



Yu.I. Feshchenko¹, M.O. Polianska¹, G.L. Gumeniuk^{1,2},
V.I. Ignatieva¹, S.G. Opimakh¹, I.V. Zvol¹, S.M. Moskalenko¹

¹ SO «National Scientific Center of Phthisiatry, Pulmonology and Allergology
named after F.G. Yanovskyi NAMS of Ukraine», Kyiv, Ukraine

² Shupyk National Healthcare University of Ukraine, Kyiv, Ukraine

Features of Psychological Disorders in Patients with Severe Asthma Exacerbations in the Wartime Conditions

The potential harm to lung health due to war is difficult to overestimate. An important factor influencing the course of bronchial asthma is stress and psychological trauma, as well as an increased risk of anxiety and depression, and a high probability of panic attacks, which exacerbate respiratory symptoms and worsen the response to standard therapy.

Objective — to investigate the features of psychological disorders in patients with severe asthma exacerbations in the wartime conditions.

Materials and methods. One hundred patients with severe asthma exacerbations were examined, including 40 military personnel and 60 civilians. All 100 patients were surveyed using the following questionnaires: Asthma Control Test (ACT), Asthma Control Questionnaire (ACQ), mMRC Dyspnoea Scale (Modified British Medical Research Council), PHQ-9 (Patient Health Questionnaire — Depression), Beck Anxiety Inventory, Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and Athens Insomnia Scale (AIS).

Results and discussion. The results of the questionnaire analysis showed that all studied patients had uncontrolled asthma and most of them had clinical signs of depression. All patients had anxiety disorders and, on average, a moderate level of sleepiness, as well as poor sleep quality and subthreshold or moderate insomnia. In comparison with civilians, military personnel with severe asthma exacerbations had significantly worse asthma control, a higher degree of dyspnoea, a higher percentage of patients with clinically significant sleepiness, and severe insomnia. Among military personnel, there was worse sleep quality — (11.9 ± 0.7) points according to the PSQI, (14.8 ± 1.0) points of the ISI, and (13.9 ± 0.9) points of the AIS compared to civilians — (9.9 ± 0.6), (12.3 ± 0.7), and (11.0 ± 0.7) points, respectively ($p < 0.05$). Among civilians, the proportion of patients with clinical signs of depression, clinically meaningful anxiety and severe anxiety is significantly higher.

Conclusions. The features of psychological disorders in patients with severe asthma exacerbations in the wartime conditions are clinically significant depression, severe anxiety, sleep quality disorders, insomnia, and daytime sleepiness in most patients. Clinicians should consider the potential risk of depression, anxiety, sleep problems in asthma patients, and offer appropriate counselling and interventions to patients.

Keywords

Bronchial asthma, stress, exacerbations, depression, anxiety, insomnia, wartime.

The potential harm to lung health due to war is difficult to overestimate. The damage of infrastructure and healthcare capacities, including the respiratory service, creates problems in the treatment of chronic respiratory diseases. During wartime, there are insufficient supplies of medicines, vaccines,

and consumables (such as disposable filter mouthpieces for pulmonary function tests), as well as a deficit of medical personnel and respiratory specialists to treat patients or train others. Air pollution due to building destruction increases the risk of silicosis from prolonged inhalation of silica dust.

Migration, overcrowding and poor hygiene contribute to higher rates of transmission of respiratory infections such as tuberculosis, COVID-19, influenza and respiratory syncytial virus. Energy deficits affect vaccine refrigeration, intensive care equipment, oxygen delivery, non-invasive ventilation, nebulisation, and general equipment maintenance. Solid fuel indoor heating or the use of generators increase air pollution and disproportionately affect vulnerable groups such as children, the elderly and those with a history of respiratory disease. Other risks are stress and psychological trauma, an increased risk of anxiety and depression and a high probability of panic attacks exacerbating respiratory symptoms [19].

There is evidence of a direct link between mental health and asthma [21]. Chronic and persistent exposure to negative stress can lead to adverse health outcomes in general and asthma in particular [13]. Persistent or long-term stress in early life is associated with an increased risk of respiratory diseases such as wheezing and asthma. This is not limited to early life, as significant negative stressful events in childhood and adolescence are prospectively associated with the development of asthma diagnosed in adulthood. Stressors, both acute and chronic, are also associated with both immediate and delayed asthma exacerbations in patients [12].

Persistent psychological stress increases the intensity of inflammatory reactions in response to various environmental triggers. These triggers include living near highways, tobacco smoke, and environmental and indoor allergens. In response to these triggers, the normal homeostatic functions of key physiological systems are disrupted. Current evidence suggests that these triggers may also partially mediate the relationship between stress and asthma and contribute to the exacerbation of the latter [12].

In a mouse model, repeated stress has been shown to increase the involvement of eosinophils, lymphocytes, and activated macrophages in the airways and to increase interleukin (IL)-13 levels in the lungs compared to unstressed mice. Stress also increases airway hyperresponsiveness in mice [21].

Psychological and physiological stress activates the hypothalamic-pituitary-adrenal axis, increasing cortisol levels [13]. Cortisol is generally considered an anti-inflammatory hormone, so there is an apparent paradox between stress-induced cortisol production and worsening of asthma and other inflammatory processes [24]. Glucocorticosteroids (GCS) are the most effective class of anti-inflammatory drugs in asthma therapy. Why does the synthesis of endogenous GCS not contribute to the anti-inflammatory effect?

