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The quality of life assessment and psychological and emotional state of patients with diabetes mellitus and cardiovascular disease in war conditions

T. I. Krytskyy, N. V. Pasyechko, L. V. Naumova, I. P. Savchenko, I. V. Smachylo, A. I. Khomitska
Ivan Horbachevsky Ternopil National Medical University of MOH of Ukraine

Type 2 diabetes mellitus and cardiovascular diseases (CVDs) are among the most common chronic diseases that significantly impair patients' quality of life and increase the risk of serious complications.
***The objective*. To assess the psychoemotional state, in particular the level of anxiety, depressive symptoms, stress, and quality of life in patients with type 2 diabetes mellitus and CVDs.**
***Materials and methods*. The study was conducted at the endocrinology and cardiology departments of the Ternopil Regional Hospital from 2021 to 2024. The study involved 78 male patients aged 30 to 60 with type II diabetes and/or CVD. The psychological and emotional state was assessed using the GAD-7 (anxiety level), BDI (depressive symptoms) scales and the Holmes and Rahe methods for determining stress resistance. The quality of life of patients was assessed using the SF-36 questionnaire.**
***Results*. The results showed a significant decrease in quality of life and stress resistance, as well as an increase in depression and anxiety levels in patients with a combination of type 2 diabetes and CVD compared to patients suffering from only one of these diseases. Patients with comorbidities experienced a significant increase in psychological and emotional stress, indicating the need for a comprehensive approach to treatment, including psychological and emotional support. The psychological and emotional state of patients has a significant impact on their quality of life and the effectiveness of therapy.**
***Conclusions*. Increased levels of stress, depression, and anxiety contribute to the deterioration of patients' overall condition, reduce their ability to cope with chronic diseases, and complicate treatment. It is necessary to integrate psychotherapeutic strategies into the therapeutic process. Further research should focus on the implementation of effective psychotherapeutic techniques aimed at reducing the psychoemotional burden in patients with comorbidities.**
Keywords: *type 2 diabetes mellitus, cardiovascular disease, quality of life, psychoemotional state, anxiety, depression.*

Оцінювання якості життя та психоемоційного стану пацієнтів із цукровим діабетом та серцево-судинними захворюваннями в умовах війни

Т. І. Крицький, Н. В. Пасєчко, Л. В. Наумова, І. П. Савченко, І. В. Смачило, А. І. Хоміцька

Цукровий діабет 2-го типу та серцево-судинні захворювання (ССЗ) належать до найпоширеніших хронічних захворювань, які суттєво погіршують якість життя пацієнтів і підвищують ризик серйозних ускладнень.
Мета дослідження: оцінити психоемоційний стан, зокрема рівень тривоги, депресивні симптоми, стрес та якість життя у пацієнтів із цукровим діабетом 2-го типу та ССЗ.
Матеріали та методи. Дослідження проводили у відділеннях ендокринології та кардіології Тернопільської обласної лікарні у 2021–2024 рр. У дослідженні взяли участь 78 чоловіків віком 30–60 років із цукровим діабетом 2-го типу та/або ССЗ. Психоемоційний стан оцінювали за допомогою шкал GAD-7 (рівень тривоги), BDI (депресивні симптоми) та методів Холмса і Рахе для визначення стресостійкості. Якість життя пацієнтів оцінювали за допомогою опитувальника SF-36.
Результати. Результати показали значне погіршення якості життя та зниження стресостійкості, а також підвищення рівня депресії й тривожності у пацієнтів із супутнім цукровим діабетом 2-го типу та ССЗ порівняно з пацієнтами, в яких діагностовано лише одне з цих захворювань. У пацієнтів із супутніми захворюваннями спостерігалося значне підвищення психоемоційного стресу, що вказує на необхідність комплексного підходу до лікування, що включає психоемоційну підтримку. Психоемоційний стан пацієнтів із зазначеними захворюваннями чинить значний вплив на якість життя та ефективність терапії.
Висновки. Підвищений рівень стресу, депресії та тривоги погіршує загальний стан пацієнтів, знижує їхню здатність справлятися з хронічними захворюваннями та ускладнює лікування. Слід інтегрувати психотерапевтичні стратегії в терапевтичний процес. Подальші дослідження мають бути спрямовані на впровадження ефективних психотерапевтичних методів для зменшення психоемоційного навантаження у пацієнтів із супутніми захворюваннями.
Ключові слова: *цукровий діабет 2-го типу, серцево-судинні захворювання, якість життя, психоемоційний стан, тривога, депресія.*

