ORIGINAL ARTICLE

CONTENTS

The impact of psychoemotional state on the intensity and nature of pain after hysteroscopic myomectomy

Olena O. Lytvak[1], Liliia I. Martynova[2], Dmytro O. Govsieiev[2]

[1]STATE INSTITUTION OF SCIENCE «CENTER OF INNOVATIVE HEALTHCARE TECHNOLOGIES» STATE ADMINISTRATIVE DEPARTMENT, KYIV, UKRAINE

[2]BOGOMOLETS NATIONAL MEDICAL UNIVERSITY, KYIV, UKRAINE

ABSTRACT

Aim: To assess the impact of psychoemotional status indicators (state anxiety, trait anxiety, and depression) on the intensity and duration of postoperative pain syndrome in patients after hysteroscopic myomectomy, and to determine their prognostic value for optimising analgesic management under conditions of wartime stress.

Materials and Methods: Ninety reproductive-age patients with submucosal uterine fibroids were examined. Group 1 (n=62) included women living under wartime stress in Ukraine: subgroup 1.1 (n=32) internally displaced persons and subgroup 1.2 (n=30) residents of Kyiv. Group 2 (n=28) comprised Ukrainian women temporarily living abroad who returned to Kyiv for planned surgery. Psychoemotional status was assessed using the Spielberger–Hanin and Beck scales, and pain using the NRS scale. Statistical analysis used nonparametric methods and ROC analysis.

Results: Anxiety levels differed significantly between all groups ($p<0.001$), highest in internally displaced persons. Subgroups 1.1 and 1.2 had higher NRS pain scores and required the maximum daily dexketoprofen dose (150 mg) compared with group 2. ROC analysis showed state anxiety strongly predicts acute pain intensity (AUC=0.804), while depression predicts pain duration in the outpatient setting (AUC=0.860).

Conclusions: Wartime stress significantly modulates pain perception by lowering the pain threshold even during hysteroscopic myomectomy. State anxiety correlates with acute postoperative pain intensity, while depressive states are associated with prolonged pain and the risk of chronification. These findings support personalised analgesia that considers patients' psychoemotional profiles.

KEY WORDS: uterine fibroids, psychoemotional state, hysteroscopy, pain

Wiad Lek. 2026;79(6):1266-1272. doi: 10.36740/WLek/222586 DOI

INTRODUCTION

Contemporary concepts of pain have undergone significant changes over recent decades. Whereas pain was previously considered a direct consequence of tissue damage and a reflection of its intensity, this view has now been revised. The modern biopsychosocial model regards pain as a complex phenomenon shaped not only by physical tissue alterations but also by the patient's psychological characteristics and environmental factors [1, 2].

Despite advances in analgesia, the lowest level of satisfaction with postoperative pain management is observed among gynaecological patients [3]. This is particularly relevant for women after hysteroscopic myomectomy, as the intensity of postoperative pain in this cohort does not always directly reflect the extent of surgical intervention [4]. Despite the minimally invasive nature of the procedure, pain perception is largely modulated by individual psychoemotional characteristics, anxiety levels, expectations regarding surgery, as well as neuroendocrine mechanisms of the stress response [5]. Moreover, interventions involving the uterus as an organ that plays a key role in reproductive function may be associated with increased psychoemotional sensitivity in patients, which affects the subjective perception of pain [6, 7].

At the same time, this issue becomes particularly relevant for women in Ukraine under wartime conditions. Chronic stress associated with the prolonged psychotraumatic impact of war is accompanied by dysregulation of the neuroendocrine response, alterations in the hypothalamic–pituitary-adrenal axis, and increased anxiety, which may modulate the intensity and qualitative characteristics of pain syndrome [8–10].

As a result, even minimally invasive interventions may be associated with more pronounced and variable pain perception.

AIM

To assess the impact of psychoemotional status indicators (state anxiety, trait anxiety, and depression) on the intensity and duration of postoperative pain syndrome in patients after hysteroscopic myomectomy, and to determine their prognostic value for optimising analgesic management under conditions of wartime stress.

MATERIALS AND METHODS

A total of 90 patients of reproductive age with submucosal uterine fibroids who underwent hysteroscopic myomectomy were included in this pilot study. To assess the characteristics of postoperative pain syndrome under different psychosocial contexts, the patients were divided into groups: Group 1 (main group, n=62) included patients living under chronic wartime stress in Ukraine. Depending on living conditions, this group was subdivided into subgroup 1.1 (n=32) – internally displaced women from frontline territories, and subgroup 1.2 (n=30) – residents of Kyiv. Group 2 (comparison group, n=28) consisted of Ukrainian women temporarily residing abroad who arrived in Kyiv for planned surgical intervention.