Endocrine-immune responses differ between acute and chronic stress conditions. In response to

chronic psychological stress, key physiological systems (such as the hypothalamic-pituitary-adrenal axis, the sympathoadrenal system, and the pro-inflammatory immune response) may function at higher or lower levels than under normal homeostasis. The imbalance of these integrated systems can lead to adverse health outcomes. Immune and neuroendocrine protective biological reactions, important for the short-term stress response, can have negative consequences under chronic stress if they continue. Chronic psychological stress, which leads to prolonged activation of the hypothalamic-pituitary-adrenal and sympathoadrenal systems, can lead to a counterregulatory response in stimulated lymphocytes and, as a result, to a decrease in the expression and/or function of glucocorticoid receptors, which leads to functional resistance to GCS. Lymphocytes of patients exposed to chronic stress are more resistant to the effects of hydrocortisone on cytokine expression (IL-5 and IFN- γ) and eosinophil activation than those in the control group [24].

Stress adversely affects asthma by reducing the response to inhaled corticosteroids (ICS) and inhaled β_2 -agonists. Short-term and long-term stress are associated with reduced expression of genes encoding the glucocorticoid receptor (5.5-fold) and β_2 -adrenergic receptors (9.5-fold) in leukocytes of children with asthma [12]. Studies have suggested that endogenous GCS may limit some of the effects of synthetic GCS and contribute to reduced sensitivity to therapy [13].

Most patients with asthma who are refractory to GCS have acquired steroid resistance. Chronic social stress is an environmental factor that can induce functional resistance to GCS in patients with asthma. Stress-induced resistance to GCS may have a number of important clinical consequences. Although patients with asthma have variable responses to GCS, which are the mainstay of asthma treatment, there is a subgroup of severely affected individuals whose symptoms are relatively or completely resistant to even high doses of GCS and who are vulnerable to the side effects of overuse of GCS [24].

Many studies have been conducted to explain the pro-inflammatory effects of GCS. The concentration of GCS is an important factor determining whether they will have a suppressive or activating effect on macrophages. During chronic stress, GCS induce a sustained increase in the inflammasomes in macrophages, which leads to an increase in inflammatory mediators production. GCS have a synergistic effect with TNF in the induction of pro-inflammatory genes from airway epithelial cells, and they can enhance the pro-inflammatory effects of IL-6. Coactivation of GCS receptors with

various pro-inflammatory transcription factors can increase their targets and lead to pro-inflammatory effects [21].

Chronic psychological stress alters innate and adaptive immune responses to a variety of pathogens. Oxidative stress also is implicated in the association between psychosocial stress and steroid-resistant asthma. This may be particularly relevant in persistent or poorly controlled asthma with neutrophilic inflammation. Indeed, oxidative stress has the possibility to contribute to steroid resistance in the context of neutrophilic inflammation [24].

Comorbid anxiety and depression play a crucial role in the interaction between stress and asthma. Asthma and depression or anxiety may have a bidirectional causal relationship. Numerous epidemiological studies have shown that psychological problems, including depression and anxiety, are widespread among patients with asthma, and asthma is a risk factor for developing anxiety or depression even without war. A meta-analysis of 19 studies and 106,813 participants showed that the prevalence of anxiety symptoms in patients with asthma was 32 % (95 % confidence interval (CI) 22–43 %), with a pooled odds ratio (OR) of 1.89 (95 % CI 1.42–2.52), significantly higher than in controls without asthma. A similar association is present between depression and asthma. Based on the World Health Survey, which included 245,404 participants from 60 countries, it was found that 18.1 % (95 % CI 15.9–20.3) of patients with asthma had a comorbid depressive disorder. A retrospective cohort study showed that patients with asthma had a higher risk of comorbid depression than controls (relative risk (RR) 1.25, 95 % CI 1.21–1.29) [4].

Depression and anxiety are associated with an increased risk of asthma (depression: OR 1.34, 95 % CI 1.25–1.44; anxiety: OR 1.45, 95 % CI 1.38–1.52), poorer symptom control, and a reduced likelihood of clinical asthma remission (depression: OR 1.19, 95 % CI 1.04–1.35; anxiety: OR 1.17, 95 % CI 1.06–1.28). Patients with depression/anxiety had more exacerbations (depression: OR 1.31, 95 % CI 1.15–1.50; anxiety: OR 1.30, 95 % CI 1.17–1.44) and more comorbid allergic conditions, including respiratory, skin, and food allergies, compared with those without depression/anxiety [4].

Furthermore, increasing evidence suggests that patients with asthma and depression or anxiety tend to have worse asthma treatment outcomes, such as more frequent attacks, poorer adherence to maintenance treatment, reduced lung function, lower quality of life, and increased risk of asthma-related mortality. Thus, psychiatric disorders and asthma have an important bidirectional relationship, and the mechanisms are complex [4].

Patients with asthma often suffer not only from symptoms of depression and anxiety, but also from panic attacks, which can exacerbate asthma symptoms. Researchers believe that in addition to pathological cellular and molecular immune processes, asthma also has a neural basis. Cyclic symptoms of asthma often lead to insomnia, daytime fatigue, decreased activity, and impaired learning and work. Neural features of asthma include structural and functional changes in brain regions, and have external manifestations of psychological or neurological disease. Neuroimaging and clinical studies have shown that patients with higher activation of the anterior insula had higher inflammatory lung signals in response to psychological stimuli associated with asthma [5].

