Український журнал клінічної хірургії
The Ukrainian Journal of Clinical Surgery

Ukrainian Journal of Clinical Surgery. 2026. March/April; 93(2):26-29.
DOI: 10.26779/2786-832X.2026.2.26

Compensatory and Adaptive Changes in the Bodies of Patients with Acute Calculous Cholecystitis Under the Influence of Pathological Emotional Processes During the War in Ukraine

V. V. Mishchenko, A. V. Ponomarenko, V. P. Mishchenko
Odessa National Medical University

Abstract

Objective. To determine the influence of pathological emotional processes on the impairment of the body's compensatory and adaptive capabilities in acute calculous cholecystitis during the war in Ukraine.

Materials and methods. In patients with acute calculous cholecystitis, anxiety states and neurotic disorders were diagnosed; well-being, activity, mood, and stress resistance were assessed; and cortisol levels in blood and 24-hour urine were determined.

Results. In cases of acute calculous cholecystitis, high levels of anxiety were observed 3.8 times more frequently in women than in men. Both men and women experienced painful symptoms. Women's self-assessments of well-being, activity, and mood were 1.8 times lower than men's and differed statistically significantly ($p < 0.05$). Women who were vulnerable to stress were 5.9 times more numerous than men. In women, serum cortisol levels exceeded the upper limit of the reference range by 1.3 times, and in men by 1.2 times, and correlated with depression.

Conclusions. Patients with acute calculous cholecystitis exhibited psychoemotional instability, fear, and stress caused by the hostilities in Ukraine. To assess mental health, reactive and trait anxiety, neurotic states, well-being, activity, mood, and stress resilience should be examined. Compensatory and adaptive changes in the bodies of patients with acute calculous cholecystitis under the influence of pathological emotional processes during the war in Ukraine require a comprehensive approach aimed at improving psychosomatic health.

Keywords: emotional processes; compensatory and adaptive changes; acute calculous cholecystitis; the war in Ukraine.

The onset of the active phase of Russia's full–scale invasion of our country has led to an intensified impact of pathological emotional processes on the population. First and foremost, people's mental health deteriorates, and their overall condition is complicated by psycho–emotional instability, fear, and acute and chronic stress. It is precisely due to chronic stress, which is a complex process, that disruptions in cell membrane permeability and mitochondrial function occur at the cellular level.

Assessment of the psycho–emotional state during wartime is aimed at identifying symptoms of anxiety (nervousness, rapid heartbeat, sleep disturbances), depression (fatigue, hopelessness), and post–traumatic stress disorder (flashbacks, avoidance of traumatic situations, hypervigilance) as a normal reaction to abnormal circumstances, as well as changes in worldview, behavior, and physical symptoms (headaches, stomach problems). Based on this assessment , the need for psychological support and rehabilitation is determined for military personnel, civilians, and internally displaced persons to prevent long–term consequences [1, 2].

In clinical practice, mental health can be assessed by evaluating anxiety levels using the STAI (State–Trait Anxiety Inventory) scale based on the Spielberger–Hanin questionnaire, which is designed to measure reactive (situational) and trait anxiety [1, 2].

The authors define trait anxiety as the degree of worry, concern, and emotional tension in response to stressors [3, 4], and state anxiety as the degree of worry, concern, and emotional tension that develops in a specific stressful situation [5, 6].

Trait anxiety is a stable individual characteristic, whereas state anxiety can be quite dynamic in terms of both duration and intensity [7, 8].

It has been demonstrated that adverse environmental factors during wartime act as triggers for potential disruptions in the body's metabolic processes. Each individual's body reacts uniquely to negative epigenetic factors [9, 10].

Thus, a premorbid background in the form of disturbances in the psychoemotional state during the period of full–scale war in Ukraine and the low capacity of the body's compensatory and adaptive mechanisms can trigger the development of a pathology manifested by the clinical picture of acute calculous cholecystitis (ACC).