Diabetes mellitus (DM) is a chronic multisystemic disease characterised by a persistent elevated blood glucose levels due to impaired insulin secretion, reduced tissue sensitivity to insulin, or a combination of these mechanisms [1]. Type 1 DM (T1DM) is caused by autoimmune destruction of pancreatic β-cells, leading to absolute insulin deficiency, while type 2 (T2) diabetes is most often associated with insulin resistance and relative insulin deficiency, which develops against a background of a combination of genetic factors, metabolic changes, excessive body weight, physical inactivity, and eating habits [2, 3]. U. Galicia-Garcia et al. (2020) described

current understanding of the pathophysiology of T2DM as a polyetiological metabolic disease based on a combination of peripheral tissue insulin resistance and pancreatic β-cell dysfunction [4]. Under conditions of excessive nutrient intake, obesity and chronic low-grade inflammation, normal regulation of insulin secretion and sensitivity to it in skeletal muscles, liver and adipose tissue is disrupted. Under the influence of glucose and lipotoxicity, β-cells undergo endoplasmic stress, accumulation of misfolded proteins, and increased formation of reactive oxygen species and activation of ultimate apoptotic pathways, leading to a progressive decrease in their functional mass. An important link in the pathogenesis is mitochondrial dysfunction, which causes impaired oxidative phosphorylation, excessive superoxide formation, and a shift in cellular metabolism towards an increase in the content of lipid intermediate metabolites (diacylglycerols and ceramides), which block the insulin signal at the IRS / AKT (insulin receptor substrate / protein kinase B) pathway level. Intestinal dysbiosis is considered an additional factor that contributes to systemic metabolic inflammation through increased intestinal barrier permeability and lipopolysaccharide uptake. At the liver level, insulin resistance causes insufficient suppression of gluconeogenesis and increased very low-density lipoprotein secretion, which forms a type of atherogenic dyslipidaemia characteristic of T2DM, namely an increase in triglycerides, a decrease in high-density lipoprotein concentration and an increase in the proportion of small dense low-density lipoprotein (LDL) particles. The latter easily penetrate the subendothelial space, oxidise and accelerate the formation of atherosclerotic plaques. In combination with endothelial dysfunction, activation of NF-κB-dependent (Nuclear Factor kappa B) pro-inflammatory cascades and vascular homeostasis disorders, this leads to high cardiovascular risk in patients with T2DM.

The comorbidity of DM with cardiovascular diseases (CVDs) is attracting increasing attention, since patients with carbohydrate metabolism disorders have a significantly higher risk of developing cardiovascular complications than people without diabetes [5]. CVD is the leading cause of morbidity and mortality among people with diabetes, and damage to the cardiovascular system determines the prognosis, rate of progression, and quality of life of these patients. N. Siam et al. (2024) note in their study that the pathophysiological link between diabetes and CVD is multifactorial, as chronic hyperglycaemia causes endothelial dysfunction, activation of oxidative stress, formation of advanced glycation end products and systemic low-grade inflammation, which together accelerate atherogenesis [6]. Insulin resistance and dyslipidaemia, characteristic of T2 diabetes, exacerbate atherosclerotic changes by increasing triglyceride levels, decreasing high-density lipoprotein concentrations, and increasing the proportion of small dense LDL particles that easily penetrate the vascular wall. The combination of DM with arterial hypertension, abdominal obesity, and autonomic dysfunction forms the so-called "cardiometabolic phenotype", which significantly increases the risk of myocardial infarction, ischaemic stroke, chronic heart failure, and peripheral arterial disease. On average, patients with T2 diabetes have a risk of cardiovascular complications that exceeds the same indicator in the general population by 2–3 times. In the long term, diabetes can lead to diabetic cardiomyopathy, which manifests itself in impaired diastolic and later systolic myocardial function even in the absence of ischaemic heart disease, indicating the autonomous role of metabolic disorders in heart pathology.