Several studies have confirmed that depression is an inflammatory disease. The level of peripheral immune inflammation in depressed patients is significantly higher than in healthy individuals, including increased expression of pro-inflammatory cytokines and their receptors. Such impaired levels of peripheral immune inflammation may directly affect brain structure and function. Notably, stress is a common risk factor for the development of asthma and depression. In asthma, stress not only suppresses the immune system of asthmatic patients, but also disrupts the Th1/Th2 cytokine balance, thereby forcing them to switch to a Th2-type immune response. In depression, stress may exacerbate the inflammatory response. The high level of comorbidity of asthma and depression suggests that there is some common pathogenesis between them. The relationship between asthma and its neurophenotype can be explained by the hypothalamic-pituitary-adrenal axis. In addition, stress and negative emotions increase the number of inflammatory mediators. Studies related to depression have also shown that depression is associated with dysfunction of the hypothalamic-pituitary-adrenal axis, and levels of stress hormones such as cortisol are significantly elevated in depressed patients [5].

The course of asthma can be influenced by stress, anxiety, sadness and imposed beliefs, as well as environmental irritants, allergens, exercise and infections, and the increased prevalence of anxiety and depressive disorders. Asthma and these psychological states and traits may mutually reinforce each other through direct psychophysiological mediation, non-adherence to medication regimens, exposure to asthma triggers and inaccurate perception of asthma symptoms, airway resistance and bronchoconstriction, particularly related to stress [20].

During wartime in Ukraine, all factors of severe asthma exacerbations, especially the impact of stress

and the presence of concomitant anxiety and depression, have undergone significant modification for the worse.

Objective — to investigate the features of psychological disorders in patients with severe asthma exacerbations in the wartime conditions.

Materials and methods

The study was conducted at the State Organization «National scientific center of phthisiatry, pulmonology and allergology named after F.G. Yanovkyi National Academy of Medical Sciences of Ukraine». To participate in the study, 130 patients with severe asthma exacerbations were screened, of whom 100 were selected and examined. All examinations were approved by the ethics committee of the Center. All patients were familiarised with the procedures and signed an informed consent form to participate in the study.

Inclusion criteria:

- male or female over 18 years of age;
- severe asthma exacerbation according to the American Thoracic Society/European Respiratory Society (ATS/ERS) [1];
- patients — military personnel and civilians injured as a result of military operations;
- provision of signed informed consent.

The ATS/ERS Working Group defines a severe asthma exacerbation as one that requires urgent action to prevent serious consequences such as hospitalisation or death from asthma. The Working Group recommends that the definition of a severe asthma exacerbation for clinical trials include at least one of the following: (a) use of systemic corticosteroids (SCS) or an increase in their stable maintenance dose for at least three days, and (b) hospitalisation or emergency department visit for asthma requiring the use of SCS [1].

To determine the severity of the course of asthma and assess disease control, patients completed the Asthma Control Test (ACT) [3], the Asthma Control Questionnaire (ACQ) [10], and the modified questionnaire of the British Medical Research Council (mMRC) dyspnoea scale. A total score on the ACT scale < 20 indicates inadequately controlled asthma [3]. According to the ACQ, asthma is inadequately controlled when the score is ≥ 1.50 [10]. The level of dyspnoea is clinically significant when mMRC ≥ 2 points [16].

To detect comorbid depression, patients completed the PHQ-9 (Patient Health Questionnaire — Depression), which identified a depressive episode (DE) and assessed its severity. Total scores of 5, 10, 15, and 20 represent the cut-off values for mild, moderate, moderately severe, and severe depression, respectively. A cut-off value of ≥ 10 points showed

a sensitivity of 88 % and a specificity of 88 % for a major depressive episode [6].

The Beck Anxiety Inventory (BAI) was used to assess anxiety symptoms over the past week. The 21 questions range from zero (not at all anxious) to three (very anxious). The recommended clinical classification of the scores is as follows: 0–7 points indicate minimal anxiety; 8–15 points indicate mild anxiety; 16–25 points indicate moderate anxiety, and 26–63 points indicate severe anxiety. The recommended cut-off for clinically significant anxiety is 16 points [18].

To screen for a possible comorbid obstructive sleep apnoea syndrome (OSAS), patients answered the questions of the Epworth Sleepiness Scale (ESS). For research purposes, clinically significant sleepiness is present if its level on the ESS is > 10 points [17].

The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality and insomnia. The questionnaire assesses sleep quality over the past month based on seven different components: (1) subjective sleep quality, (2) sleep latency, (3) sleep duration, (4) habitual sleep efficiency, (5) sleep disturbance, (6) use of sleeping medications, and (7) daytime dysfunction. Component scores range from zero (no difficulty) to three (severe difficulty), and their sum gives a total score of 0 to 21, with higher values indicating worse sleep quality. A PSQI score of more than five is considered a sign of poor sleep quality [2].

The Insomnia Severity Index (ISI) is a 7-point scale that aims to assess symptoms of insomnia. This scale assesses sleep initiation, sleep maintenance, early morning awakening, interference with daily functioning, perceived severity of sleep disturbance, worry about sleep problems, and satisfaction with sleep patterns. Each item is rated on a 5-point Likert scale (zero = no problem; four = very severe problem), giving a total score of 0 to 28. The total score should be interpreted as follows: no insomnia (0–7), subthreshold insomnia (8–14), moderate insomnia (15–21), and severe insomnia (22–28) points [22].