Inclusion criteria: verified submucosal uterine fibroid accompanied by clinical symptoms (in particular, menstrual cycle disorders and pain syndrome) and constituting an indication for surgical treatment; feasibility of applying a unified postoperative analgesia protocol; provision of informed voluntary consent to participate in the study, including psychometric testing.

Exclusion criteria: regular use of psychotropic drugs (neuroleptics, tranquillizers) that could distort the assessment of pain and psychoemotional status; presence of chronic pain syndromes of other localisation; contraindications to the use of drugs included in the standard analgesic regimen (dexketoprofen, paracetamol); patient refusal to continue participation in the study or inability to complete assessment at the outpatient stage.

Assessment of psychoemotional status was performed in the preoperative period using validated psychometric instruments. Levels of state anxiety (SA) and trait anxiety (TA) were determined using the Spielberger–Hanin scale (1978). The results were interpreted as follows: up to 30 points – low anxiety; 31–45 points – moderate anxiety; 46–80 points – high anxiety.

Depressive symptoms were assessed using the Beck Depression Inventory (BDI). Scores were interpreted as follows: 0–9 points – no depression; 10–18 points – mild; 19–29 points – moderate; 30–63 points – severe depression.

Pain intensity was assessed using the Numeric Rating Scale (NRS). Patients subjectively rated pain severity from 0 (no pain) to 10 (maximum intensity pain).

Statistical analysis of the results was performed using non-parametric methods. Quantitative data are presented as the median (Me), interquartile range [Q1; Q3], and the 10th and 90th percentiles (P10–P90). Comparisons between three independent groups were conducted using the Kruskal–Wallis test. Pairwise comparisons were performed using the Mann–Whitney U test with Bonferroni correction. Categorical variables across three groups were compared using Fisher's exact test. Pairwise comparisons were pre-specified based on the study design and clinical rationale, therefore, no correction for multiple comparisons was applied. Pairwise post-hoc comparisons were performed using Fisher's exact test or Pearson's χ^2 test, depending on the expected cell frequencies (Fisher's exact test was applied when any expected cell count was less than 5). The predictive ability of psychoemotional indicators for pain intensity and duration was assessed using ROC analysis with calculation of the area under the curve (AUC) and determination of the 95% confidence interval (CI). A p-value <0.05 was considered statistically significant.

ETHICS

The study was conducted in accordance with the principles of the Declaration of Helsinki and the standards of good clinical practice. All patients were informed about the purpose of the study, the character of the examinations performed, and the anonymous use of aggregated data for scientific analysis. Written informed consent was obtained from all participants prior to inclusion. The study protocol was approved by the local bioethics committee of the participating institution.

FRAMEWORK

The study was conducted during 2025–2026 within the framework of the research project "Optimization of approaches to providing specialized medical care for surgical patients using personalized anesthetic support" (state registration No. 0125U000315), based at the gynaecological department of the State Institution of Science «Center of innovative healthcare technologies» State Administrative Department. The study was also carried out in accordance with the research theme of the Department of Hospital Obstetrics at Bogomolets National Medical University, "Modern approaches to

Table 1. Indicators of Psychoemotional Status of Patients in the Study Groups Before Surgical Intervention

Parameters (points)	Subgroup 1.1		Subgroup 1.2		Group 2		p
	Me [Q1;Q3]	P10–P90	Me [Q1;Q3]	P10–P90	Me [Q1;Q3]	P10–P90	
State anxiety	62.5[51;75]	47 – 78	51[43.5;56]	36 – 64	42[35;46]	28 – 54	p_1<0.001 p_2<0.001 p_3<0.001
Trait anxiety	50[42;56]	29 – 66	34.5[30;39]	22 – 44	26.5 [22;34]	20 – 45	p_1<0.001 p_2<0.001 p_3=0.009
Depression	22.5[11;27]	8 – 38	11.5[8;14]	6 – 32	27.5 [17;41]	8 – 48	p_1=0.003 p_2=0.023 p_3<0.001

Notes: Data are presented as Me [Q1; Q3], as well as P10–P90 (10th and 90th percentiles). Statistical significance between groups was assessed using the Kruskal–Wallis test with subsequent pairwise comparisons using the Mann–Whitney U test; p_1 – level of significance for comparisons between subgroup 1.1 and 1.2; p_2 – between subgroup 1.1 and group 2; p_3 – between subgroup 1.2 and group 2

Source: compiled by the authors of this study

diagnosis, treatment, and prevention of obstetric and gynaecological diseases: perinatal and maternal aspects, immunology of women's health, homeostasis, reproductive potential, and the impact of somatic health on the condition of the mother, foetus, and newborn" (state registration No. 0125U000002), at the gynaecological department of the Municipal Non-Profit Enterprise "Kyiv Perinatal Centre".