In the body of a patient with ACH, compensatory and adaptive changes in homeostasis occur [11–13]. However, due to the body's failure to reduce its sustained resistance (active, passive) to the effects of the war environment during the conflict, sustained resistance to the influence of xenobiotics, the stability of external and internal barriers, and personalized reactivity are disrupted; initially functional changes develop, followed by organic disorders [14, 15].

The pathogenetic cycle of CKD development during wartime includes pathological psychoemotional stress,

stress (acute, chronic), vasospasm, hypercoagulation, inflammatory processes, activation of chronic somatic diseases, concomitant pathogenic microflora, vitamin D deficiency, and trace element deficiencies, including magnesium deficiency [13].

Research objective: To determine the impact of pathological emotional processes on impairments in the body's compensatory and adaptive capabilities in patients with chronic kidney disease during the war in Ukraine.

Materials and methods

During the war initiated by Russia on February 24, 2022, the Department of General and Minimally Invasive Surgery at the Odessa Regional Clinical Hospital treated 58 patients with CHD aged 18 to 82 years. There were 44 women (75.9%) and 14 men (24.1%)

The impact of wartime emotional processes on the impairment of the compensatory and adaptive capabilities of the bodies of patients with CHD, as well as their psychosomatic state, was assessed using psychological questionnaires.

The Spielberger–Hanin scale was used to diagnose anxiety states as an informative method for self–assessment of reactive anxiety as a state and trait anxiety as a stable personality characteristic [1, 2].

According to the general interpretation of the scores, the following levels of anxiety were identified: up to 30 points – low, 30–44 points – moderate, 45 points and above – high.

To identify and assess neurotic states across six scales—anxiety, neurotic depression, asthenia, hysterical reaction type, obsessive–phobic, and vegetative disorders—the clinical questionnaire by K. K. Yakhina and D. M. Mendelevich [3] was used. Patients assessed their current condition on a five–point scale: 5 points – this condition has never occurred, 4 points – this condition has rarely occurred, 3 points – sometimes, 2 points – often, 1 point – constantly or always. Then, diagnostic coefficients were summed across all six scales. A score greater than +1.28 indicated good health, while a score less than –1.28 indicated the presence of pathological disorders.

Patients' well–being, activity, and mood were assessed using the SAN method, which derives its name from the initial letters of the three states under study [4].

The extreme degree of expression of the negative pole of a pair of polar words characterizing the psychoemotional state was rated at 1 point, and the extreme degree of expression of the positive pole at 7 points.

The arithmetic mean of the obtained scores was calculated both for all three studied states combined and separately for each state: well–being, activity, and mood.

Stress resilience was determined using the Holmes–Rahe method [6]. The ability to resist stress was assessed based on the total score obtained: 150–199 – high; 200–299 – borderline; 300 and above – low (vulnerability to stress).

Stress leads to an increase in cortisol (the stress hormone) levels in blood serum and 24–hour urine [10]. Reference ranges for serum cortisol levels: morning (7:00–10:00 AM) – 5.0–25.0 μg/dL (138–635 nmol/L); evening (4:00 PM – 8:00 PM) – 3 – 10 μg/dL (2.3 – 11.9 nmol/L). Reference values for free cortisol in 24–hour urine are 20–120 μg/day (55–330 nmol/day). Elevated levels of this hormone indicate depression.

For statistical analysis of the results, the STATISTICA 10 Enterprise Portable (2011, ENG) software was used to calculate the mean (M) and standard deviation (m). The statistical significance of differences in the studied parameters was determined using the Student's t–test at a p–value < 0.05.

The study was conducted in accordance with the ethical standards established in the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards.

The study protocol was approved by the Local Ethics Committee (Meeting No. 6, December 3, 2025). Informed consent was obtained from the patients to participate in the study.

