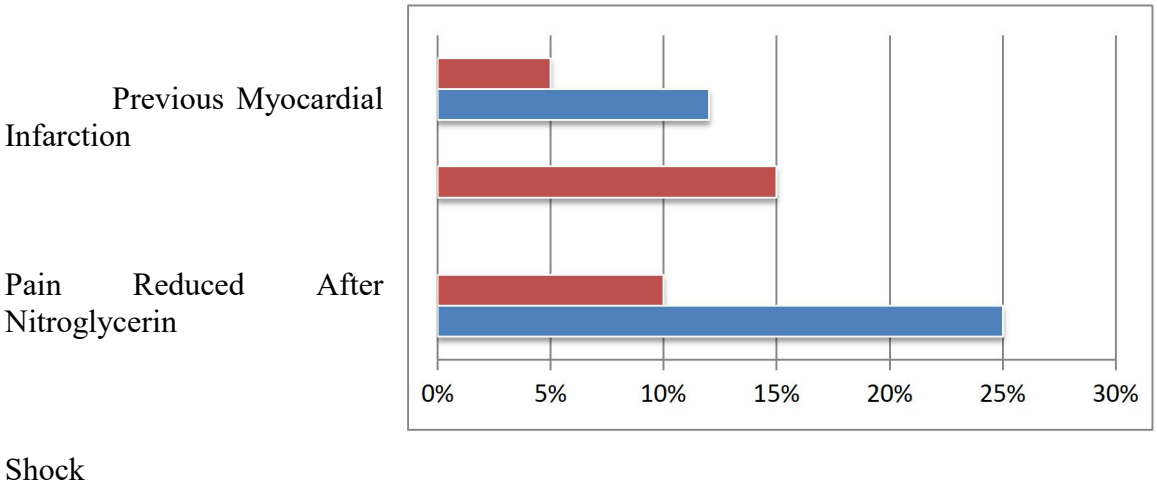

Figure 4. Clinical Status Indicators in ACS Patients (Main vs. Control Group)

Indicator	**Main Group (%)**	**Control Group (%)**
Shock	25%	10%
Pain Reduced with Nitroglycerin	0%	15%
Previous Myocardial Infarction	12%	5%

Legend:

- *Main Group*
- *Control Group*

Figure 3. Additional Complaints in Patients with Chest Pain

Table 4. Heredity and Harmful Habits

No.		Main group		Control group	
		n=60	%	n=20	%

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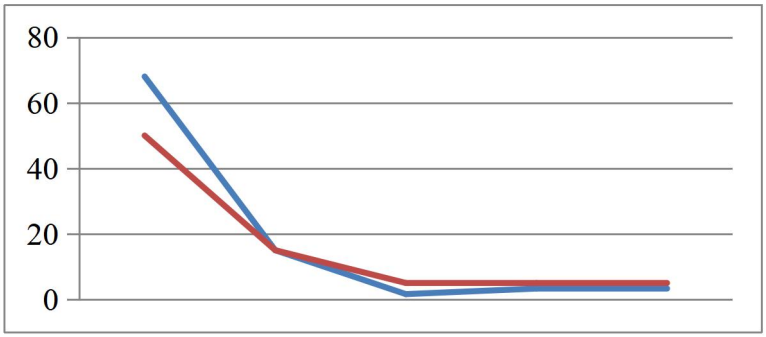
1	Hereditary diseases: Arterial hypertension Diabetes mellitus	0 41 9	0 68 15	0 10 3	0 50 15
2	Bad habits: smoking, alcoholic drinks	0 21 22	 35 37	0 9 13	 45 65
3	Chronic diseases: Fatty hepatosis Chronic cholecystitis Chronic gastritis Hypertension Diabetes mellitus	0 0 1 2 5 41 9	 0 1.6 3.3 8.3 68 15	0 1 1 1 10 3	 5 5 5 50 15

According to Table 4, hereditary factors played a significant role in 41 patients (68%), primarily those suffering from hypertension. Additionally, 9 patients (15%) had diabetes mellitus, while other comorbidities such as fatty liver disease (1.6%), chronic hepatitis (3.3%), and chronic gastritis (8.3%) further worsened the overall condition of the patients. Harmful habits were also found to be important contributing factors: 21 patients (35%) were smokers, and 22 patients (37%) reported alcohol consumption.



