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## DETECTION AND ASSESSMENT OF DISORDERS OF THE DEPRESSIVE SPECTRUM IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION DEPENDING ON THE METHOD OF TREATMENT

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The frequent combination of mental disorders of the depressive spectrum and cardiovascular diseases is one of the most urgent problems of modern medicine. The purpose of the study was to identify and assess, with the help of various psychodiagnostic methods, the degree of severity of depressive disorders in patients with acute myocardial infarction depending on the treatment method as a prerequisite for optimal drug therapy. 73 patients with the aforementioned pathology were studied and were divided into two groups. Group I included 44 patients who underwent urgent coronary angiography with subsequent stenting of the infarct-related coronary artery; Group II – included 29 patients who received only drug therapy. Examination of patients was carried out according to Ukrainian standards, in particular, a survey according to the scale of Beck and Zung. Patients with acute myocardial infarction after urgent coronary angiography with stenting of the infarct-dependent artery were more likely to have mild and moderate depression according to the Beck scale compared to patients who received only conservative medical treatment. The reverse pattern is observed for moderate and severe depression. 68.2% of patients with acute myocardial infarction after interventional intervention and 62.1% on the background of conservative treatment according to the Zung scale showed depression of various degrees of severity, mostly mild.

**Key words:** acute myocardial infarction, mental state, urgent coronary angiography, drug therapy, stenting.

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## ВИЯВЛЕННЯ ТА ОЦІНКА РОЗЛАДІВ ДЕПРЕСИВНОГО СПЕКТРУ У ХВОРИХ НА ГОСТРИЙ ІНФАРКТ МІОКАРДА ЗАЛЕЖНО ВІД МЕТОДУ ЛІКУВАННЯ

Нерідке поєднання психічних розладів депресивного спектру та серцево-судинних захворювань є однією з найбільш актуальних проблем сучасної медицини. Метою дослідження було виявлення та оцінка за допомогою різних психодіагностичних методів ступеня тяжкості депресивних розладів у хворих на гострий інфаркт міокарда залежно від методу лікування як передумова до оптимізації медикаментозної терапії. Досліджено 73 хворих з вищезгаданою патологією, які розподілені на дві групи: I група – 44 хворих, яким проводили ургентну коронарографію з подальшим стентуванням інфарктзалежної коронарної артерії; II група – 29 хворих, які отримували тільки медикаментозну терапію. Обстеження хворих проводилось згідно стандартів України, зокрема опитування за шкалою Бека та Цунга. У хворих на гострий інфаркт міокарда після ургентної коронарографії із стентуванням інфарктзалежної артерії переважала легка та помірна депресія за шкалою Бека у порівнянні з хворими, яким проводилося лише консервативне медикаментозне лікування. Зворотна закономірність спостерігається для вираженої та важкої депресії. У 68,2 % хворих на гострий інфаркт міокарда після інтервенційного втручання та 62,1 % на фоні консервативного лікування за шкалою Цунга виявлено депресію різного ступеня тяжкості, переважно легку.

**Ключові слова:** гострий інфаркт міокарда, психічний стан, ургентна коронарографія, медикаментозна терапія, стентування.

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A frequent combination of mental disorders of the depressive spectrum and cardiovascular diseases is one of the most urgent problems of modern medicine [1, 8, 13]. Today, studying the mental sphere is necessary to understand somatic symptoms and behavioral factors influencing treatment adherence, adherence to a healthy lifestyle, rehabilitation and prevention [9, 11].

Depression is one of the most common mental disorders that often accompanies an acute myocardial infarction (AMI), negatively affects its clinical course, and increases the risk of complications from the cardiovascular system and mortality [3, 11, 15]. According to studies in patients with AMI who suffered from depression, the mortality rate is 5 times higher in the next 12 months than in patients without such disorders [8].

Depression can be considered one of the risk factors for developing AMI and, at the same time, be the cause of a complicated course of the post-infarction period [14]. 65 % of patients with AMI had symptoms of depression, and every fourth patient had symptoms within 18–24 months after an acute cardiovascular event [7].

