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Identification and assessment of risk factors role in myocardial infarction development

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**Abstract**

**Introduction:** The high level of morbidity and mortality from cardiovascular disease is largely due to insufficient influence on the main risk factors that contribute to the development of myocardial infarction. Therefore, a detailed study and assessment of risk factors is among the most important problems of medical and social importance.

**The aim:** To study and evaluate the impact of biological, social and hygienic, social and economic, psychological, natural and climatic risk factors on the development of myocardial infarction.

**Materials and methods:** A sociological survey was conducted in 500 people aged 34 to 85. They were divided into two groups. The main group consisted of 310 patients with myocardial infarction. The control group consisted of 190 practically healthy people, identical by age, gender and other parameters, without diseases of the cardiovascular system.

**Results**: It was defined that 30 factors have a significant impact on the development of myocardial infarction. Data analysis revealed that the leading risk factors for myocardial infarction were biological and socio-hygienic. The main biological factors were: hypertension and hypercholesterolemia. The man socio-hygienic factor was smoking.

**Conclusions**: Identification of risk factors provides new opportunities for the development of more effective approaches for the prevention and treatment of myocardial infarction.

**Key words:** myocardial infarction, risk factors.

**Introduction**

Diseases of the cardiovascular system, in particular myocardial infarction, rank high among the causes of morbidity, disability and adult mortality throughout the world. As follows from 2016 data, 15.2 million out of 56.9 million of deaths worldwide were attributed to ischemic heart disease and stroke [1]. According to the American Association of Cardiologists, by 2030 the death rate from cardiovascular system diseases will reach 23.6 million people [2]. A high morbidity and mortality rate is largely due to insufficient influence on the main risk factors that contribute to myocardial infarction development, namely: hypertension, hypercholesterolemia, smoking, unhealthy diet, stress, physical inactivity, heredity, alcohol consumption, obesity [3, 4, 5, 6]. A detailed study and assessment of risk factors for myocardial infarction development is among the most important issues of medical and social importance.

**The aim**

The purpose of the survey was to study and assess the impact of biological, socio-hygienic, socioeconomic, psychological and climatic factors on myocardial infarction development.

**Materials and methods**

A survey of patients with myocardial infarction was performed in order to conduct a sociological study. The study included 500 people, aged 34 to 85 years. The main group included 310 patients with myocardial infarction (195 (63±2.7%) men and 115 (37±2.7%) women), whose average age was 58.7±0.5 years and who were treated in cardiology department for patients with myocardial infarction of Kharkiv municipal hospital No. 28 and Clinical health resort “Roshcha”. The control group consisted of 190 practically healthy individuals (110 (58±3.6%) men and 80 (42±3.6%) women), whose average age was 59.6±0.9 years, identical in age, sex, and other indicators, having no cardiovascular disease in past medical history. A copy of control cards data from the of the follow-up clinic (form No. 30/y) and inpatient medical records (form No. 003/y) was also performed in order to clarify the information in the course of the study. The main risk factors of myocardial infarction were studied with the help of variance analysis. Statistical processing of the data was performed using the programs Statistica 9.0 and Microsoft Office Excel. The following indicators were calculated: the strength of factors impact (η-%), odds ratio (OR), level of significance (p).

**Results and discussion**

The study found that 30 factors have a significant impact on myocardial infarction development. All factors were divided into 5 groups: biological, socioeconomic, socio-hygienic, psychological, and natural and climatic. Data analysis showed that biological factors had the greatest influence on myocardial infarction occurrence. Thus, the frequency of hypertension occurrence in the main group of 51.6±2.8% was significantly higher than in the control group of 18.4±2.8% (OR = 4.8; p <0.001; η-11%). The presence of hypercholesterolemia was detected in 45.2±2.8% of the main group patients and 15.8±2.6% of the control group (OR = 4.5; p <0.001; η 9%). Heredity remarkable for cardiovascular diseases was observed in 32.3±2.7% of the main group patients and in 10.5±2.3% of the control group (OR = 4.1, p <0.001; η-6%). It should be noted that the occurrence frequency of chronic diseases in the main group was significantly higher than in the control group, respectively – 32.3±2.7% and 15.8±2.7% (OR = 2.5; p < 0.001; η-3%). Using anthropometric data, the body mass index was calculated and it was found that 25.8±2.5% of the main group patients were overweight, while only 10.5±2.3% of the control group had this risk factor (OR = 2.9; p <0.001; η-3%). High blood glucose was remarkable in 22.6±2.4% of the main group patients and in 10.5±2.3% of the control group (OR = 2.3; p <0.001; η-2%). The results are shown in the Table I.