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Condition	Main Group	Control Group
Hypertension	68%	50%
Diabetes Mellitus	15%	~12%
Fatty Liver Disease	1.6%	~1%
Chronic Cholecystitis	~3%	~3%
Chronic Gastritis	8.3%	~7%

Legend:

Main Group

Control Group

Figure 4. Heredity and Harmful Habits

Table 5. The Influence of BMI and Nutrition in Patients with Acute Coronary Syndrome (ACS)

No.		Main group		Control group	
		n=60	%	n=20	%
1.	BMI: normal	13	22	2	10
	Overweight	35	58	17	85
	Obesity 1-2 degrees	12	20	1	5
2.	Nutrition: fatty	37	62	15	75
	Not greasy	23	38	5	25
3.	Gender: male	36	60	15	75
	women	24	40	5	25
4.	Age: 40-59 years	33	55	13	65
	60-79 years old	27	45	7	35

Analysis Based on Table and Figure 5

The data presented in Table and Figure 5 clearly indicate that 35 patients (58%) had excess body weight, and 12 patients (20%) were diagnosed with Grade I–II obesity, while only 13 patients (22%) had a normal body mass index (BMI). Dietary habits revealed that a majority of respondents—37 patients (62%)—regularly consumed fatty foods, while only 24 patients (38%) reported a lower preference for such dishes. This dietary factor is considered

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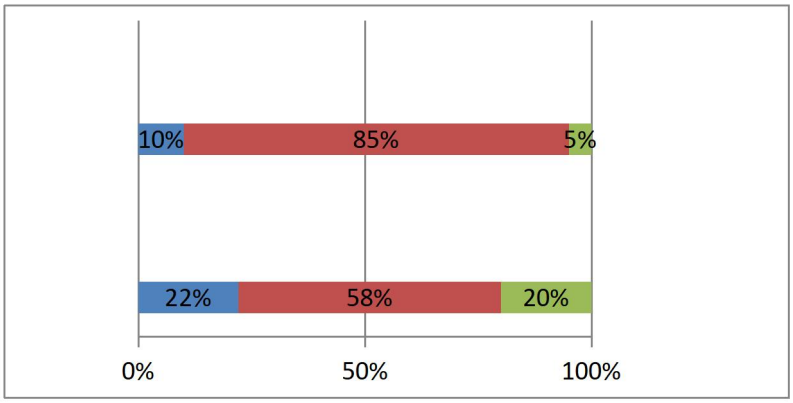
significant in the development of acute coronary syndrome (ACS). In terms of gender distribution, the pathology was more prevalent among men (36 patients, 60%) than women (24 patients, 40%).According to the age classification of the World Health Organization (WHO), the condition was more common among the young (18–44 years) and middle-aged (45–59 years) population. Specifically, 33 patients (55%) were in the 40–59 age range, compared **to** 27 patients (45%) aged 60–79 (elderly and senile age categories).

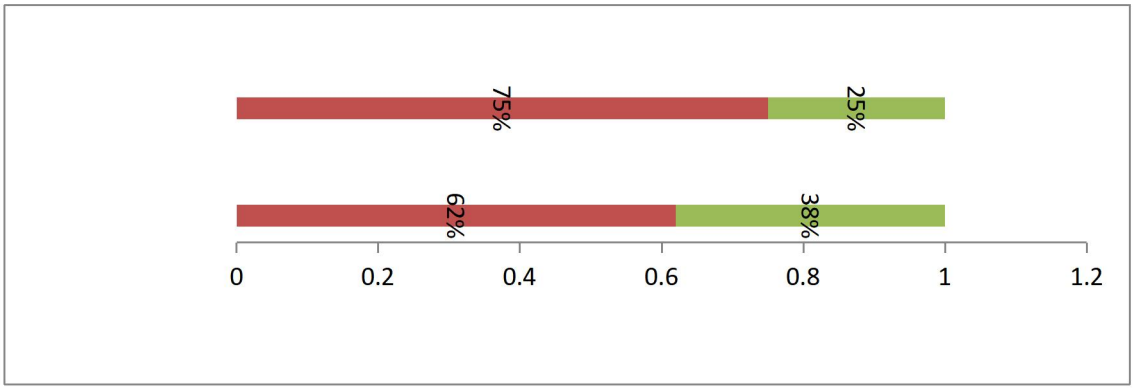
- *Normal*
- *Overweight*
- *Obesity Grade I–II*



- **Main Group** 22% 58% 20%

  Control Group 10% 85% 5%

Figure 5a. Impact of Body Mass Index (BMI)



Group Fatty Foods (%) Non-Fatty Foods (%)