There is a direct relationship between the degree of depression and the prognosis of patients who have undergone AMI with subsequent myocardial revascularisation. This is due to the activation of the sympathoadrenal system, which increases the aggregation of platelets, and causes vasoconstriction, heart

rhythm dysregulation and low heart rate variability [4]. Timely treatment of depression in patients who have recently undergone AMI significantly reduces the risk of death, repeated revascularization, and the number of hospitalizations [9, 10].

In recent years, endovascular methods of coronary reperfusion have been widely used for treating AMI, one of which is angioplasty of coronary arteries, which has become a routine, least traumatic and safe treatment method [3, 13]. Revascularization increases patients' life expectancy, reduces the risk of possible disease complications, and improves the quality of life [9, 10].

Despite the progress in the surgical and therapeutic directions of treatment of patients with AMI, depression remains a risk factor for a negative prognosis after an acute coronary disaster [8, 11].

The high prevalence of affective disorders in medical practice makes it necessary to perform a study of the psychological state of all AMI patients for the timely detection of possible anxiety-depressive diseases with further optimization of drug therapy routes if necessary, which is currently insufficiently studied and is an urgent problem of modern cardiology.

**The purpose** of the study was to identify and assess, with the help of various psychodiagnostic methods, the degree of severity of depressive disorders in patients with AMI depending on the treatment method as a prerequisite for optimal drug therapy.

**Materials and methods.** 73 patients with AMI participated in this study. The first group consisted of 44 patients who underwent urgent coronary angiography followed by infarct-related coronary artery stenting. The second group consisted of 29 patients who refused urgent coronary angiography or were hospitalized 24 hours after the attack onset. The average age of the subjects in group I was  $64.65 \pm 1.45$  years ( $M \pm SEM$ ), and in group II –  $68.21 \pm 1.32$  years ( $M \pm SEM$ ). In group I, there was 26 (59.1 %) men and 18 (40.9 %) women; in group II, respectively, 20 (69.0 %) men and 9 (31.0 %) women.

Characteristics of the first group of subjects:  $28.2 \pm 1.3$  % of patients smoked,  $48.3 \pm 2.1$  % had grade II-III obesity,  $73.8 \pm 2.5$  % hypercholesterolemia,  $68.6 \pm 3.2$  % – stable angina pectoris of functional class II-III tension in the anamnesis,  $19.7 \pm 1.4$  % – AMI in the anamnesis. In the second group of patients:  $33.6 \pm 1.7$  % of patients smoked,  $54.2 \pm 2.6$  % had obesity,  $68.9 \pm 2.4$  % – had hypercholesterolemia,  $74.5 \pm 2.9$  % – had stable angina pectoris of functional class II-III in the anamnesis,  $20.4 \pm 1.8$  % – AMI in the anamnesis.

Examination of patients was carried out by the Unified Clinical Protocol for emergency, primary, secondary (specialized) and tertiary (highly specialized) medical care and rehabilitation for patients with the acute coronary syndrome with ST-segment elevation (Order of the Ministry of Health of Ukraine dated 14.09.2021 No. 1936).

To identify and assess mental disorders of the depressive spectrum in patients with AMI, on the 7th–8th day of stay in the cardiology department, a survey was performed according to the Beck and Zung scale. When interpreting the results of questionnaires, it should be remembered that we only get preliminary and approximate ideas about the patient's mental state, and a specialist establishes the diagnosis of depression during a thorough examination.

The Beck scale is the gold standard for diagnosing the severity of depression. According to the degree of symptom expression, each item is assigned values from 0 (symptom absent or minimally expressed) to 3 (highest manifestation of the symptom). The severity of 21 symptoms of depression is graded on the Beck Depression Inventory scale: items 1–13 – Cognitive-Affective subscale (C–A) and items 14–21 – subscale of somatic manifestations of depression (S–P) [5].

The Zung scale allows screening for depression and determining its degree in a patient. The questionnaire includes 20 items that reflect the subjective frequency of depressive symptoms. The scale contains 10 positively and 10 negatively worded questions. Each of them is evaluated on a scale from 1 to 4 (based on the answers “extremely rarely”, “rarely”, “often”, and “most of the time” [6].

