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Comparative analysis of subclinical anxiety-depressive syndrome in STEMI patients before and during active hostilities in Kharkiv Region, Ukraine

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The aim – to assess subclinical emotional distress in patients with ST-Elevation Myocardial Infarction (STEMI) before and during the ongoing conflict in the Kharkiv Region

Materials and methods. The study encompassed 242 patients exhibiting subclinical emotional distress and hospitalized with STEMI at «L.T. Malaya TNI of NAMSU» before active conflict, compared with 65 patients during the conflict. Adherence to ethical standards was ensured, in line with the 1964 Helsinki Declaration, and the protocol received approval from the local ethics committee (Protocol № 8, dated 29.08.2016, and Protocol № 4, dated 12.05.2022). Participants completed the DASS-21 questionnaire, reflecting their emotional state 10–14 days prior, and received STEMI treatment as per current guidelines.

Results. We showed that anxiety more frequent appeared during the active hostilities (p=0.0218). Depression had the influence on excessive smoking (p=0.0199), LV EF decrease (p=0.0057), LDL-C increase (p=0.0393). Anxiety and stress intrude into hypertension frequency (p=0.0171, p=0.0489) consequently as well as anxiety – on LDL-C increase (p=0.0068). All data of subclinical emotional distress during active hostilities associate with the frequency of smoking increase: p=0.0422 for depression, p=0.0275 for anxiety and p=0.0199 for stress. Depression associates with LVEF decrease (p=0.0267), the leucocytes count increase (p=0.0467), high frequency of hypertension (p=0.0410). Anxiety associates with higher heart rate (p=0.0277), depression and stress – with younger age (p=0.0369).

Conclusions. Our research demonstrates close associations between the data of subclinical emotional distress both in patients with STEMI before and during the active hostilities in Kharkiv Region. Data were assessed with DASS-21 questionnaire on 10 –14 day prior the event. These results should be undertaken during general practitioner's appointment to prevent further cardiovascular event.

Key words: STEMI, subclinical emotional distress, active hostilities in Kharkiv Region.

Myocardial infarction (MI) stands as a predominant cause of death and disability worldwide. Emotional disturbances, notably anxiety and depression, frequently afflict individuals with MI. Major depression is known to elevate the risk for coronary artery disease (CAD), as corroborated by studies [1, 2, 3], with a depression prevalence of 15–30 % in CAD patients. The intricate and multifaceted links between depression and increased CAD risk remain largely elusive. In individuals with CAD,

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depression is linked to more pronounced functional impairments, diminished therapy adherence, and reduced cardiac rehabilitation engagement. These observations pertain primarily to significant depression, with subclinical forms remaining under-researched [4, 5].

Anxiety, though prevalent post-MI, has an uncertain association with MI itself. A.M. Roest and colleagues, through a 2010 meta-analysis encompassing 250,000 participants and 20 studies, identified a 26 % heightened risk of CAD associated with anxiety and other medical conditions [6].

Y. Wen et al., 2021, performed a study aimed at providing an updated and comprehensive evaluation of the association between anxiety and short-term and long-term prognoses in patients with MI. The authors conducted a systematic search in the PubMed and Cochrane databases (January 2000–October 2020). Their study provided strong evidence that increased anxiety was associated with poor prognosis in patients with MI [7].

P.J. Tully et al., 2020, noticed that anxiety disorder patients frequently present to emergency departments and outpatient appointments for atypical cardiovascular symptoms; the accurate identification and treatment of anxiety is, therefore, a major priority for all persons involved in cardiovascular care [8].

The association between ACS and stress has frequently been documented, and some authors argue that stress can be a critical risk factor for ACS and a prognostic marker. There is little evidence regarding the prevalence of stress among patients with acute myocardial infarction (AMI) [9].

Pathophysiologic mechanisms in conjunction with depression, anxiety, stress and AMI are still incompletely understood.

The aim of the research was to compare subclinical emotional distress before and during active hostilities in patients with STEMI.

The hypothesis was that excessive emotional triggers would lead to a change in the patient's lifestyle to enhance the inflammatory response compared with the peace period.