The Athens Insomnia Scale (AIS) consists of eight items, each rated from 0 to 3 (0: no problem at all, 1: slight problem, 2: moderate problem, 3: very serious problem/did not sleep). AIS scores should be interpreted as follows: no insomnia (0–5), mild insomnia (6–9), moderate insomnia (10–15), and severe insomnia (16–24). There are some differences between the ISI and AIS scales. In particular, the ISI includes some psychological components of insomnia (e.g., anxiety and satisfaction), whereas the AIS includes physiological components (e.g., sleepiness and daytime functioning) [11].

Data collection and mathematical processing were carried out using licensed software products.

Table 1. Level of asthma symptom control in patients with severe asthma exacerbations ($M \pm m$)

Indicator	Main group (n = 40)			Control group (n = 60)		
	Number of patients		Mean	Number of patients		Mean
	n	%		n	%	
ACT, score	—	—	10.7 ± 0.6	—	—	$12.5 \pm 0.5^*$
ACT < 20 points, n	40	100.0 ± 9.3	10.7 ± 0.6	60	100.0 ± 6.3	12.5 ± 0.5
ACQ, score	—	—	2.9 ± 0.1	—	—	2.7 ± 0.1
ACQ ≥ 1.5 points, n	40	100.0 ± 9.3	2.9 ± 0.1	60	100.0 ± 6.3	2.7 ± 0.1
mMRC, score	—	—	2.6 ± 0.1	—	—	$2.3 \pm 0.1^*$
mMRC ≥ 2 points, n	28	70.0 ± 7.2	2.8 ± 0.2	39	65.0 ± 6.2	2.5 ± 0.2

Note. * Statistically significant difference between groups, $p < 0.05$.

Table 2. Assessment of anxiety and depression symptoms in patients with severe asthma exacerbations ($M \pm m$)

Indicator	Main group (n = 40)			Control group (n = 60)		
	Number of patients		Mean	Number of patients		Mean
	n	%		n	%	
PHQ-9, score	—	—	8.1 ± 1.2	—	—	9.8 ± 0.8
> 5 points, n	23	57.5 ± 7.8	—	47	$78.3 \pm 5.3^*$	—
≥ 10 points, n	10	25.0 ± 6.8	—	18	30.0 ± 5.9	—
BAI, score	—	—	26.5 ± 1.7	—	—	29.6 ± 1.5
> 15 points, n	23	57.5 ± 7.8	—	54	$90.0 \pm 3.9^*$	—
0–7 points, n	2	5.0 ± 3.4	—	3	5.0 ± 2.8	—
8–15 points, n	5	12.5 ± 5.2	—	3	5.0 ± 2.8	—
16–25 points, n	9	22.5 ± 6.6	—	17	28.3 ± 5.8	—
26–63 points, n	14	35.0 ± 7.5	—	37	$61.7 \pm 6.3^*$	—

Note. * Statistically significant difference between groups, $p < 0.05$.

Statistical processing was performed using the mathematical and statistical capabilities of MS Excel.

Results and discussion

We conducted a screening of 130 patients to identify patients with severe asthma exacerbations. According to the inclusion criteria, 100 patients were recruited into the study and divided into two groups. The first (main) group consisted of 40 patients — military personnel (38 men and 2 women, mean age (41.1 ± 2.1) years). The second (control) group consisted of 60 patients — civilians (35 men and 25 women, mean age (40.9 ± 2.9) years). The studied groups did not differ in age, but had a statistically significant difference in gender: among the military personnel group, the percentage of men $(95.0 \pm 5.0)\%$ was higher than among civilians $(58.3 \pm 6.4)\%$, $p < 0.05$. To determine the level of asthma symptom control, all 100 patients completed a questionnaire (Table 1).

In all studied patients, asthma had an uncontrolled course, as evidenced by the average ACT score of (10.7 ± 0.6) points in patients in the main group and (12.5 ± 0.5) points in the control group, and asthma

had a significantly worse level of control in the main group, $p < 0.05$. According to the ACQ questionnaire, 100.0 % of patients in both groups had an index of ≥ 1.5 points (inadequately controlled). Patients in the main group had a statistically significantly higher level of dyspnoea on the mMRC scale — (2.6 ± 0.1) points compared to patients in the control group — (2.3 ± 0.1) points, $p < 0.05$.

The assessment of symptoms of depression and anxiety was presented in Table 2. The mean score on the PHQ-9 scale indicated the presence of signs of depression in the studied subjects — (8.1 ± 1.2) points in the main group and (9.8 ± 0.8) points in the control group, with greater severity of symptoms in the control group, but without a significant difference. The value of PHQ-9 > 5 points was observed in 23 $(57.5 \pm 7.8)\%$ of patients in the main group and 47 $(78.3 \pm 5.3)\%$ of patients in the control group and was on average (10.8 ± 1.4) points and (11.2 ± 1.5) points, respectively, which corresponded to manifestations of mild and moderate depression.