Based on the study, it was determined that all socio-hygienic factors had a significant effect on myocardial infarction development. The study examined such factors as: smoking, excessive consumption of fatty foods, alcohol abuse, failure to comply with dietary pattern, physical inactivity, excessive consumption of food, coffee, fast foods, ready-to-cook foods, and the presence of occupational hazards in past medical history. Smoking is known to be one of the significant risk factors for myocardial infarction worldwide. In our study, it was revealed that smoking had the greatest influence on this pathology development among the socio-hygienic factors. Smoking was significantly more common in the main group 35.5±2.7%, than in the control group 10.4±2.3% (OR = 4.7; p <0.001; η-7%). Diet nature was also of great importance. Excessive consumption of fatty foods was observed in 26.5±2.5% of the main group patients and in 8.4±1.9% of the control group (OR = 3.9; p <0.01; η-5%). When assessing the dietary pattern, it was found that 33.9±2.7% of the main group patients and 17.9±2.8% of the control group did not comply with the diet (OR = 2.4; p <0.01; η-3 %); excessive food consumption was observed in 21.9±2.4% of the main group patients and in 11.1±2.3% of the control group (OR = 2.3; p <0.001; η-2%). A certain effect of excessive alcohol consumption on myocardial infarction development has also been proven. In our study, it was revealed that among the patients of the main group and the control group, excessive alcohol consumption was 32.3±2.6% and 13.2±2.4%, respectively (OR = 2.9; p <0.001; η- 4%). Factors such as fast foods and ready-to-cook foods consumption also had a definite influence on myocardial infarction development. We found that 10.6±1.8% of the main group patients and 3.2±1.2% of the control group often consumed fast foods (OR = 3.7; p <0.001; η -1%) and 16.5±2.1% of the main group patients and 7.9±1.9% of the control group patients consumed ready-to-cook foods (OR = 2.3; p <0.05; η-1%). According to the World Health Organization, physical activity of 60% of the world population does not reach the level necessary to maintain and preserve health, causing 1.9 million deaths in the world every year. Thus, physical inactivity is one of the causes of death and is considered as one of the risk factors for the cardiovascular pathology development, in particular myocardial infarction [7, 8]. Therefore, the study found that the frequency of physical inactivity occurrence in patients of the main and control groups was 29.0±2.6% and 14.7±2.6%, respectively (OR = 2.4; p <0.001; η - 3%). It is believed that coffee, whose active substance is caffeine, is one of the products affecting cardiovascular disease development, in particular myocardial infarction. Under the influence of caffeine, myocardial contractions are enhanced, and the heart rate increases. In our study, it was found that 15.2±2.0% of the main group patients and 6.8±1.9% of the control group regularly consumed coffee (OR = 2.4; p <0.01; η-1%). Various scientific researchers have also studied the role of occupational hazards and their relationship with myocardial infarction development. When assessing the impact of occupational hazards on this pathology development, we found that 9.4±1.6% of the main group patients and 2.6±1.2% of the control group were exposed to occupational hazards (OR = 3.8; p < 0.05; η -1%). The results are shown in the Table II.

The study found that socioeconomic as well as psychological factors also had a significant impact on myocardial infarction development. We attributed the following to the group of psychological factors: the type of personality temperament and the presence of stress at work and at home. Socioeconomic factors included: marital status, education level, professional status, financial security level. It should be noted that such factors as stressful situations at work and stress in the family were of the greatest influence among all the factors of these groups. It was established that 26.5±2.5% of the main group patients and 8.4±1.9% of the control group were exposed to stress at workplace (OR = 3.9; p <0.01; η-5%); 40.0±2.8% of the main group patients and 21.1±2.9% of the control group indicated stressful situations in the family (OR = 2.5; p <0.001; η- 4%). The type of personality temperament also plays a specific role in myocardial infarction development. Thus, the personal and behavioral characteristics of people with such as “choleric” temperament type are considered to be an expressive factor in cardiovascular diseases development, in particular myocardial infarction [9]. Based on our scientific research, it was found that 24.5±2.4% of the main group patients and 13.2±3.1% of the control group had this type of temperament (OR = 2.1; p <0.001; η- 2%). It was also found that professional status and education level in a certain way affect this pathology development. Thus, 12.3±1.9% of the main group patients and 4.7±1.6% of the control group did not have a higher education (OR = 2.8; p <0.01; η- 1%). The executive positions at work among patients of the main and control groups was 16.1±2.1% and 5.3±1.6, respectively (OR = 3.5; p <0.01; η-2%). When analyzing the level of financial security, it was found that 20.0±2.3% of the main group patients and 10.5±2.3% of the control group had a low level of financial security (OR = 2.1, p <0.01; η- 1%). 15.2±2.0% of the main group patients and 6.8±1.9% of the control group indicated their marital status as divorced, single and widowed (OR = 2.4; p <0.01; η -1%). The results are shown in the Table III.