METHODS

We included 242 patients from the STEMI patient database who were admitted to the intensive care unit of «L.T. Malaya TNI of NAMSU» from August 2016 to February 2019. The comparative group included 65 STEMI patients who were admitted during the active hostilities in the Kharkiv Region, Ukraine, from January 2023 to February 2024. Both groups' Inclusion criteria were acute STEMI, age >18 years old, and a lack of contraindications to percutaneous coronary intervention (PCI). Exclusion criteria were previous myocardial infarction, established chronic heart failure, known malignancy, severe comorbidities (anaemia, chronic obstructive lung disease, bronchial asthma, liver cirrhosis, chronic kidney disease, valvular heart disease, bleeding), and inability to understand written informed consent.

Ethical declaration

The study adhered to ethical guidelines, aligning with the 1964 Helsinki Declaration and its subsequent updates, receiving approval from the local ethics committee (Protocol №8 dated 29.08.2016 and Protocol №4 dated 12.05.2022). Informed consent was obtained from all participants.

Upon admission, patients underwent immediate conventional coronary angiography using the Digital X-ray system «Integris Allura» (Philips Healthcare, Best, Netherlands), with either radial or femoral vascular access employed. Primary PCI with the Orsiro Mission drug-eluting stent (Biotronic AG) was performed for all participants, who were then administered adjuvant treatment according to current ESC guidelines [10].

Emotional status

All patients from the final cohort had emotional changes at the subclinical level and were examined by a psychiatrist according to the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5). Major depression was excluded from the analysis. On 2–3 days after revascularization, the patients were emotionally stable and answered questions themselves. Depression Anxiety and Stress Scale (DASS-21) questionnaire, the short version of DASS-42, was completed with all patients. This questionnaire has five levels of each stay – normal, mild, moderate, strong, and very strong. All responses were based on the patients' feelings two weeks before their STEMI. It consists of 21 items divided into three 7-point subscales for anxiety, depression, and stress. Depression was considered to exist when the patient's score was >9, anxiety >7 and stress >14 points [11].

Determination of risk factors and comorbidities

Hypercholesterolemia was diagnosed following the 2019 European Cardiology Society dyslipidemia guidelines [12], hypertension according to the 2018

European hypertension guidelines [13], and type 2 diabetes either based on the latest ADA statement (2019) [14] or existing treatment records.

Echo examination

Patients underwent two-dimensional transthoracic echocardiography using the «Aplio 500» ultrasound machine (TUS-A500, Toshiba Medical Systems Corporation, Japan) in the left lateral decubitus position. LVEDV, LVESV, and LVEF were calculated using Simpson's method.

Blood samples

Blood samples were drawn before PCI and centrifuged; serum was isolated and stored in plastic tubes until shipped to the immune-chemical and molecular-genetic researchers laboratory of «L.T. Malaya TNI of NAMSU». Troponin I (TnI) level was detected with a chemoluminescent immunoassay (Humalyser 2000, Mannheim, Germany). The TnI level average was 0,5–50,0 ng/mL. Total cholesterol (TC), triglycerides (TG) and high-density lipoprotein (HDL) cholesterol were evaluated with an enzymic method using an automatic biochemistry analyser «HumaStar 200» (Human, Germany, 2005). Low-density cholesterol (LDL) levels were calculated according to the W.T. Friedewald formula. Blood glucose was assessed using the glucose oxidase method on a biochemical analyzer «Humalyzer 2000», No. 18300–5397.

Statistics

Statistical analyses were performed using «Statistica® for Windows 6.0» (StatSoft Inc., № AXXR712D833214FAN5). Continuous variables are presented as mean ± standard deviation (SD) when normally distributed or median and interquartile range (IQR) if otherwise. Categorical variables are presented as frequencies (n) and percentages (%). Mann-Whitney and Wald-Wolfowitz criteria were used for intergroup differences and quantitative values. We performed univariate and multivariate log regression analyses to determine the factors that could be associated with depression, anxiety, and stress. We calculated the beta coefficient, standard errors (SE), odds ratio (OR), and 95 % confidence interval (CI) for each factor. The multiple variate log-regression analysis did not include factors for which P values were calculated as >0.5. All differences were considered statistically significant with 2-tailed $p<0.05$.

RESULTS

Our study categorized the patients into two groups: the first group comprised individuals admitted before the onset of active hostilities in the Kharkiv Region. In contrast, the second group included those admitted during the conflict. Most participants in both groups were male, and the average age of patients in both groups showed no significant differences.