The frequency of PHQ-9 values > 5 points was significantly higher among civilian patients, $p < 0.05$. Signs of a major depressive episode (PHQ-9 $\geq$

Table 3. Assessment of symptoms of sleep disorders in patients with severe asthma exacerbations ($M \pm m$)

Indicator	Main group (n = 40)			Control group (n = 60)		
	Number of patients		Mean	Number of patients		Mean
	n	%		n	%	
ESS, score	—	—	12.4 ± 0.9	—	—	10.5 ± 1.1
ESS > 10 points, n	29	72.5 ± 7.1	—	25	$41.7 \pm 6.4^*$	—
PSQI, score	—	—	11.9 ± 0.7	—	—	$9.9 \pm 0.6^*$
PSQI > 5 points, n	39	97.5 ± 2.5	—	46	$76.7 \pm 5.5^*$	—
ISI, score	—	—	14.8 ± 1.0	—	—	$12.3 \pm 0.7^*$
0–7 points, n	6	15.0 ± 5.6	—	18	30.0 ± 5.9	—
8–14 points, n	12	30.0 ± 7.2	—	21	35.0 ± 6.2	—
15–21 points, n	14	35.0 ± 7.5	—	20	33.3 ± 6.1	—
22–28 points, n	8	20.0 ± 6.3	—	1	$1.7 \pm 1.7^*$	—
AIS, score	—	—	13.9 ± 0.9	—	—	$11.0 \pm 0.7^*$
0–5 points, n	3	7.5 ± 4.2	—	12	20.0 ± 5.2	—
6–9 points, n	7	17.5 ± 6.0	—	17	28.3 ± 5.8	—
10–15 points, n	10	25.0 ± 6.8	—	17	28.3 ± 5.8	—
16–24 points, n	20	50.0 ± 7.9	—	14	$23.3 \pm 5.5^*$	—

Note. * Statistically significant difference between groups, $p < 0.05$.

≥ 10 points) were present in a quarter of patients in the main group ($10 (25.0 \pm 6.8) \%$) and almost a third ($18 (30.0 \pm 5.9) \%$) of the control group. According to the literature, among patients with asthma, those with depression have an increased risk of asthma exacerbations and asthma-related emergency department visits [14], which is also observed in our study – the occurrence of severe exacerbations requiring hospitalisation.

Patients with severe asthma exacerbations are characterised by anxiety states, and the average score on the BAI corresponds to its severe level. Only 5.0 % of patients in both groups reported minimal anxiety. The proportion of patients with clinically significant anxiety (> 15 points on the BAI scale) was statistically significantly higher among civilians. Among them, more than half of the patients – 37 ($61.7 \pm 6.3) \%$ – suffered from severe anxiety, which is significantly higher than among military personnel – 14 ($35.0 \pm 7.5) \%$, $p < 0.05$. Our data are consistent with the observations of other authors that in many studies the prevalence of anxiety among patients with asthma ranged from 13.7 to 54.3 %, which is a consistently higher rate than in the general population. Anxiety was associated with poorer asthma control, reduced quality of life and, in some cases, impaired lung function and higher inflammatory markers. Depression was the strongest risk factor for anxiety. In certain subgroups, asthma-related anxiety was associated with increased symptom reporting and exacerbations, even without worsening objective measures of airway obstruction [7].

When studying the symptoms of sleep disorders, it was found that patients with severe asthma exacerbations experience sleepiness, which on average corresponds to its moderate level (Table 3). The average value of the level of sleepiness according to the ESS was (12.4 ± 0.9) points in the main group and (10.5 ± 1.1) points in the control group. At the same time, the score on the ESS > 10 points was observed in 29 ($72.5 \pm 7.1) \%$ of patients in the main group and was on average (14.2 ± 1.2) points, which corresponded to pronounced manifestations of sleepiness and sleep-disordered breathing. In the control group, the score on the ESS > 10 points was observed in 25 ($41.7 \pm 6.4) \%$ of patients and was on average (13.8 ± 1.4) points. The percentage of patients with clinically meaningful sleepiness was statistically significantly higher among military personnel, $p < 0.05$. According to the literature data, the results of other studies indicate that concomitant OSAS worsens lung function in patients with asthma with a subsequent decrease in forced expiratory volume in one second. On the other hand, asthma does not have a significant effect on polysomnography results, but increases daytime sleepiness, assessed by the Epworth sleepiness scale in patients with OSAS [23].

Sleep quality was impaired in the majority of patients with asthma exacerbations. According to the Pittsburgh Sleep Quality Index, military personnel had worse sleep quality – (11.9 ± 0.7) points compared to civilians – (9.9 ± 0.6) points, $p < 0.05$.

The ISI on average indicates subthreshold insomnia in the studied patients, with the degree of sleep disorders being more severe among military personnel — (14.8 ± 1.0) points compared to civilians — (12.3 ± 0.7) points, $p < 0.05$. Only 15.0 % of military personnel and 30% of civilians met the criteria for normal sleep according to the ISI. Severe insomnia was observed in 8 (20.0 ± 6.3) % of military personnel, which was statistically significantly higher compared to civilians (in 1 (1.7 ± 1.7) % of patients), $p < 0.05$.

Analysis of the AIS data followed the same pattern as that of the Insomnia Severity Index. The average level of insomnia was moderate, but was more severe among military personnel — (13.9 ± 0.9) points compared to civilians — (11.0 ± 0.7) points, $p < 0.05$. Severe insomnia was observed in half of the military personnel — 20 (50.0 ± 7.9) %, which was statistically significantly more frequent than among civilians — 14 (23.3 ± 5.5) %, $p < 0.05$.