According to the results of the study, it can be asserted that natural and climatic factors also had a significant impact on myocardial infarction development. According to literary sources, it is known that 80% of patients with various diseases respond to unstable weather conditions. It was also established that the frequency of myocardial infarction cases depends in a certain way on natural factors. Thus, when assessing the influence of meteorological factors, we found that 33.9±2.7% of the main group patients and 15.8±2.4% of the control group felt their health deteriorated as a result of changing weather conditions (OR = 3.1; p <0.001; η-4%). Arterial pressure drops were reported in 18.1±2.8% of the main group patients and 6.3±2.4% of the control group (OR = 3.3; p <0.001; η-3%). It was found that chest pain in case of changing weather conditions was present in 19.7±2.3% of the main group patients and 6.8±1.9% of the control group (OR = 3.3; p <0.001; η- 3%); headaches were present in 25.8±2.3% of the main group patients and 13.2±3.1% of the control group (OR = 2.3; p <0.001; η-2%). It is known that the human body is covered with a circadian rhythm, all organs work cyclically. The effect of circadian rhythms on the function of various biological systems was investigated and changes were observed depending on the time of day. It was found that fibrinolysis suppression in the morning coincides with the peak of thrombotic complications. The peak of cardiovascular complications incidence occurs at 4-5 in the morning. We found that 20.9±2.3% of the main group patients and 8.9±2.1% of the control group showed deterioration in their health conditions in the morning (OR = 2.7; p <0.01; η -2 %). Intense changes in the weather play a significant role in the complex effects of climate on the human body. Significant changes occur especially in the transitional seasons of the year – autumn-spring. During our study, it was found out that 31.9±2.7% of the main group patients and 17.9±2.7% of the control group showed a dependence of their health status on the season (OR = 2.2; p <0.001; η- 2%). The level of oxygen consumption by the body has been studied for many years. Scientists have concluded that insufficient oxygen consumption also leads to cardiovascular diseases development. In the study, 14.8±2.8% of the main group patients and 6.3±2.4% of the control group indicated that they had not spent enough time in the out-of-doors (OR = 2.6; p <0.001; η -1%). The results are shown in the Table IV.

**Conclusions**

1. The main risk factors for myocardial infarction among the adult population were identified; they were classified as biological and socio-hygienic.

2. It was determined that the most significant biological factors are hypertension and hypercholesterolemia (OR = 4.8; p <0.001; η-11% and OR = 4.5; p <0.001; η 9%, respectively). At the same time, heredity, the presence of chronic diseases, overweight and high blood glucose levels also had a significant effect on myocardial infarction development.

3. It was determined that such socio-hygienic factors as smoking and excessive consumption of fatty foods have a great influence on myocardial infarction development (OR = 4.7; p <0.001; η-7% and OR = 3.9; p <0,001; η-5%, respectively). It was also proved that physical inactivity, failure to comply with dietary pattern, excessive consumption of food, alcohol, fast foods, ready-to-cook foods, as well as the presence of occupational hazards, have a certain impact on this pathology development.

4. The study results indicate that such psychological factors as stress at work and stress at home have a significant influence on myocardial infarction development (OR = 3.9; p <0.01; η-5% and OR = 2.5; p <0.001; η- 4%, respectively). Such natural and climatic factors as felt health deteriorated as a result of changing weather conditions and drop in blood pressure (OR = 3,1; p <0,001; η 4% and OR = 3,3; p <0,001; η-3%, respectively) also influence myocardial infarction development in a certain way.

5. Identification of the main risk factors for myocardial infarction is important for the effective primary and secondary measures to prevent this pathology occurrence.

**References**

1.Terenda N. Vchennya pro infarct miokarda v istorychnomu aspekti [The doctrine of myocardial infarction in historical aspect]. Visnyk sotsial’noyi medytsyny ta organizatsiyi ohorony zdorov’ya Ukrainy. 2013;1:56-61.

2.Lawrence J, Laslett M, Alagona P. The Worldwide Environment of Cardiovascular Disease: Prevalence, Diagnosis, Therapy, and Policy Issues. Journal American College of Cardiology. 2012:1-49.

3.Libbi P, Oganov R, Bonou R etal. Bolezni serdtsa po Braunval’du. Rukovodstvo po serdechno-sosudistoy sisteme [Heart disease according to Braunwald. Guide to Cardiovascular Medicine]. 2013;3:158-176.

4.Kiani F, Hesabi N, Arbabisarjou A. Assessment of Risk Factors in Patients With Myocardial Infarction. Global Journal of Health Science. 2016;8(1):255-262.

5.Pedersen L, Frestada D, Michelsen M etal. Risk factors for myocardial infarction in women and men: a review of the current literature. Current Pharmaceutical Design. 2016:3835-3852.

6.Salehi R, Motemavele M, Goldust M. Risk factors of coronary disease in women. Pac J Biol Sci. 2013:195-197.

7.Roberts R. Genetics of Coronary Artery Disease. Circ. Res. 2014;114(12):1890–1903.

8.Roever L. Risk Factors for Cardiovascular Disease: Evidence from Studies. Journal of Cardiovascular Diseases and Diagnosis. 2015;3(2):23-25.

9.Bondarevich S. Teoreticheskiye predposylki razrabotki modeli zdorovya v usloviyah postneoklassiki v ramkah sinergeticheskogo podhoda. Modeli metafizicheskogo zdorovya [Theoretical prerequisites for the development of a model of health in post-non-classical conditions within the framework of a synergistic approach. Model of metaphysical health]. Visnyk ONY imeni I.I. Mechnikova. Psihologiya. 2012;17:466-478.