As showed the *Table. 1*, reliable differences were noticed between the frequency of arterial hypertension (p=0.028), dyslipidemia (p=0.043), smoking (p=0.001), and the level of total cholesterol (p=0.026), which were higher in the 2nd group of patients. They did not differ by localisation in the case of anterior MI. There were more cases of posterior MI in group 1 (p=0.0001), and other localisations of MI appeared more frequently in the 2nd group (p=0.0001). One injured coronary artery appeared more frequently in the 1st group (p=0.051) and two or more – in the 2nd (p=0.09). Left ventricular ejection fraction was less in the group of patients during active hostilities (p=0.020), both with higher levels of anxiety (p=0.0098).

Table 2 demonstrates the frequency of subclinical distress before and during active hostilities: anxiety was revealed to be more frequent in the 2nd group (p=0.0218).

As shown in *Table 2*, anxiety more frequently appeared during active hostilities (p=0.0218).

In the 1st group of patients, we received positive correlations between the level of anxiety and arterial hypertension (r=0.215, p=0.0008), smoking (r=0.158, p=0.014), the level of total cholesterol (r=0,154, p=0.019), also between depression and arterial hypertension (r=0.193, p=0.003), smoking (r=0.210, p=0.001). Other correlations between anxiety, depression, stress, cardiovascular risk factors and hemodynamic parameters did not have reliable character.

In the 2nd group of patients, there are positive correlations between stress level and smoking (r=0.195, p=0.021), anxiety and smoking (r=0.254, p=0.003), depression and smoking (r=0.169, p=0.046).

The following investigation required performing univariate and multivariate linear regression analysis to determine the associations of subclinical distress with different data of STEMI patients *(Tables 3 and 4)*.

As shown in *Table 3*, depression is associated with excessive smoking (p=0.0199), LV EF decrease (p=0.0057), and LDL-C increase (p=0.0393). Anxiety and stress intrude into hypertension frequency

Table 1
Clinical characteristics of STEMI patients before and during active hostilities in the Kharkiv region

Data	Before active hostilities n=242	During active hostilities n=65	p
Age, years	58.98±9.52	60.55±10.50	0.104
Gender, m/f (n/%)	189/53 (78.1/21.9)	48/17 (73.8/26.2)	0.468
Hypertension, (n/%)	186/76.9	60/92,3	0.0028
DM 2T, (n/%)	46/19.0	11/16,9	0.664
Dyslipidemia, (n/%)	158/65.3	51/79.4	0.043
Smoking, (n/%)	133/55.0	21/32.3	0.001
Troponin I, ng/ml	6,75 [2,53–10,87]	6,91 [2,58–11,75]	0,239
TC, mmol/l	5.17±1.29	5.56±1.44	0.026
LDL-C, mmol/l	3.15±1.18	3.32±1.33	0.442
Localization of STEMI			
Anterior	118/48.8	35 /53.8	0.467
Posterior	103/42.6	6/9.2	0.0001
Other	21/8.6	24/37.0	0.0001
Amount of damaged coronary arteries			
1	107/44.2	20/30.8	0.051
2	66/27.3	15/23.1	0.496
>2	67/27.7	29/44.6	0.009
Haemodynamic			
SBP, mm Hg	134.91±25.36	133.19±20.30	0.681
DBP, mm Hg	80.39±14.20	80.70±9.58	0.458
HR, per 1 min	77.73±15.85	75.46±10.83	0.466
LV EDV, ml	137.03±38.65	130.02±33.45	0.392
LV ESV, ml	63.54±27.86	63.26±23.12	0.811
LV EF, %	52.52±11.05	49.49±9.75	0.020
DASS-21			
Depression	6.0 [2.0–14.0]	9.0 [4.0–12.0]	0.097
Anxiety	8.0 [4.0–14.0]	10.0 [6.0–16.0]	0.0098
Stress	12.0 [6.0–16.0]	13.0 [8.0–20.0]	0.121
Treatment			
ACEi/ARA II, (n/%)	236/97.5	62/95.3	0.353
β-blockers, (n/%)	241/99.6	64/98.5	0.321
Ticagrelor/clopidogrel, (n/%)	242/100	65/100	
Statins, (n/%)	242/100	65/100	
AMCR, (n/%)	54/22.3	11/16.9	0.344
ASA, (n/%)	242/100	65/100	

ACEi – angiotensin converting enzyme inhibitors; AMCR – antagonists of mineralocorticoid receptors; ARAII – antagonists of receptors to angiotensin-II; ASA – acid acetylsalicylic; DBP – diastolic blood pressure; DM 2T – diabetes mellitus type II; HR – heart rate; LDL-C – low-density lipoprotein cholesterol; LVEDV – left ventricular end-diastolic volume; LVESV – left ventricular end-systolic volume; LVEF – left ventricular ejection fraction; SBP – systolic blood pressure; TC – total cholesterol.