According to the literature data, insomnia is highly prevalent in patients with asthma and is associated with systemic inflammation, decreased lung function, and increased mortality. Uncontrolled asthma is associated with significantly higher severity of insomnia and higher levels of depression, anxiety, and stress. Asthma control is a stronger independent predictor of insomnia severity. These findings highlight the clinical importance of assessing sleep disturbances in patients with asthma [8]. Comorbid asthma, OSAS, depression, and insomnia are associated multidirectionally with adverse clinical outcomes, worsening control, and increased frequency of asthma exacerbations [15]. Uncontrolled asthma is associated with nocturnal symptoms and awakenings. Sleep apnoea responsible for sleep fragmentation and decreased sleep quality, and insomnia

exacerbates symptoms of anxiety and depression, which in turn increase the risk of asthma exacerbations, thus completing the vicious cycle [9].

Overall, the analysis of the questionnaire results in military personnel and civilians with severe asthma exacerbations showed that all patients had uncontrolled asthma and most of them had clinical signs of depression. All patients had anxiety disorders and, on average, a moderate level of sleepiness, as well as poor sleep quality and subthreshold or moderate insomnia. Military personnel had significantly worse asthma control according to the ACT questionnaire, and a greater degree of dyspnoea according to the mMRC questionnaire. The percentage of patients with a clinically meaningful level of sleepiness was statistically significantly higher among military personnel. According to the Pittsburgh Sleep Quality Index, military personnel had worse sleep quality. The Insomnia Severity Index and Athens Insomnia Scale scores were also higher among military personnel. Among civilians, the proportion of patients with clinical signs of depression, clinically significant and severe anxiety was significantly higher.

Conclusions

The features of psychological disorders in patients with severe asthma exacerbations in the wartime conditions are clinically significant depression, severe anxiety, sleep quality disorders, insomnia, and daytime sleepiness in most patients.

Psychological and sleep assessments are important in the management of asthma. Clinicians should consider the potential risk of depression, anxiety and, sleep problems in asthma patients, and offer appropriate counselling and interventions to patients.

Ethics Declaration. During data collection, analysis, and publication, patient confidentiality was ensured. All patients provided voluntary written consent for the use of their data in the scientific publication.

Funding Sources. The work is a fragment of the scientific research work of the SO «National Scientific Center of Phthisiatry, Pulmonology and Allergology named after F.G. Yanovskyi NAMS of Ukraine» «To investigate the features of the complicated course of the bronchial asthma severe exacerbations in military personnel and civilians injured as a result of military operations, and to work out the technology for their treatment», state registration number 0125U000465 and was carried out with funds from the state budget.

There is no conflict of interest.

Authors' participation: concept and design of the article — Yu.I. Feshchenko, M.O. Polianska; material collection and material processing — V.I. Ignatieva, I.V. Zvol, S.M. Moskalenko; writing and editing of the article — S.G. Opimakh; editing of the article — G.L. Gumeniuk.

References

- Bourdin A, Bjerner L, Brightling C, Brusselle GG, Chanez P, Chung KF, et al. ERS/EAACI statement on severe exacerbations in asthma in adults: facts, priorities and key research questions. *Eur Respir J*. 2019 Sep 28;54(3):1900900. doi: 10.1183/13993003.00900-2019. PMID: 31467120.
- Carpi M. The Pittsburgh Sleep Quality Index: a brief review. *Occup Med (Lond)*. 2025 Apr 4;75(1):14-15. doi: 10.1093/occmed/kqae121. Erratum in: *Occup Med (Lond)*. 2025 Jul 14;75(3):214. doi: 10.1093/occmed/kqaf038. PMID: 40190123; PMCID: PMC11973415.
- Chang MS, Yu I, Park S, Lee JH, Lee SJ, Lee WY, et al. Selection of Representative Questionnaire Items from the Asthma Control Test. *J Pers Med*. 2022 Nov 16;12(11):1913. doi: 10.3390/jpm12111913. PMID: 36422089; PMCID: PMC9693413.
- Chen Y, Cai H, Ye X, Zhu G, Song Y, Abuduxukuer Z, et al. Association of depression, anxiety with asthma outcomes and allergic comorbidities: results from the National Health Interview Survey. *J Affect Disord*. 2025 Nov 15;389:119677. doi: 10.1016/j.jad.2025.119677. PMID: 40516621.
- Chen C, Zhao G, Lv D, An J, Tian C, Zhao Y, et al. Prevalence, Economic Burden, and Neurophenotype of Asthma. *Explor Res Hypothesis Med*. 2023;8(4):359-365. doi: 10.14218/ERHM.2022.00104.
- Cosci F, Christensen KS, Ceccatelli S, Patierno C, Carrozzino D.