RESULTS

The first stage of the study involved a comprehensive analysis of the baseline psychoemotional status of patients prior to surgery. Given that the modern concept of pain formation is based on the biopsychosocial model, verification of anxiety and depression levels was necessary to further determine their role in modulating postoperative pain perception. The summarised results of the comparative analysis of anxiety and depression indicators in the study groups are presented in Table 1.

The analysis between the study groups demonstrated statistically significant differences in the level of state anxiety (H=37.29; p<0.001), trait anxiety (H=37.59; p<0.001), and depression (H=21.19; p<0.001). According to pairwise comparisons, state and trait anxiety differed significantly between all study groups. Regarding depression levels, statistically significant differences were also observed between all groups; however, the least pronounced difference was found between groups 1.2 and 2 (Table 1).

The next stage of the study focused on evaluating the impact of the identified psychoemotional disturbances on pain levels in the postoperative period. Analysis of pain intensity using the NRS scale and the amount of analgesic consumption allowed assessment of the effectiveness of the standard analgesic regimen under different levels of stress load. Particular attention was paid not only to the subjective perception of pain during hospital stay, but also to the need for additional analgesia and the duration of pharmacological support after discharge to the outpatient rehabilitation stage.

The clinical characteristics of the pain syndrome and the structure of drug consumption in the study groups are presented in Table 2.

Analysis of the distribution of postoperative pain intensity according to the Numeric Rating Scale (NRS) between the study groups demonstrated statistically significant differences (χ^2=17.520; df=4; p=0.002). The obtained data indicate that the structure of pain intensity differed substantially between groups. In particular, in Group 2, the proportion of patients with mild pain was higher compared with subgroups 1.1 and 1.2, whereas these subgroups showed a higher proportion of patients with severe pain compared with Group 2. At the same time, in all groups, patients with moderate pain predominated, with no statistically significant differences observed between groups for this category. Thus, Group 2 demonstrated a shift in distribution towards lower pain intensity, whereas subgroups 1.1 and 1.2 were shifted towards higher NRS values.

Comparative analysis of the distribution of baseline analgesic doses on the first postoperative day revealed a statistically significant difference between the study groups (χ^2=20.091; df=4; p<0.001). In Group 2, a greater proportion of women achieved adequate analgesia with 50 mg dexketoprofen compared with subgroups 1.1 and 1.2. In contrast, subgroups 1.1 and 1.2 were characterised by a predominance of patients requiring a daily dose of 150 mg.

It was established that the frequency of additional analgesia requirements also differed significantly between

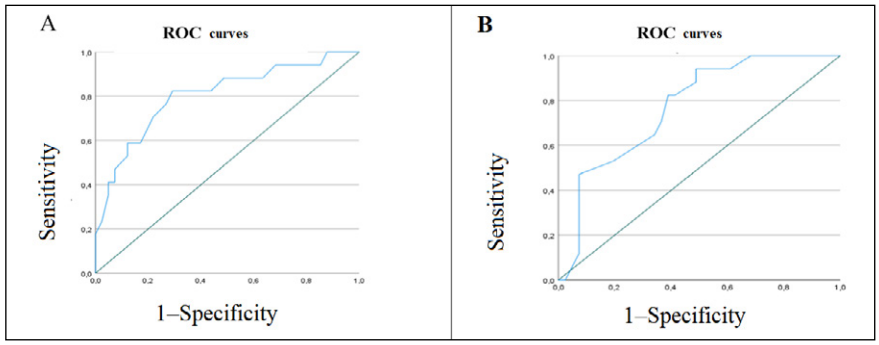

Fig. 1. ROC curves for assessing the predictive ability of anxiety regarding postoperative pain intensity: A – state anxiety; B – trait anxiety
Picture taken by the authors

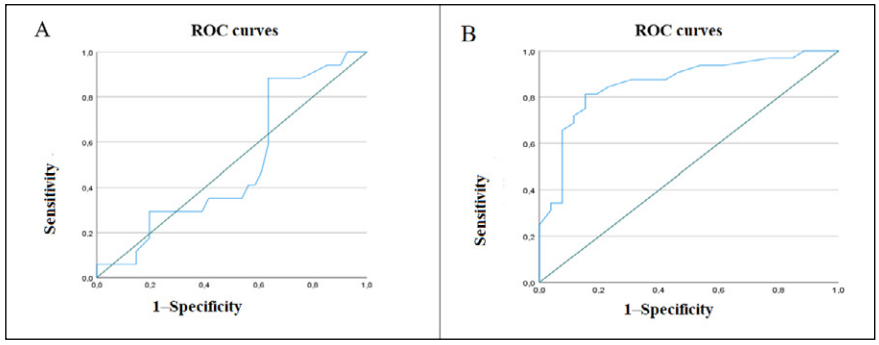

Fig. 2. ROC curves for assessing the predictive ability of depression level: A – for predicting postoperative pain intensity (AUC=0.506); B – for predicting the duration of postoperative pain syndrome (AUC=0.860)
Picture taken by the authors

groups (χ^2=12.857; p=0.02), with a consistent decrease from subgroup 1 to Group 2, confirmed by a significant linear trend (p<0.001). Thus, in subgroup 1.1, 37.5% (95% CI: 21.1–56.3) of patients and in subgroup 1.2, 30% (95% CI: 14.7–49.4) required additional analgesia during the first postoperative day. In Group 2, no need for additional analgesia was observed.