Table 2
Depression, anxiety and stress before and during active hostilities in the Kharkiv Region

Data	Before active hostilities n=242	During active hostilities n=65	p
Depression	94/38.8 %	31/47.7 %	0.1947
Anxiety	133/55 %	46/70.8 %	0.0218
Stress	79/32.6 %	29/44.6 %	0.0720

Table 3
Multivariate analysis of subclinical emotional distress before active hostilities in Kharkiv Region

Data	Dependent variable: depression			
	Multivariate linear regression analysis (χ^2=26.34; p=0.0001) AUC=0.706 (0.633–0.772)			
	β-coefficient	OR	95 % CI	P
Age	–0.024	0.976	0.9399–1.0130	0.1997
Smoking	0.826	0.438	0.2182–0.8776	0.0199
LVEF	–0.047	0.954	0.9231–0.9865	0.0057
LDL-C	0.301	0.740	0.5557–0.9854	0.0393
Data	**Dependent variable: anxiety**			
	Multivariate linear regression analysis (χ^2=23.02; p<0.0001) AUC=0.695 (0.622–0.762)			
Arterial hypertension	0.942	2.566	1.1823–5.5667	0.0171
LDL-C	0.403	0.669	0.4994–0.8950	0.0068
Data	**Dependent variable: stress**			
	Multivariate linear regression analysis (χ^2=10.85; p=0.028) AUC=0.660 (0.579–0.734)			
Arterial hypertension	0.913	2.492	1.0045–6.1830	0.0489
Dislipidemia	0.649	0.522	0.2465–1.1060	0.0897
Heart rate	–0.023	0.977	0.9534–1.0020	0.0713

AUC – area under the curve; CI – confidential interval; LDL-C – low-density cholesterol; LVEF – left ventricular ejection fraction; OR – odds ratio.

(p=0.0171, p=0.0489), consequently, as well as anxiety – on LDL-C increase (p=0.0068).

Table 4 demonstrates that all data of subclinical emotional distress associated with the frequency of smoking increase: p=0.0422 for depression, p=0.0275 for anxiety and p=0.0199 for stress. Depression is associated with LVEF decrease (p=0.0267), a leucocyte count increase (p=0.0467), and a high frequency of hypertension (p=0.0410). Anxiety is associated with higher heart rate (p=0.0277), depression and stress – with a younger age (p=0.0369).

DISCUSSION

In our investigation, we found that during active hostilities, all forms of subclinical emotional distress, including depression, anxiety, and stress, were linked to a higher prevalence of smoking among patients. Before the onset of combat, smoking was associated only with depression among patients. This finding aligns with a systematic review by Mahase E. in 2019 from Imperial College London and the London School of Hygiene and Tropical Medicine, which identified that war con-

Table 4
Multivariate analysis of subclinical emotional distress during active hostilities in the Kharkiv Region

Data	Dependent variable: depression			
	Multivariate linear regression analysis (χ^2=17.91; p=0.012) AUC=0.815 (0.662 –0.910)			
	β-coefficient	OR	95 % CI	P
Age	–0.147	0.864	0.7770–0.9601	0.0066
Hypertension	3.475	32.313	1.1518–906.5567	0.0410
Smoking	2.106	0.122	0.0160–0.9288	0.0422
Leukocyte count	0.282	0.754	0.5711–0.9959	0.0467
Localization of MI	–0.797	0.451	0.1893–1.0732	0.0718
LVEF	–0.128	0.880	0.7859–0.9853	0.0267
Amount of injured arteries	0.599	1.819	0.9246–3.5822	0.0831
Data	**Dependent variable: anxiety**			
	Multivariate linear regression analysis (χ^2=13.62; p=0.018) AUC=0.809(0.675–0.905)			
DBP	0.122	1.129	0.9845–1.2952	0.0825
Smoking	1.716	0.179	0.0391–0.8268	0.0275
SBP	0.039	0.962	0.9070–1.0204	0.1977
LVEF	–0.085	0.919	0.8304–1.0166	0.1009
HR	0.085	1.088	1.0094–1.1735	0.0277
Data	**Dependent variable: stress**			
	Multivariate linear regression analysis (χ^2=20,22; p=0,0005) AUC=0,925(0.778–0.987)			
Age	–0.256	0.774	0.6086–0.9846	0.0369
Smoking	4.478	0.011	0.0003–0.4931	0.0199
Leukocyte count	0.386	0.679	0.4513–1.0243	0.0650
Amount of injured arteries	1.125	3.080	0.9556–9.9271	0.0596