- Patient Health Questionnaire-9: A clinimetric analysis. *Braz J Psychiatry*. 2024;46:e20233449. doi: 10.47626/1516-4446-2023-3449. PMID: 38281157; PMCID: PMC11302993.
7. Ferreiro-Posse A, Mendoza-Zambrano E, Tiotiu A, Gonzalez-Barcala FJ. The asthma-anxiety connection: friends or foes? *J Asthma*. 2026 Apr 9;1-5. doi: 10.1080/02770903.2026.2654583. PMID: 41924916.
 8. Günaydin S, Şimşek MH, Bektaş Aksoy H, Şimşek ŞM. Associations Between Asthma Control, Insomnia Severity, and Psychosocial Outcomes: A Cross-Sectional Mediation Analysis. *Healthcare (Basel)*. 2026 May 23;14(11):1446. doi: 10.3390/healthcare14111446. PMID: 42278699; PMCID: PMC13257098.
 9. Lai Y, Zhang X, Dong H, Li M. The interaction effects between depression and sleep status on asthma: a national cross-sectional study. *Front Psychiatry*. 2024 Oct 16;15:1487550. doi: 10.3389/fpsyt.2024.1487550. PMID: 39479594; PMCID: PMC11521870.
 10. McDowell R, Heaney L, Brown T, Bunting B, Burhan H, Chaudhuri R, et al; UK Severe Asthma Registry. An examination of factorial invariance of the Asthma Control Questionnaire among adults with severe asthma. *PLoS One*. 2023 Dec 7;18(12):e0295493. doi: 10.1371/journal.pone.0295493. PMID: 38060586; PMCID: PMC10703262.
 11. Okajima I, Miyamoto T, Ubara A, Omichi C, Matsuda A, Sumi Y, et al. Evaluation of Severity Levels of the Athens Insomnia Scale Based on the Criterion of Insomnia Severity Index. *Int J Environ Res Public Health*. 2020 Nov 26;17(23):8789. doi: 10.3390/ijerph17238789. PMID: 33256097; PMCID: PMC7730071.
 12. Oren E, Martinez FD. Stress and asthma: Physiological manifestations and clinical implications. *Ann Allergy Asthma Immunol*. 2020 Oct;125(4):372-373.e1. doi: 10.1016/j.anai.2020.07.022. PMID: 32717300.
 13. Palumbo ML, Prochnik A, Wald MR, Genaro AM. Chronic Stress and Glucocorticoid Receptor Resistance in Asthma. *Clin Ther*. 2020 Jun;42(6):993-1006. doi: 10.1016/j.clinthera.2020.03.002. PMID: 32224031.
 14. Pickard-Michels T, Adderley NJ, Nagakumar P, Simms-Williams N, Sitch A, Thayakaran R, et al. Association between mental health disorders and asthma exacerbations in adults: a retrospective cohort study in UK primary care. *BMJ Open Respir Res*. 2025 Nov 17;12(1):e003244. doi: 10.1136/bmjresp-2025-003244. PMID: 41253408; PMCID: PMC12625874.
 15. Rhoads SL, Edinger J, Khatriwada A, Zimmer J, Zelarney P, Wechsler ME. The impact of insomnia and depression on asthma control. *J Asthma*. 2024 Oct;61(10):1248-1251. doi: 10.1080/02770903.2024.2335367. PMID: 38526345.
 16. Ribeiro S, Cardoso CS, Valério M, Machado J, Costa J, Rodrigues C, et al. Confirmatory Evaluation of the Modified Medical Research Council Questionnaire for Assessment of Dyspnea in Patients with Chronic Obstructive Pulmonary Disease in Portugal. *Acta Med Port*. 2022 Feb 1;35(2):89-93. doi: 10.20344/amp.15208.
 17. Scharf MT. Reliability and Efficacy of the Epworth Sleepiness Scale: Is There Still a Place for It? *Nat Sci Sleep*. 2022;14:2151-2156. doi: 10.2147/NSS.S340950.
 18. Snodgrass MA, Bieu RK, Schroeder RW. Development of a Symptom Validity Index for the Beck Anxiety Inventory. *Clin Neuropsychol*. 2025 Oct;39(7):1944-1959. doi: 10.1080/13854046.2024.2429162. Epub 2024 Nov 15. PMID: 39545865.
 19. Spinou A, Moxham J, Hamdan E. The impact of war on the respiratory health of civilians in Gaza. *Lancet*. 2025 Nov 29;406(10519):2535-2536. doi: 10.1016/S0140-6736(25)02209-3. PMID: 41308663.
 20. Verma AK, Tripathi S, Tripathi A, Gupta S, Singh A, Tripathi P, et al. Interplay of psychological factors and bronchial asthma: a comprehensive review. *Monaldi Arch Chest Dis*. 2025 Jul 16. doi: 10.4081/monaldi.2025.3208. PMID: 40689585.
 21. Vliagoftis H. Psychological stress and asthma: a new enemy within. *Int Arch Allergy Immunol*. 2014;164(2):109-11. doi: 10.1159/000363447. PMID: 24943960.
 22. Wang S, Jülich ST, Lei X. Latent profile of the insomnia severity index: A longitudinal study. *Sleep Med*. 2024 Mar;115:202-209. doi: 10.1016/j.sleep.2024.02.027. PMID: 38368737.
 23. Wang D, Zhou Y, Chen R, Zeng X, Zhang S, Su X, et al. The relationship between obstructive sleep apnea and asthma severity and vice versa: a systematic review and meta-analysis. *Eur J Med Res*. 2023 Mar 30;28(1):139. doi: 10.1186/s40001-023-01097-4. PMID: 36998095; PMCID: PMC10062016.
 24. Wright RJ. Stress and acquired glucocorticoid resistance: a relationship hanging in the balance. *J Allergy Clin Immunol*. 2009 Apr;123(4):831-2. doi: 10.1016/j.jaci.2009.02.017. PMID: 19348921; PMCID: PMC4807974.