Results

In women with GAD, both situational (reactive) and state anxiety were found to be statistically significantly ($p < 0.05$) more common than in men. The prevalence of low and moderate levels of anxiety in women was 3.2 and 1.3 times lower, respectively, while the prevalence of high levels of anxiety was 3.8 times higher than in men (*Table 1*).

According to the questionnaire developed by K. K. Yakhina and D. M. Mendelevich, the prevalence of neurotic

Table 1. **Distribution of patients with CHD by frequency of detection and degree of anxiety on the Spielberger–Hanin scale, by gender**

Type of anxiety	Degree of anxiety (scores)											
	Patients with CHD											
	Men (n=14)						Women (n=44)					
	up to 30 (low)		30–44 (moderate)		45 and older (high)		up to 30 (low)		31–44 (moderate)		45 and above (high)	
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
Reactive (situational)	5	35.7	8	57.1	1	7.1	3	6.8*	16	36.4	25	56.8*
Personal	7	50.0	4	28.6	3	21.4	9	20.5	12	27.3	23	52.3*
Average	6	42.9	6	42.9	2	14.3	6	13.6*	14	31.8	24	54.5*
Note.	* - $p < 0.05$ compared to the corresponding value in men. The same applies to *Tables 2–4*.											

Table 2. **Distribution of patients with CHD by frequency of neurotic states as determined by the questionnaire by K. K. Yakhin and D. M. Mendelevich, depending on gender**

Neurotic state	Patients with CHD					
	Men (n=14)			Women (n=44)		
	frequency		coefficient	frequency		odds ratio
	abs.	%		abs.	%	
Anxiety	2	14.3	-1.29 ± 0.45	14	31.8*	-1.45 ± 0.43
Neurotic depression	4	28.6	0.23 ± 0.21	25	56.8*	-1.31 ± 0.51
Asthenia	4	28.6	-1.47 ± 0.56	27	61.4*	-1.64 ± 0.36
Hysterical reaction type	3	21.4	1.01 ± 0.43	25	56.8*	0.34 ± 0.12
Obsessive-compulsive disorders	2	14.3	1.16 ± 0.33	13	29.5*	1.03 ± 0.43
Vegetative disorders	2	14.3	0.45 ± 0.42	23	52.3*	0.78 ± 0.13
Average	3	21.4	0.015 ± 0.0008	21	47.7*	-0.375 ± 0.019

Table 3. **Assessment of well-being, activity, and mood in patients with CHD using the SAN method (scores) by gender**

Scale	Patients with CHD	
	Men (n=14)	Women (n=44)
Well-being	3.4 ± 0.18	1.6 ± 0.08*
Activity	3.0 ± 0.15	2.0 ± 0.1*
Mood	3.1 ± 0.16	1.9 ± 0.09*
Average	3.2 ± 0.16	1.8 ± 0.09*

Table 4. **Distribution of patients with CHD by stress resistance level according to the Holmes–Rahe method, by gender**

Stress resistance, points	Patients with CHD			
	Males (n=14)		Women (n=44)	
	abs.	%	abs.	%
High (150–199)	10	71.4	6	13.6*
Threshold (200–299)	2	14.3	2	4.5*
Low (300 and above)	2	14.3	37	84.1*

disorders in patients with CHD (*Table 2*) was 2.2 times higher in women than in men, and this difference was statistically significant ($p < 0.05$). At the same time, the mean diagnostic coefficient for men was +0.015 ± 0.0008, and for women, –0.375 ± 0.019, meaning that both men and women had pathological disorders.

According to the SAN methodology, well–being, activity, and mood in men were rated at (3.2 ± 0.16) points, which is 2.3 times lower than the maximum score of 7 points; in women, the rating was (1.8 ± 0.09) points, which is on average 1.8 times lower than in men, and this difference is statistically significant ($p < 0.005$), and 3.9 times lower than the maximum score of 7 points (*Table 3*).