AUC – area under the curve; CI – confidential interval; DBP – diastolic blood pressure; HR – heart rate; LDL-C – low density cholesterol; LVEF – left ventricular ejection fraction; MI – myocardial infarction; OR – odds ratio; SBP – systolic blood pressure.

flicts correlate with increased risks of CAD, stroke, diabetes, elevated blood pressure, and cholesterol levels, and heightened alcohol and tobacco consumption [15].

Our study also highlighted interesting correlations between depression and a decrease in left ventricular ejection fraction (LVEF), both before and during active conflicts. This observation is supported by the work of R. Bagherian-Sararoudi et al. in 2013, who explored the link between LVEF and the onset of depression post-MI, finding that left ventricular dysfunction is tied to a higher depression risk three months post-MI [16].

M.E. AbuRuz, 2019, researched patients with STEMI who were assessed by the Hospital Anxiety and Depression Scale (HADS) and the Control Attitude Scale-Revised (CAS-R) questionnaires. Authors estimated in-hospital complications depending on the reply and revealed that patients with high depression scores (8–21) were more likely to develop complications (χ^2 = 34.15, p < .001) than those with low depression scores (0–7). Among complications were no separately analysed low ejection fraction [17].

R. Pelletier et al., 2014, studied the association between depression and cardiovascular disease severity

in younger patients. They enrolled 1023 patients (aged ≤55 years) hospitalised with acute coronary syndrome through the GENdEr and Sex Determinants of cardiovascular disease: From bench to beyond-Premature Acute Coronary Syndrome study. Left ventricular EF, Killip class, cardiac troponin I, and Global Registry of Acute Coronary Events score data were collected through chart review. The authors concluded that major depression was associated with a lower likelihood of having an abnormal left ventricular ejection fraction (OR, 0.70; 95 % CI, 0.51–0.97; p=0.03). After adjustment for sociodemographic and clinical characteristics, neither major depression nor depressive symptoms were associated with disease severity indices, and there were no sex differences [18]. In our research, we observed a similar situation – depression and stress associated with a patient's younger age.

S.R. Meisel et al., 1991, showed that during the first days of the Gulf War, a sharp rise in the incidence of acute MI and sudden death was noticed in Israel compared with five control periods [19].

G.F. Lorem et al., 2023, performed epidemiological research concerning participants from the Tromsø Study with a confirmed diagnosis of myocardial infarction. They distinguish patients with post-traumatic stress disorder (PTSD). The authors found no direct association between myocardial infarction as illness trauma and symptom levels (p=0.123). However, they found a significant linear trend (p=0.002), indicating that symptom severity increased proportionately as the number of post-traumatic events increased [20].

N. Singh et al., 2021, evaluated soldiers who sustained STEMI during the strenuous Battle Field Efficiency Test (BPET) and other such activities. At angiography, 20/25 (80 %) patients had non-obstructive epicardial vessels, while 5/25 (20 %) had occluded vessels. The authors revealed that a period of strenuous physical exertion temporarily increased the risk of having an acute coronary syndrome. This robust finding provides strong evidence for comprehensive, graded physical training before strenuous military activities [21].

N.F. Crum-Cianflone et al., 2014, investigated PTSD in young US service members during the war in Iraq and Afghanistan. Authors revealed that combat deployments were associated with new-onset CAD among young US service members and veterans. Experiences of intense stress may increase the risk for CAD over a relatively short period among young adults [22].

H. Al-Makhamreh et al., 2021, investigated the complexity of CAD among Syrian refugee patients referred to Jordan University Hospital and its relation to war-related stressors. The authors evaluated the SYNTAX-I score to indicate a higher complexity of CAD in Syrian war survivors with higher stress scores. As a result, they revealed that exposure to multiple war-related stressors may increase the complexity and severity of CAD [23].