The situation becomes even more complicated in the context of martial law, when numerous additional stress factors affect the body and psyche of patients with chronic diseases [7–9]. Military action is accompanied by increased psychoemotional tension, a sense of danger, loss of social stability and the usual way of life. A significant proportion of patients face limited access to specialised medical care, a shortage of medicines, and difficulties in regularly monitoring their blood sugar and blood pressure [10, 11]. Lifestyle changes, forced relocation, irregular meals, reduced physical activity, and interruptions in treatment regimens can worsen the course of diabetes and contribute to the progression of CVD. Psychoemotional stress can increase the level of counterinsular hormones, which further complicates glycaemic control [12–14]. Chronic stress increases the frequency of anxiety and depressive disorders, which, in turn, affect the patient's motivation to follow recommendations, monitor their condition, eat a balanced diet, and take prescribed medications on time [15, 16].

In the context of managing patients with DM combined with CVDs, the assessment of quality of life becomes particularly relevant, as it is considered not only as a subjective indicator of well-being, but also as an integral marker of clinical status, adaptive capabilities and treatment effectiveness [17–19]. Quality of life in this category of patients is influenced by a wide range of factors, including metabolic compensation, the presence and severity of cardiovascular complications, physical endurance, psychoemotional state, social support, access to treatment, and the ability to follow medical recommendations in everyday life.

The objective of the study was to assess the psychoemotional state, in particular the level of anxiety, depressive symptoms, stress, and quality of life in patients with T2DM and CVDs.

MATERIALS AND METHODS

The study was conducted at the endocrinology and cardiology departments of the Ternopil Regional Hospital from 2021 to 2024. A total of 78 male patients aged 30 to 60 participated in the study. The study included individuals with T2DM and/or CVD who were under regular medical supervision and were able to comply with the prescribed therapy. The diagnosis of T2DM was confirmed on the basis of medical records and laboratory test results in accordance with current clinical guidelines, with the onset of the disease not preceding the patient's 30th birthday. Cardiovascular pathology was determined by the presence of documented grade I–II arterial hypertension, stable ischaemic heart disease, stable angina pectoris or chronic heart failure of New York Heart Association (NYHA) functional class I–III without signs of decompensation at the time of inclusion.

Table 1

General characteristics of patients by group (M ± SD)

Indicators	Group I	Group II	Group III
Number of patients, N	23	24	31
Age, years	48.2 ± 6.4	47.5 ± 6.1	49.3 ± 5.9
BMI, kg/m^2	30.2 ± 3.5	29.8 ± 4.1	31.0 ± 3.6
Systolic pressure, mmHg	120 ± 10	130 ± 12	140 ± 15
Diastolic pressure, mmHg	75 ± 8	85 ± 10	90 ± 12
Fasting glucose, mmol/L	7.5 ± 1.2	6.0 ± 0.9	8.2 ± 1.3
Heart rate (pulse), beats/min	75 ± 10	78 ± 8	82 ± 12

Notes: p < 0.05 – statistical differences between the parameters studied in comparison; BMI – body mass index; M ± SD – Mean ± Standard Deviation.

The exclusion criteria were: T1DM, diagnosis of diabetes before the age of 30 with possible autoimmune aetiology, NYHA functional class IV heart failure, active oncological or systemic inflammatory diseases, renal or hepatic failure in the stage of decompensation, mental disorders requiring specialised psychiatric care, as well as the use of antidepressants, anxiolytics or other psychotropic drugs during the last three months. Selection was based on an analysis of the outpatient's medical records, electronic medical system and clinical examination.

Patients were divided into 3 groups according to the combination of metabolic and cardiovascular disorders. Group I consisted of 23 patients with T2DM without clinical signs of cardiovascular pathology. Group II included 24 patients with CVD without carbohydrate metabolism disorders (HbA1c < 5.7% and normal fasting blood glucose levels). Group III included 31 patients with a combination of T2DM and CVD. The groups were comparable in terms of age and body mass index (BMI).