Men with CHD exhibited high stress resilience (*Table 4*), ranging from 150 to 199 points, and this was observed 5.3 times more frequently in men than in women ($p < 0.05$). Threshold resistance (200–299 points) was observed in men 3.2 times more frequently than in women ($p < 0.05$). At the same time, women exhibited stress vulnerability (300 points or more), meaning that stress resilience in women was low, and it was observed 5.9 times more frequently than in men ($p < 0.05$).

Serum cortisol levels in women with CHD were (875 ± 35.3) nmol/L and exceeded the upper limit of the reference range by a factor of 1.4 ($p < 0.05$). In men with CHD, serum cortisol levels were (825 ± 27.1) nmol/L and exceeded the upper limit of the reference range by 1.3 times ($p < 0.05$).

The 24–hour urinary excretion of free cortisol in women with CHD was (231.1 ± 6.6) μg/day, and in men it was (222.0 ± 7.2) μg/day, which was statistically significantly ($p < 0.05$) higher than the upper limit of normal by 1.9 and 1.9 times, respectively, while an increase of less than 3 times the upper limit of normal cortisol levels in daily urine is observed in cases of chronic anxiety and depression.

Discussion

Assessment using the Spielberger–Hanin scale is the only way to differentiate anxiety as a personality trait and as a state. Situational (reactive) anxiety is assessed as an emotional reaction to a stressful situation. Personality anxiety characterizes the subject's predisposition to a state of anxiety and represents a constitutional threshold that directly correlates with emotional and neurotic breakdowns and psychosomatic illnesses [1, 7].

To influence the pathogenic mechanisms underlying the development of GCH during wartime, women should cultivate a sense of confidence and success and shift the focus from external demands, strictness, and the high importance placed on task–setting toward a meaningful understanding of their activities. Men need to be active, identify motivational aspects of their activities, show interest, and develop a sense of responsibility in solving various tasks [3, 8].

Based on the value of the final indicator, one can assess the level of current anxiety in a patient with GAD, determine whether they are under the influence of stress, and assess the intensity of this influence. Both men and women with CHD during the period of military operations in Ukraine experience pathological disorders, which is associated with the etiopathogenic mechanisms of this condition's development.

Thus, during the war in Ukraine, the functional state of the female body exhibits negative characteristics compared to that of the male body, which explains the statistically significant increase in the incidence of CHD among women during this period. The development of various somatic diseases, including GCS, during martial law—a period characterized by the combined effects of stressful situations—depends on an individual's ability to cope with stress. Cortisol (a stress hormone) is one of the most important glucocorticosteroids, whose primary effects include increasing blood glucose levels, as well as anti–inflammatory and immunosuppressive actions. Hypercortisolism correlates with the development of depression [5, 9].

Conclusions

1. The general condition of patients with gallstone disease, which clinically manifests as gallbladder disease, deteriorates during the period of full–scale war in Ukraine due to psycho–emotional instability, fear, and acute and chronic stress.

2. To assess mental health, reactive and trait anxiety, neurotic states, well–being, activity, mood, and stress resilience should be examined.

3. Compensatory and adaptive changes in the body manifesting as psychoemotional disturbances in GCH during the period of military operations in Ukraine require a comprehensive approach aimed at improving psychosomatic health.

Funding. No sponsorship was involved in conducting the scientific research or in the process of preparing the article for publication**.**

Authors' contributions. Mishchenko V. V. – research concept and design; Ponomarenko A. V. – data collection and processing; Mishchenko V. P. – analysis of results, writing of the text.

Conflict of interest. None.

Consent to publication. All authors have read the final draft of the manuscript and consented to its publication.