C.J. Boos et al., 2019, conducted a systematic review to find a link between combat and related traumatic injury (TI) to an increased cardiovascular disease (CVD) risk. There is insufficient data to either support or refute an association between combat or combat-related TI and either CVD or an increased burden of cardiovascular risk factors. There is a weak strength of evidence in support of a link between severe combat-related TI and CVD and CAD-related death. There is a need for further data from well-conducted prospective cohort studies following recent combat operations [24].

A.J. Wawrzyniak et al., 2022, distinguished a group of triggers which appeared within 24 hours of MI. There were behavioral triggers (physical activity, sexual activity, alcohol use, cigarette smoking, substance use, and sleep disturbances) and psychological triggers, which were divided into environmental factors (natural disasters, sporting events, and war) and psychological triggers (acute emotional distress, bereavement, work stress, and anger) [25].

D. Miric et al., 2002, compared the following periods: the three years preceding the war, from 1989–1991, during the three years of complete war activities, from 1992–1994, and the three years after the war, from 1995–1997. The authors showed that the number of hospitalised patients with MI was the greatest during the war period. It included significant increase in incidence in men under, with smoking as the most important risk factor, especially for infarctions of inferior site [26].

M.T. Manoj et al., 2018, revealed that depression (35 % vs 20 %, p=0.024), anxiety (41 % vs 14 %, p<0.001) and stress (36 % vs 15 %, p=0.002) had a statistically significant association with MI on comparing cases vs controls. Higher levels of depression, anxiety and stress were associated with an increased risk of MI with OR of 2.790, 6.429, and 3.470, respectively [27].

As for the interpretation of anxiety, such as a risk factor for further cardiac events, D. Benninghoven et al., 2006, considered that a higher level of anxiety may

improve patient compliance and regular medical checkups. However, as a result of their study, the authors showed that cardiac events occurred in 24 of 76 patients during a mean follow-up period of 31 months after MI. The group of anxious patients not only suffered more often from cardiac events, but these events also occurred earlier than in nonanxious patients. Anxious patients were more likely to continue smoking, whereas less anxious patients were more likely to give up smoking [28].

P. Li et al., 2020, after propensity score matching, showed that the anxiety group had a lower incidence of in-hospital mortality (3.0 % vs 4.4 %, p<0.001), cardiac arrest (2.1 % vs 2.8 %, p<0.001), cardiogenic shock (4.9 % vs 5.6 %, p = 0.007), and ventricular arrhythmia (6.7 % vs 7.9 %, p<0.001) than the non-anxiety group. The STEMI subgroup found no differences in in-hospital outcomes (all p>0.05) between the matched groups. So, in conclusion, although authors found that anxiety was associated with better in-hospital outcomes, subgroup analysis revealed that this only applied to patients admitted for NSTEMI instead of STEMI [29].

S.V. Ciric-Zdravkovic et al., 2014, showed that current anxiety and anxious personality structure were strongly associated with the course of coronary heart disease. In particular, this refers to the length of hospital stay and number of hospitalisations [30].

K. Mal et al., 2019, performed a study of participants who suffered from anxiety and depression two weeks prior to their myocardial infarction. Authors showed that depression and anxiety could be risk factors for myocardial infarction in susceptible individuals [31].

H. Santos et al., 2023, showed that pathological stress levels did not predict major adverse cardiovascular events or severity at admission. ACS patients had higher perceived stress levels, as determined by the 10-item Perceived Stress Scale (PSS-10) than the control group. The perceived stress level was not associated with a worse prognosis in STEMI patients [32].

M.D. Gupta et al., 2023, showed that on a 30-day follow-up after STEMI, subjects with moderate/severe stress had higher MACE; however, the difference was non-significant (2.1 % vs 1.04 %; p=0.42). A high prevalence of perceived stress and low well-being index was observed in patients presenting with AMI in India [33].

D. Kosmas et al., 2022, evaluated the stress level before MI. The authors detected the stress level 75, 60, 30, and 15 days before the event. The stress level on the 15th day before MI was the highest [34].

Several found an association of elevated depressive symptoms with WBC-related markers of inflammation. However, the results of these meta-analyses had distinctive conclusions mainly owing to heterogeneity in study design, depressive symptoms measures, potential confounders considered, measured inflammatory markers and sample characteristics [35].