In addition to a general examination of patients with T2DM and cardiovascular pathology, tests were performed including electrocardiography, echocardiography (ejection fraction, hypertrophy, diastolic function), blood pressure measurement, BMI and waist circumference. Complete blood counts (haemoglobin, white blood cells, erythrocyte sedimentation rate), urinalysis (protein, glucose, white blood cells), and blood chemistry tests (glucose, proteins, creatinine, lipid profile, electrolytes) were performed. These tests allow for an assessment of cardiovascular and renal function, as well as overall metabolism.

Comparative data on patients, including key clinical indicators, are presented in Table 1.

To assess quality of life, we used the Short Form Health Survey (SF-36) questionnaire, which contains 36 questions divided into 8 domains reflecting physical and psychoemotional health [20]. The results were analysed according to the official methodology with the calculation of physical and mental components. The questionnaire is characterised by high internal consistency (Cronbach's coefficient $\alpha = 0.85–0.95$) and has proven itself in studies of patients with chronic diseases.

Depressive symptoms were assessed using the Beck Depression Inventory (BDI), which contains 21 items with each symptom rated from 0 to 3 points [21, 22]. The results were interpreted according to clinical thresholds: minimal depression (0–13 points), mild (14–19), moderate (20–28) and severe depression (29–63). Anxiety levels were assessed using the Generalized Anxiety Disorder (GAD)-7 scale, which includes 7 items with a rating from 0 to 3 points for each [23, 24]. The results were interpreted according to the standard severity thresholds for the respective instruments [25].

To assess the degree of stress resistance in patients, the Holmes and Rahe method "Determination of stress resistance and social adaptation" was used, consisting of 43 events, each of which was assigned a certain score depending on its importance and complexity [26]. Respondents were asked to review the list of events and mark those that had occurred in their lives over the past year. To determine the level of stress resistance, the scores for all selected events were added up. The results were interpreted as follows: 150–199 points indicate a high level of stress resistance; 200–299 points indicate a threshold level of stress resistance; 300 points and above indicate a low level of stress resistance, indicating high vulnerability to stress factors.

Patients were given officially validated questionnaires in Ukrainian. Statistical analysis was performed using descriptive and comparative statistics. The normality of distribution was assessed using the Shapiro–Wilk test. Correlations between indicators were determined using Pearson's or Spearman's correlation analysis. The level of statistical significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

The SF-36 questionnaire is one of the most widely used tools for assessing health-related quality of life. It allows patients to subjectively assess their physical condition, psychoemotional well-being and ability to perform everyday activities. The SF-36 includes 8 scales that characterise the level of physical functioning, the impact of somatic and emotional factors on the performance of daily roles, pain intensity, overall health, energy potential (vitality), social activity, and mental well-being. The values obtained are summarised in 2 integral indicators: the physical health component and the mental health component. The use of SF-36 in patients with a combination of DM and CVDs is important because it allows assessing not only the degree of metabolic compensation or the severity of somatic pathology, but also the subjective quality of life in conditions of chronic stress and psychoemotional stress.

Table 2

Assessment of quality of life in patients with T2DM and CVDs using the SF-36 scale, N = 78 (M ± SD)

SF-36 questionnaire index	Group I (N = 23)	Group II (N = 24)	Group III (N = 31)
Physical Functioning (PF)	58.14 ± 2.43	54.11 ± 2.63	47.64 ± 3.01
Role-Physical (RP)	62.71 ± 3.12	54.56 ± 3.12	46.13 ± 3.23
Bodily Pain (BP)	68.23 ± 2.65	60.23 ± 3.11	54.23 ± 3.18
General Health (GH)	61.29 ± 2.85	55.27 ± 3.34	48.12 ± 3.01
Vitality (VT)	63.23 ± 2.24	59.98 ± 3.15	49.45 ± 3.19
Social Functioning (SF)	68.24 ± 3.12	63.45 ± 3.35	59.34 ± 3.36
Role-Emotional (RE)	61.63 ± 2.57	58.87 ± 3.17	52.18 ± 3.21
Mental Health (MH)	61.12 ± 2.68	58.23 ± 3.22	54.23 ± 2.54
Physical Component Summary (PCS)	62.59 ± 2.76	56.04 ± 3.05	49.03 ± 3.11
Mental Component Summary (MCS)	63.55 ± 2.65	60.13 ± 3.22	53.80 ± 3.07

Notes: p < 0.05 – statistical differences between the parameters studied in comparison; SF-36 – Short Form Health Survey; T2DM – type 2 diabetes mellitus; CVDs – cardiovascular diseases; M ± SD – Mean ± Standard Deviation.