References

1. Vavryniv OL, Khrystuk OL. Research on psychoemotional states of the personality under the influence of stress factors. Scientific Bulletin of the Lviv State University of Internal Affairs. 2023 Dec;(2): 11-4. Ukrainian. doi: 10.32782/2311-8458/2023-2-2.
2. Kovalchuk ZYa. Socio-psychological safety as an organizational condition for restoring mental health. Habitus. 2025;69(2):95-100. Ukrainian. doi: 10.32782/2663-5208. 2025.69.2.18.
3. Kulchytska A, Polikarchyk S. Psychological analysis of the problems of psycho-emotional states of individuals in the conditions of separation. Habitus. 2023; 41: 133-45. Ukrainian. doi: 10.29038/2227-1376-2023-41-kyl.
4. Mazyar OV, Nedzelska LV. Research on the emotional profile of attachment. Personality Psychology. 2021 Jan;1:155-9. Ukrainian. doi: 10.32843/2663-5208.2021.21.27.
5. Tan TX, Liu Y, Zhang Q, Li G, Chen X, Li J. Affective Representation of Early Relationships with Parents and Current Anxiety and Depression. J Genet Psychol. 2022 Mar-May;183(3):235-49. doi: 10.1080/00221325.2022.2043231. Epub 2022 Feb 26. PMID: 35220918.
6. Khurtenko OV. Analysis of the main approaches to understanding the phenomenon of emotional stability of the individual in foreign psychology. Prospects and innovations in science. 2023;(16):629-38. Ukrainian. doi:10.52058/2786-4952-2023-16(34)-629-638 .
7. Whissel C Emotion and the Body. In: Whissell C. Engaging with Emotion. Springer, Cham;2023:65-87. ISBN:‍978-3031213977.
8. Greenbaum RL, Deng Y, Butts MM, Wang CS, Smith AN. Managing my shame: Examining the effects of parental identity threat and emotional stability on work productivity and investment in parenting. J Appl Psychol. 2022 Sep;107(9):1479-97. doi: 10.1037/apl0000597. Epub 2021 Oct 14. PMID: 34647781.
9. Dennis CPL. Emotional Stability and Motivation of 21st Century Learners: A Comparative Review of Learning Theories. Quantum J Soc Sci Human. 2022;3(6):68-80. doi:10.55197/qjssh.v3i6.190.
10. Voitenko OV, Tkachuk TL. Psychological effects of combat stress on military servicemen. Likars'ka Sprava. 2017;(7):141-6. Ukrainian. doi: 10.31640/LS-2017(7)27.
11. Gomes CA, Junior CS, Di Saverio S, Sartelli M, Kelly MD, Gomes CC, et al. Acute calculous cholecystitis: Review of current best practices. World J Gastrointest Surg. 2017 May 27;9(5):118-26. doi: 10.4240/wjgs.v9.i5.118. Erratum in: World J Gastrointest Surg. 2017 Oct 27;9(10):214. doi: 10.4240/wjgs.v9.i10.214. PMID: 28603584; PMCID: PMC5442405.
12. Hall BR, Armijo PR, Krause C, Burnett T, Oleynikov D. Emergent cholecystectomy is superior to percutaneous cholecystostomy tube placement in critically ill patients with emergent calculous cholecystitis. Am J Surg. 2018 Jul;216(1):116-9. doi: 10.1016/j.amjsurg.2017.11.002. Epub 2017 Nov 3. PMID: 29128102.
13. Pisano M, Allievi N, Gurusamy K, Borzellino G, Cimbanassi S, Boerna D, et al. 2020 World Society of Emergency Surgery updated guidelines for the diagnosis and treatment of acute calculus cholecystitis. World J Emerg Surg. 2020 Nov 5;15(1):61. doi: 10.1186/s13017-020-00336-x. PMID: 33153472; PMCID: PMC7643471.
14. Oksyutovych M, Melnychuk D. Constructive strategies of individual behavior in psychogenic crisis situations. Scientific notes of the University "KROK". 2023;(1): 253-60. Ukrainian. /doi: 10.31732/2663-2209-2022-69-253-260.
15. Psychological assistance in conditions of military action. Psychological Bulletin No. 3. Kyiv: Scientific and Methodological Center of the Higher Education Institution; 2023. 202 p. Ukrainian.

Received 28.11.25