J. Nunes et al., 2021, identified leukocyte levels at admission as independent long-term mortality predictors in both non-STEMI and STEMI patients [36].

Our study uncovered positive associations between leukocyte count and subclinical depression during STEMI's acute phase amid hostilities in the Kharkiv Region, paralleling findings on the relationship between LDL-C levels and depression from previous studies, which suggest LDL-C influences depression through serotonin metabolism alterations [37].

In summary, our research revealed close associations between the data of subclinical emotional distress both in patients with STEMI before and during the active hostilities in the Kharkiv Region. Data were assessed with the DASS-21 questionnaire 10–14 days prior to the event. These results should be undertaken during a general practitioner's appointment to prevent a further cardiovascular event.

CONCLUSIONS

1. Our study showed more frequent anxiety in patients before STEMI during the period of active hostilities.

2. We found that during active hostilities, all forms of subclinical emotional distress, including depression, anxiety, and stress, were linked to a higher prevalence of smoking among patients. Before the onset of combat, smoking was associated only with depression among patients.

3. During active hostilities, the associations of depression with decreased LVEF and a high frequency of hypertension and leukocytosis were shown. Depression and stress are both associated with younger age and anxiety – with high heart rates. Before active hostilities, the associations between depression and decreasing LVEF, anxiety and depression – with high levels of LDL-C, anxiety and stress – with arterial hypertension were less expressed.

There is no conflict of interests.

Author contribution: conception and design – O.P., M.K.; critical revision of the article – M.K.; acquisition of data – I.V.; analysis and interpretation of data – O.P., M.K., I.V.; drafting the article – I.V.

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Порівняльний аналіз субклінічного тривожно-депресивного синдрому в пацієнтів із гострим інфарктом міокарда з елевацією сегмента ST до та під час активних бойових дій у Харківській області

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Мета роботи – оцінити субклінічний емоційний дистрес у пацієнтів із гострим інфарктом міокарда (ГІМ) з елевацією сегмента ST до та під час воєнного конфлікту в Харківській області.

Матеріали і методи. У дослідження залучено 242 пацієнти із субклінічним емоційним дистресом, госпіталізованих з приводу ГІМ з елевацією сегмента ST до ДУ «Національний інститут терапії імені Л.Т. Малої НАМН України» до повномасштабної війни, та 65 пацієнтів – під час воєнних дій. У дослідженні дотримувалися етичних стандартів згідно з Гельсінською декларацією 1964 року та узгоджувального протоколу комітету з етики та деонтології (Протокол №8

від 29.08.2016 та Протокол №4 від 12.05.2022). Учасники дослідження заповнили опитувальник DASS-21, який відобразив їхній емоційний стан за 10–14 днів до інфаркту міокарда.

Результати. Встановлено, що тривожність частіше з'являлась під час активних бойових дій (p=0,0218). Депресія впливала на надмірне куріння (p=0,0199), зниження фракції викиду лівого шлуночка (ФВЛШ) (p=0,0057), підвищення рівня холестерину ліпопротеїдів низької щільності (ХСЛПНЩ) (p=0,0393). Тривожність і стрес впливали на частоту гіпертензії (p=0,0171, p=0,0489 відповідно), як і тривожність – на підвищення рівня ХСЛПНЩ (p=0,0068). Усі дані субклінічного емоційного дистресу під час активних бойових дій асоціювалися з підвищенням частоти куріння: p=0,0422 для депресії, p=0,0275 для тривожності та p=0,0199 для стресу. Депресія асоціювалася зі зниженням ФВЛШ (p=0,0267), підвищенням рівня лейкоцитів (p=0,0467), високою частотою гіпертензії (p=0,0410). Тривожність асоціювалася з більшою частотою серцевих скорочень (p=0,0277), депресія та стрес – з молодим віком виникнення події (p=0,0369).

Висновки. Наше дослідження демонструє щільні асоціації між даними стосовно емоційного дистресу в пацієнтів із ГІМ з елевацією сегмента ST як до, так і під час активних бойових дій у Харківській області. Дані отримані за допомогою опитувальника DASS-21, вони відображають стан пацієнта за 10–14 днів до події. Ці дані можуть отримати лікарі загальної практики на прийомі для запобігання майбутнім серцево-судинним подіям.

Ключові слова: гострий інфаркт міокарда з елевацією сегмента ST, субклінічний емоційний дистрес, активні бойові дії в Харківській області.