To treat AMI, standard drug therapy was prescribed to all patients (short-and/or long-acting nitrates, if necessary, beta-blockers or calcium channel blockers, statins, anticoagulants, disaggregants, angiotensin-converting enzyme inhibitors or angiotensin II receptor antagonists, mineralocorticoid receptor antagonists and diuretics).

The study of patients was performed by the basic bioethical provisions of the Council of Europe Convention on Human Rights and Biomedicine (from 04.04.1997), Helsinki Declaration of the World Medical Association on Ethical Principles of Scientific Medical Research with Human Participation (1964–2008) and Order of the Ministry of Health of Ukraine No. 690 dated September 23, 2009.

The exclusion criteria in our study were NYHA functional Class IV heart failure, uncontrolled arterial hypertension, heart defects, endocrine disorders, peptic ulcer of the stomach and duodenum 12 in the acute stage, the presence of mental disorders and dependence on psychoactive substances, oncological and degenerative diseases.

Statistical processing of research materials was carried out using the IBM SPSS Statistics 22.00 program. The main statistical indicators were: M – mean and SEM – standard error of the mean. Pearson's Chi-square test was used to assess differences in categorical variables. The difference between the compared values was considered probable at  $p < 0.05$ .

**Results of the study and their discussion.** According to the Zung scale, 30 (68.2%) patients in group I had depressive disorders of varying degrees of severity, of which 13 (29.5%) had mild depression, 9 (20.5 %) – had moderate depression, 8 (18.2 %) – severe depression. In Group II, 18 (62.1 %) patients had depression, respectively – 10 (34.5 %), 6 (20.7 %) and 2 (6.9 %). After the intervention, depression was not observed in 14 (31.8 %) patients with AMI, against the background of conservative therapy – in 11 (37.9 %) (Fig. 1).

In patients with AMI, mild, moderate, and severe depression, according to the Zung scale, was found. Still, it was more pronounced in patients who underwent urgent coronary angiography with subsequent stenting of the infarct-dependent coronary artery compared with patients who underwent only medical treatment (Table 1).

Table 1

**The relationship between the degree of severity of depression according to the Zung scale in patients with AMI and the method of treatment**

Groups of subjects depending on the severity of depression according to the Zung scale	Groups of patients depending on the method of AMI treatment	
	Stenting (Group I, n=44)	Non-stenting (Group II, n=29)
No depression, 25–49 points (n=25)	14 (*56.0 %, **31.8 %, ***19.2 %)	11 (*44.0 %, **37.9 %, ***15.1 %)
Mild depression, 50–59 points (n=23)	13 (*56.5 %, **29.5 %, ***17.8 %)	10 (*43.5 %, **34.5 %, ***13.7 %)
Moderate depression, 60–69 points (n=15)	9 (*60.0 %, **20.5 %, ***12.3 %)	6 (*40.0 %, **20.7 %, ***8.2 %)
Severe depression, 70 points or more (n=10)	8 (*80.0 %, **18.2 %, ***11.0 %)	2 (*20.0 %, **6.9 %, ***2.7 %)

Notes: \* – percentage of those studied for depression severity on the Zung scale (by line), \*\* – a percentage of the quantitative characteristics of patients depending on the method of AMI treatment (by column), \*\*\* – percentage of the quantitative summation characteristic of the dependence between the degree of severity of depression according to the Zung scale and the method of treatment in patients with AMI.

The significance of the relationship between the degree of severity of depression according to the Zung scale in patients with AMI and the method of treatment according to Pearson's Chi-square, odds ratio, linear through linear association is for Pearson's Chi-square=1.952,  $df=3$ ,  $p=0.038$ , respectively, for the odds ratio=2.108,  $df=3$ ,  $p=0.038$  and linear-by-linear association=1.295,  $df=1$ ,  $p=0.012$ .

According to Beck's scale, 21 (47.7 %) of patients with AMI had mild depression (subdepression), 7 (15.9 %) had moderate depression, and 6 (13.6 %) had severe depression (moderate severity). In group II, 7 (24.1 %) patients were diagnosed with mild depression (subdepression), 4 (13.8 %) with moderate depression, 8 (27.6 %) with severe depression (moderate severity), and 5 (17.2 %) with severe depression. Depression was not observed in 10 (22.7 %) patients with AMI with surgical intervention, respectively in 5 (17.2 %) – on the background of drug treatment (Fig. 2).