Table 2 compares 3 groups of patients: those with T2DM (Group I), CVD (Group II), and a combination of both (Group III). The results of the study using the SF-36 questionnaire showed significant limitations in the quality of life and psychoemotional state of patients.

A significant decline in physical functioning in Group III is one of the key features. The physical functioning score in this group was significantly lower, indicating significant limitations in patients' ability to perform daily physical activities. This may be due to the fact that the combination of these diseases exacerbates the decline in physical endurance, making patients more vulnerable to physical exertion. Compared to patients with diabetes and CVD, patients with comorbid conditions have greater difficulty performing simple physical tasks such as climbing stairs, walking long distances, or playing sports.

Another important aspect is role functioning, which is determined by physical condition. Patients in Group III had significantly lower scores on this parameter, indicating difficulties in performing professional duties and participating in other social roles due to physical limitations caused by both diabetes and CVD. This is further confirmed by low pain intensity scores, as patients in Group III reported higher pain intensity compared to other groups. Muscle and joint pain, as well as discomfort caused by CVD, negatively affect patients' ability to perform physical tasks.

Overall health, vitality, and social functioning also declined significantly in patients in Group III, indicating a decrease in their ability to maintain an active lifestyle and participate in social interactions. This may be the result of limitations in physical functioning, pain, and psychoemotional stress caused by chronic diseases.

Mental health in patients with a combination of diabetes and CVD also showed the worst results. This confirms the presence of elevated levels of depression and anxiety among patients in this group, which are characteristic symptoms of chronic diseases. The psychoemotional state of patients is directly related to their ability to follow treatment recommendations and adhere to treatment regimens, which can affect the effectiveness of therapy and improvement in overall health. Patients with T2DM combined with CVD experience high levels of stress, which can complicate glycemic control and drug therapy.

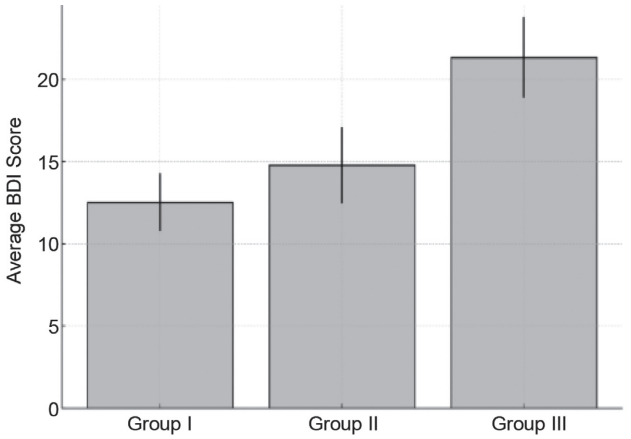

Fig. 1. Level of depression in patients with T2DM and CVDs according to the Beck test results

Notes: BDI – Beck Depression Inventory; T2DM – type 2 diabetes mellitus; CVDs – cardiovascular diseases.

Patients with a combination of T2 diabetes and CVD have significantly lower quality of life scores on all parameters assessed by the SF-36 scale. These data underscore the importance of a comprehensive approach to the treatment of such patients, in particular, taking into account not only physical but also psychoemotional aspects, which play a decisive role in maintaining health and improving the quality of life of patients with diabetes and CVD.

Analysis of depressive symptoms using the Beck questionnaire showed a gradual increase in depression levels depending on the frequency of exacerbations of T2DM and CVDs (Fig. 1).