Ю.І. Фещенко¹, М.О. Полянська¹, Г.Л. Гуменюк^{1,2}, В.І. Ігнат'єва¹,
С.Г. Опімах¹, І.В. Зволь¹, С.М. Москаленко¹

¹Державна установа «Національний науковий центр фізичної реабілітації, пульмонології та алергології імені Ф.Г. Яновського НАМН України», Київ

²Національний університет охорони здоров'я України імені П.Л. Шупика, Київ

Особливості психологічних порушень у пацієнтів із тяжкими загостреннями бронхіальної астми в умовах воєнного стану

Потенційну шкоду для здоров'я легень унаслідок війни складно переоцінити. Важливими чинниками впливу на перебіг бронхіальної астми є стрес та психологічна травма, підвищений ризик тривог і депресії, висока ймовірність панічних атак, що загострюють респіраторні симптоми та погіршують відповідь на стандартну терапію.

Мета роботи — дослідити особливості психологічних порушень у пацієнтів із тяжкими загостреннями бронхіальної астми в умовах воєнного стану.

Матеріали та методи. Обстежено 100 пацієнтів із тяжкими загостреннями бронхіальної астми, з них 40 військовиків і 60 цивільних осіб. Усім хворим проведено анкетування за такими опитувальниками: астма-контроль тест, опитувальник контролю астми, шкала задишки (модифікований опитувальник Британської медичної дослідницької ради), опитувальник-анкета здоров'я пацієнта — Депресія, шкала тривоги Бека, анкета Епфорта, Піттсбурзький опитувальник якості сну, індекс тяжкості безсоння, Афінська шкала безсоння.

Результати та обговорення. Аналіз результатів анкетування військовиків і цивільних осіб із тяжкими загостреннями бронхіальної астми виявив, що всі досліджувані хворі мали неконтрольований перебіг астми, більшість — клінічні ознаки депресії. Усі пацієнти мали тривожні розлади та в середньому помірний рівень сонливості, а також погану якість сну. Індекс тяжкості безсоння та Афінської шкали безсоння в середньому в групах свідчили про субпорогове й помірне безсоння. Порівняно з цивільними особами військовикам із тяжкими загостреннями астми притаманний вірогідно гірший контроль астми, більший ступінь задишки, більша частка пацієнтів із клінічно значущим рівнем сонливості, тяжким безсонням. У військовиків була гірша якість сну: $(11,9 \pm 0,7)$ бала за Піттсбурзьким опитувальником якості сну, $(14,8 \pm 1,0)$ бала за індексом тяжкості безсоння, $(13,9 \pm 0,9)$ бала за Афінською шкалою безсоння, тоді як у цивільних осіб відповідні показники становили $(9,9 \pm 0,6)$, $(12,3 \pm 0,7)$ та $(11,0 \pm 0,7)$ бала відповідно ($p < 0,05$). Серед цивільних осіб вірогідно більшою була частка хворих із клінічними ознаками депресії, клінічно значущою та тяжкою тривоги.

Висновки. Особливостями психологічних порушень у пацієнтів із тяжкими загостреннями бронхіальної астми в умовах воєнного стану є клінічно значуща депресія, тяжкий рівень тривоги, порушення якості сну, безсоння та денна сонливість у більшості хворих. Клініцисти мають урахувати потенційний ризик депресії, тривоги й проблем зі сном у пацієнтів з астмою та пропонувати хворим відповідні консультації та втручання.

Ключові слова: бронхіальна астма, стрес, загострення, депресія, тривога, безсоння, воєнний стан.

Контактна інформація / Corresponding author

Опімах Світлана Генріхівна, к. мед. н., ст. наук. співр. відділення діагностики, терапії і клінічної фармакології захворювань легень
<https://orcid.org/0000-0002-4631-2048>
 E-mail: opimakh@ifp.kiev.ua

Ю.І. Фещенко, <https://orcid.org/0000-0002-4505-8287>
 М.О. Полянська, <https://orcid.org/0000-0003-0305-7988>
 Г.Л. Гуменюк, <https://orcid.org/0000-0001-8160-7856>
 В.І. Ігнат'єва, <https://orcid.org/0000-0003-0604-4349>
 І.В. Зволь, <https://orcid.org/0000-0001-8533-2618>
 С.М. Москаленко, <https://orcid.org/0000-0002-0364-2047>

Стаття надійшла до редакції/Received 18.06.2026.
 Стаття рекомендована до опублікування/Accepted 15.07.2026.
 Стаття опублікована / Published 24.09.2026.

ДЛЯ ЦИТУВАННЯ

- Feshchenko YuI, Polianska MO, Gumeniuk GL, Ignatieva VI, Opimakh SG, Zvol IV, Moskalenko SM. Features of Psychological Disorders in Patients with Severe Asthma Exacerbations in the Wartime Conditions. Туберкульоз, легеневі хвороби, ВІЛ-інфекція. 2026;3:5-13. doi: 10.30978/TB2026-3-5.
- Feshchenko YuI, Polianska MO, Gumeniuk GL, Ignatieva VI, Opimakh SG, Zvol IV, Moskalenko SM. Features of Psychological Disorders in Patients with Severe Asthma Exacerbations in the Wartime Conditions. Tuberculosis, Lung Diseases, HIV Infection (Ukraine). 2026;3:5-13. <http://doi.org/10.30978/TB2026-3-5>.