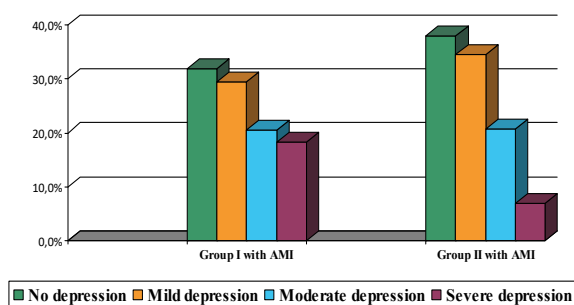


Fig. 1. The degree of severity of depression according to the Zung scale in patients with AMI depends on the method of treatment

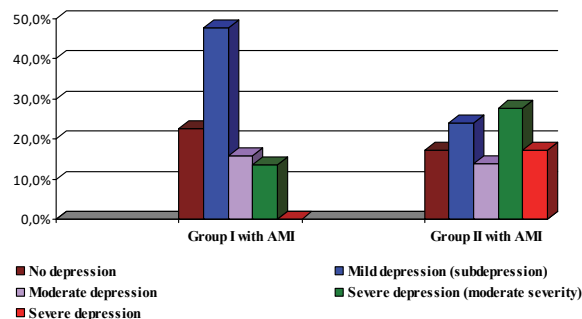


Fig. 2. The severity of the depressive disorder, according to the Beck scale in patients with AMI depends on the method of treatment

In patients with AMI after myocardial revascularization from stenting of the infarct-dependent artery, mainly mild and moderate depression, according to the Beck scale, is observed, in contrast to those patients who received only conservative treatment. The reverse pattern is observed for severe and severe depression, which indicates a positive effect of treatment with percutaneous coronary intervention (PCI) on the emotional state of patients and improved prognosis (Table 2).

**The relationship between the degree of severity of depression according to the Beck scale  
in patients with AMI and the method of treatment**

Groups of subjects depending on the severity of depression according to the Beck scale	Groups of patients depending on the method of AMI treatment	
	Stenting (Group I, n=44)	Non-stenting (Group II, n=29)
No depression, 0–9 points (n=15)	10 (*66.7 %, **22.7 %, ***13.7 %)	5 (*33.3 %, **17.2 %, ***6.8 %)
Mild depression (subdepression), 10–15 points (n=28)	21 (*75.0 %, **47.7 %, ***28.8 %)	7 (*25.0 %, **24.1 %, ***9.6 %)
Moderate depression, 16–19 points (n=11)	7 (*63.6 %, **15.9 %, ***9.6 %)	4 (*36.4 %, **13.8 %, ***5.5 %)
Severe depression (moderate severity), 20–29 points (n=14)	6 (*42.9 %, **13.6 %, ***8.2 %)	8 (*57.1 %, **27.6 %, ***11.0 %)
Severe depression, 30–63 points (n=5)	0 (*0 %, **0 %, ***0 %)	5 (*100.0 %, **17.2 %, ***6.8 %)

Notes: \* – percentage of those studied for depression severity on the Beck scale (by line), \*\* – a percentage of the quantitative characteristics of patients depending on the method of AMI treatment (by column), \*\*\* – a percentage of the quantitative summation characteristic of the dependence between the degree of severity of depression according to the Beck scale and the method of treatment in patients with AMI.

The significance of the relationship between the severity of depression according to the Beck scale in patients with AMI and treatment tactics according to Pearson's chi-square, odds ratio, linear through linear association: (Pearson chi-square=12.204, df=4, p=0.016; odds ratio=13.976, df=4, p=0.007 and linear-by-linear association=8.165, df=1, p=0.04).