Main Group 62% 38%

Control Group 75% 25%

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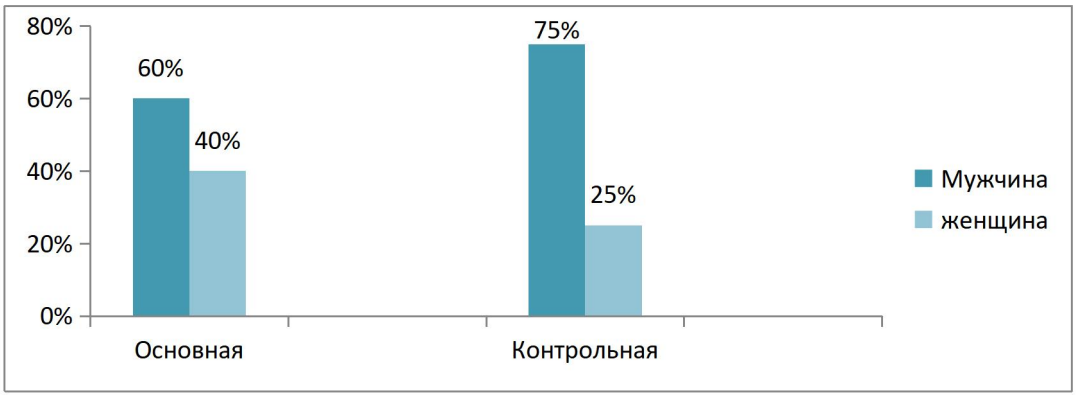
- *Fatty*
- *Non-fatty*
- *Diet*

Figure 5b. Nutrition in Patients with Acute Coronary Syndrome (ACS)

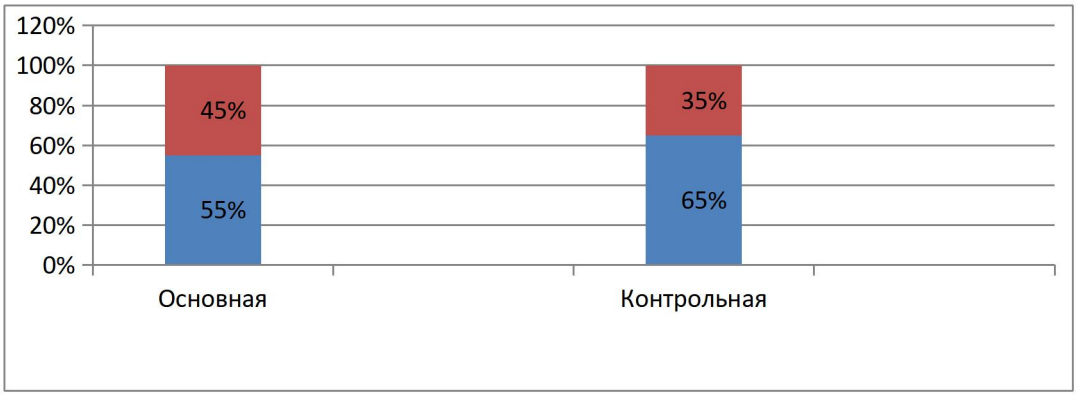


Group	Men (%)	Women (%)
Main Group	60%	40%
Control Group	75%	25%

Legend:

- *Men*
- *Women*

Figure 5c. Gender Distribution in Patients with Acute Coronary Syndrome (ACS)



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Legend:

- *Ages 40–59*
- *Ages 60–79*

Figure 5g. Age Distribution of Patients with Acute Coronary Syndrome (ACS)

For the early diagnosis of ST-segment elevation acute coronary syndrome (STEMI), urgent interventions are required to relieve chest pain, reduce myocardial workload and oxygen demand, limit the size of necrosis in the case of myocardial infarction, and to manage and prevent complications such as shock and life-threatening arrhythmias**.** Shock was observed in 15 patients (25%) in the main group and in 2 patients (10%) in the control group. No patients in the main group reported pain relief after nitroglycerin administration**,** which confirms the accuracy of STEMI diagnosis in this group, while 3 patients (15%) in the control group did report pain relief.A history of myocardial infarction was confirmed through interviews with relatives in 7 patients (12%) in the main group and 1 patient (5%) in the control group.Hereditary factors played a key role, with 41 patients (68%) having a family history of hypertension**,** 9 patients (15%) with diabetes mellitus**,** and other comorbidities including fatty liver disease (1.6%), chronic hepatitis (3.3%), and chronic gastritis (8.3%), which contributed to worsening clinical conditions.Harmful habits such as smoking (21 patients, 35%) and alcohol consumption (22 patients, 37%) were also identified as important contributing factors.

According to the analysis, 35 patients (58%) were overweight, and 12 patients (20%) had Grade I–II obesity. Only 13 patients (22%) had a normal body mass index (BMI).

As expected, the majority of patients (37 individuals, 62%) reported regularly consuming fatty foods, while only 24 patients (38%) had a lower preference for high-fat meals, which is a notable contributing factor to the development of acute coronary syndrome (ACS). The condition was more prevalent among men (36 patients, 60%) than women (24 patients, 40%).Based on the World Health Organization (WHO) age classification, the disease affected primarily the young (18–44 years) and middle-aged (45–59 years) population. Specifically, 33 patients (55%) were in the 40–59 age group, compared to 27 patients (45%) aged 60–79 (elderly and senile age categories).

Conclusion

Early diagnosis of ST-segment elevation acute coronary syndrome (STEMI) reveals that the aforementioned factors play a significant role in predisposing individuals to this pathology.

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