Patients in Group I, who had only T2DM, showed minimal depressive symptoms (12.53 ± 1.76), indicating relative emotional stability and low psychological distress. Patients in Group II, who suffered from CVDs, showed a moderate increase in scores (14.78 ± 2.32), while in

Group III, which included patients with both diseases, there was a significant increase in the average score to 21.34 ± 2.45, which corresponds to possible moderate depression ($p < 0.05$ compared to Group I). The data obtained confirm the hypothesis that the combination of DM and CVDs significantly contributes to the development of depressive symptoms.

Assessment of anxiety levels using the GAD-7 scale also showed a clear upward trend in patients with a combination of T2DM and CVD (Fig. 2).

In Group I, the average score on the GAD-7 scale was 8.22 ± 2.11, which corresponds to a mild level of anxiety and indicates the presence of moderate anxiety symptoms among patients suffering only from T2DM. This may indicate a more stable emotional state and a relatively low level of psychoemotional stress associated with this disease. Group II includes patients with CVD and the higher anxiety level – 12.75 ± 2.29, which corresponds to a moderate level of anxiety. This indicates increased psychoemotional stress in patients with cardiovascular pathologies, probably due to concerns about their health, the need for constant medical supervision, and restrictions on physical activity. The highest level of anxiety was observed in Group III, which included patients with a combination of T2DM and CVDs. The average score for this group was 19.68 ± 2.34, indicating a pronounced level of anxiety. This indicates a significant increase in psychoemotional stress in patients with 2 chronic diseases that require constant medical supervision, limit physical activity, and increase anxiety due to constant concern for their health.

Using the Holmes and Rahe method, not only was the intensity of stressful events experienced assessed, but also the extent to which the patient is able to cope with the psychoemotional stress arising from these events (Table 3). This is important for understanding the impact of stress on the psychoemotional state of patients with chronic diseases such as T2DM and CVDs.

In Group I, which consisted of patients with T2DM, the majority of patients demonstrated a threshold level of stress resistance (43.5%), indicating a moderate ability to adapt to stress factors. 30.4% of patients had a high level of stress resistance, while 26.1% demonstrated a low level of stress resistance, indicating increased vulnerability to stress. The average score for this group was 185.6 ± 3.2, confirming the presence of a moderate level of stress resistance among patients. Group II, which included patients suffered from CVDs, a higher level of stress resistance was observed compared to Group I. Most patients in this group (58.3%) demonstrated a high level of stress resistance, 33.3% demonstrated a threshold level, and only 8.3% had a low level of stress resistance. The average score for this group was 175.4 ± 2.8, indicating a generally higher level of stress resistance compared to patients in Group I, despite the larger number of patients with high stress resistance. In Group III, which included patients with a combination of T2DM and CVD, the level of stress resistance was significantly reduced. Only 6.5% of patients in this group demonstrated a high level of stress resistance, 19.4% demonstrated a threshold level, while the vast majority (74.1%) had a low level of stress resistance, indicating significant vulnerability to stress factors. The average score for this group was 310.2 ± 4.1, confirming high sensitivity to stress in patients with comorbidities.

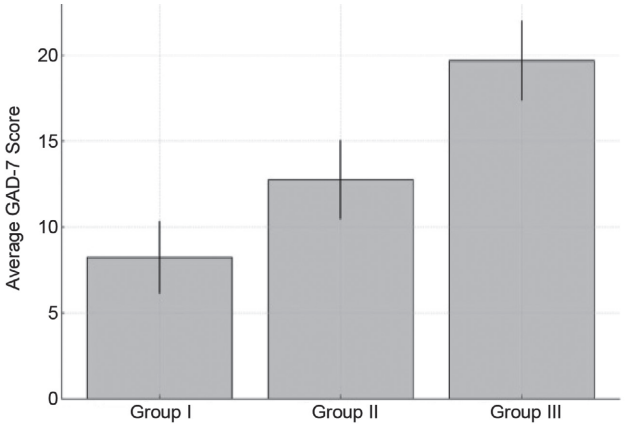

Fig. 2. Anxiety levels in patients with T2DM and CVDs according to the GAD-7 scale

Notes: GAD-7 – Generalized Anxiety Disorder-7; T2DM – type 2 diabetes mellitus; CVDs – cardiovascular diseases.