Evaluating the results obtained in the study of the degree of depression according to the scale of Zung and Beck, we see that they differ somewhat. If the percentage of patients with mild depression was higher in group II of patients with AMI compared to the I group of patients, according to the Beck scale, the opposite pattern was observed. Similar correlation patterns were observed when comparing groups with severe depression – according to the Zung scale, it occurred more often in patients who underwent urgent coronary angiography with stenting of an infarct-related artery, in contrast to Beck's score, where the severity of depression was more significant in patients who were treated only with conservative drug therapy. How can we explain such discrepancies? This is probably due to greater detail and division into 4 groups of the severity of depressive disorders according to Beck's scale, which from our point of view, more accurately reflects the psycho-emotional state of patients, and not into 3 groups as according to Zung's scale. The results of the Beck scale are consistent with our other studies, where severe depression, according to the Patient Health Questionnaire, clinically expressed anxiety and depression, according to the Hospital Anxiety and Depression Scale, prevailed in AMI patients who did not undergo coronary angiography [2]. Therefore, it is probably more correct to use Beck's scale to assess the severity of depression in patients with AMI.

Regardless of the survey method used, the majority of AMI patients (68.2 % in group I, 62.1 % in group II according to the Zung scale and 77.3 % in group I and 82.8 % in group II according to the Beck scale) were observed mental disorders of the depressive spectrum.

The more severe degree of depression in patients who were treated only by the method of conservative drug therapy is probably caused by the condition when patients understand that, for one reason or another, they did not have time to carry out modern interventional treatment of AMI or they failed to make a responsible and correct decision in time, refusing the proposed coronary intervention, especially during the rehabilitation period, communicating with patients who underwent such treatment. The thought that “I gave up, and the attack may return because the problem still exists” does not contribute to normalising the mental state. Therefore, it is likely that the lability of the emotional state of patients can cause the development of minor anxiety, then anxiety, and later a severe depressive episode.

The patient's perception of his mental health in combination with the somatic disease during treatment is essential because it affects the course and prognosis of AMI [15].

Against the background of morpho-functional changes of the myocardium and pathophysiological changes in the body against the background of AMI, a significant role is played by the patient's awareness of his illness due to a sharp limitation of physical activity, a psychologically difficult atmosphere during his stay in the intensive care unit and polypharmacotherapy.

Interventions for patients with AMI significantly improve the condition, daily activity level, psycho-emotional state, and quality of life [2, 10].

PCI with coronary artery stenting is one of the most effective methods of treating AMI, which not only improves blood supply to the heart muscle but also allows patients to return to everyday life. But the psycho-emotional stress that occurs during the disease and its surgical treatment can become an independent predictor of death in these patients [9]. Extreme stress leads to hyperactivation of the

hypothalamic-pituitary-adrenal axis, which in turn increases the release of cortisol. A cascade of reactions is triggered: activation of the sympathoadrenal system, an increase in the levels of adrenaline, norepinephrine and dopamine circulating in the plasma, which reduce the reserve capacity for their synthesis, the discrepancy between the synthesis and release of mediators grows, which leads to a gradual suppression of the adaptation-trophic function of the heart [4].

The results of our study show that patients who have suffered AMI, regardless of the treatment method, need timely diagnosis and correction of mental disorders because they affect the course and prognosis of the primary somatic disease and require adequate treatment and rehabilitation measures. A cardiologist and a psychiatrist must observe patients with such a complex comorbid pathology and, if necessary, correct their psycho-emotional state.

### Conclusions

1. All patients with AMI, regardless of the treatment method of the main disease (only conservative drug therapy or endovascular treatment), should undergo a mental state assessment to identify possible disorders of the depressive spectrum and determine their severity. To reduce the risk of developing acute coronary events, doctors of various therapeutic specialties need to identify and correct existing mental disorders in their patients.

2. The specific influence of the AMI treatment method on the severity of depressive disorders that develop in a certain category of patients is determined. To improve the quality of diagnosis of depression in patients with AMI, regardless of treatment tactics, it is advisable to use the screening scales of Beck and Zung, with the subsequent need for a well-founded complex correction of treatment and assessment of its effectiveness. To assess the severity of depressive disorders, it is advisable to use the Beck scale, which better details the possible clinical manifestations of detected changes in the mental state of patients with AMI.

3. Patients with AMI after urgent coronary angiography with stenting of the infarct-dependent artery were more likely to have mild and moderate depression according to the Beck scale compared to patients who received only conservative medical treatment. The reverse pattern is observed for moderate and severe depression. In 68.2% of patients with AMI after interventional intervention and 62.1% on the background of conservative treatment according to the Zung scale, depression of various degrees of severity, primarily mild, was found.

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