Table 3

Stress resistance levels in patients with T2DM and CVDs according to the Holmes and Rahe method, N = 78

Level of stress resistance (points)	Group I (N = 23), n (%)	Group II (N = 24), n (%)	Group III (N = 31), n (%)
High (150–199)	7 (30.4)	14 (58.3)	2 (6.5)
Threshold (200–299)	10 (43.5)	8 (33.3)	6 (19.4)
Low (vulnerability) (≥ 300)	6 (26.1)	2 (8.3)	23 (74.1)
M ± SD	185.6 ± 3.2	175.4 ± 2.8	310.2 ± 4.1

Notes: $p < 0.05$ – significant difference between group indicators; T2DM – type 2 diabetes mellitus; CVDs – cardiovascular diseases; M ± SD – Mean ± Standard Deviation.

The results of the study indicate the importance of a comprehensive assessment of the psychoemotional state of patients with a combination of T2DM and CVDs. These patients have significantly lower quality of life and stress resistance indicators, as well as higher levels of depression and anxiety compared to patients with only one of these diseases. The level of stress resistance, depression, and anxiety is closely related to the progression of diseases and can significantly affect the effectiveness of therapy and prognosis. In particular, the combination of 2 chronic diseases significantly reduces the ability of patients to cope with psychoemotional stress, which, in turn, can worsen their general condition and quality of life.

These data confirm the need for a comprehensive approach to treating patients with comorbidities, including not only physical therapy but also psychoemotional support. It is important to consider the psychological state of patients, including their ability to cope with stress, depression, and anxiety, as this can significantly affect treatment outcomes and prognosis. An important area for further research is the development and implementation of psychotherapeutic strategies aimed at increasing stress resistance and alleviating psychoemotional stress in these patients.

CONCLUSIONS

Psychoemotional disorders, such as depression and anxiety have a significant impact on the health of patients with T2DM and CVDs. According to the study results, the combination of these diseases contributes to a significant reduction in patients' quality of life, increased stress levels and deterioration of their psychoemotional state, which can complicate disease management. It is important that psychoemotional support be integrated into the treatment process for such patients. The psychological state of patients, including their ability to cope with stress, depression and anxiety, must be taken into account, as this can affect the effectiveness of therapy.

Information about the authors

Krytskyy Taras I. – Ivan Horbachevsky Ternopil National Medical University of MOH of Ukraine
ORCID: 0000-0002-7476-2775
Pasyechko Nadiia V. – Ivan Horbachevsky Ternopil National Medical University of MOH of Ukraine
ORCID: 0000-0002-2081-4269
Naumova Liudmyla V. – Ivan Horbachevsky Ternopil National Medical University of MOH of Ukraine
ORCID: 0000-0002-3135-3509
Savchenko Iryna P. – Ivan Horbachevsky Ternopil National Medical University of MOH of Ukraine
ORCID: 0000-0002-9687-1219
Smachylo Iryna V. – Ivan Horbachevsky Ternopil National Medical University of MOH of Ukraine
ORCID: 0000-0003-4323-8628
Khomitska Alla I. – Ivan Horbachevsky Ternopil National Medical University of MOH of Ukraine
ORCID: 0009-0007-4654-3608

Відомості про авторів

Крицький Тарас Ігорович – Тернопільський національний медичний університет імені І. Я. Горбачевського МОЗ України
ORCID: 0000-0002-7476-2775
Пасєчко Надія Василівна – Тернопільський національний медичний університет імені І. Я. Горбачевського МОЗ України
ORCID: 0000-0002-2081-4269
Наумова Людмила Валеріївна – Тернопільський національний медичний університет імені І. Я. Горбачевського МОЗ України
ORCID: 0000-0002-3135-3509
Савченко Ірина Петрівна – Тернопільський національний медичний університет імені І. Я. Горбачевського МОЗ України
ORCID: 0000-0002-9687-1219
Смачило Ірина Володимирівна – Тернопільський національний медичний університет імені І. Я. Горбачевського МОЗ України
ORCID: 0000-0003-4323-8628
Хоміцька Алла Іванівна – Тернопільський національний медичний університет імені І. Я. Горбачевського МОЗ України
ORCID: 0009-0007-4654-3608

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