After discharge, the need for oral analgesia was present in almost all women; however, the requirement for additional analgesia during this period was observed in 18.8% (95% CI: 7.2–36.4) of patients in subgroup 1.1 and 17.9% (95% CI: 6.1–36.9) of patients in Group 2.

Analysis of the duration of analgesic use during the outpatient period demonstrated a between-group difference at a statistically significant level (H=50.5; p<0.001). Further pairwise analysis using the Mann–Whitney U test with Bonferroni correction showed that patients in subgroup 1.1 and Group 2 used analgesics for a longer period than those in subgroup 1.2 (Table 2).

Given the identified significant differences in pain intensity and duration of analgesic support between groups, the next stage of the study involved determining the prognostic significance of each component of psychoemotional status. Considering the modern pain model assumes a complex interaction between the psychological domain and the nociceptive system, it became necessary to objectify which indicators—anxiety or depression—have higher discriminative ability in predicting the severity of the postoperative course.

The results of the prognostic model evaluation for anxiety and depression indicators are presented in Fig. 1 and Fig. 2.

According to the ROC curve analysis, the level of state anxiety demonstrated good predictive ability for the development of severe postoperative pain (AUC=0.804; 95% CI: 0.673–0.935; p<0.001). The obtained results indicate that an increased level of state anxiety is associated with a higher probability of developing an intense pain syndrome in the postoperative period.

Additionally, ROC curve analysis showed that trait anxiety also has predictive value for the development of severe postoperative pain (AUC=0.770; 95% CI: 0.647–0.894; p=0.001). However, its discriminative ability was slightly lower compared with state anxiety, indicating a more pronounced influence of the current psychoemotional state on pain formation.

The ROC curve analysis showed that the level of depression does not have predictive value for the development of severe postoperative pain (AUC=0.506; 95% CI: 0.347–0.666; p=0.939). These findings indicate the absence of a statistically significant association between depressive symptoms and pain intensity in the postoperative period.

However, ROC curve analysis demonstrated a high predictive ability of depression level regarding the duration of postoperative pain syndrome (AUC=0.860; 95% CI: 0.761–0.959; p<0.001). It was found that depressive symptoms are associated with a prolonged pain course and may be considered a risk factor for pain chronification.

The conducted ROC analysis allowed for the mathematical confirmation of the role of the current emotional state in modulating the acute pain response, as well as the assessment of the impact of depressive states on

Table 2. Comparative characteristics of postoperative pain intensity and parameters of analgesic support in patients of the study groups

Parameters		Subgroup 1.1 (n=32)	Subgroup 1.2 (n=30)	Group 2 (n=28)	p
NRS (postoperative)	1	1 (3.1%)	1 (3.3%)	6 (21.4%)	p_1=1,000 p_2=0,043 p_3=0,048
	2	18 (56.3%)	14(46.7%)	20 (71.4%)	p_1=0,612 p_2=0,287 p_3=0,067
	3	13 (40.6%)	15(50%)	2 (7.1%)	p_1=0,610 p_2=0,003 p_3<0,001
Analgesic dose (dexketoprofen), 1st postoperative day	1	0 (0%)	1 (3.3%)	7 (25%)	p_1=0,484 p_2=0,003 p_3=0,023
	2	24 (75%)	20 (67.7%)	20 (71.4%)	p_1=0,759 p_2=0,778 p_3=0,780
	3	8 (25%)	9 (30%)	1 (3.6%)	p_1=0,778 p_2=0,029 p_3=0,013
Need for additional analgesia (paracetamol), 1st postoperative day		12 (37,5%)	9 (30.0%)	0 (0%)	p_1=0.522 p_2<0.001 p_3=0.002
Oral analgesia (outpatient period)		32 (100%)	22 (73.3%)	28 (100%)	p_1=0.001 p_2=1.000 p_3=0.005
Need for additional analgesia (outpatient period)		6 (18,8%)	0 (0%)	5 (17.9%)	p_1=0.024 p_2=1.000 p_3=0.021
Duration of analgesic intake (outpatient period)		2 [2;3]	1 [0;1]	2 [2;3]	p_1<0.001 p_2=0.519 p_3=0.002

Notes: NRS (Numeric Rating Scale) – numerical pain rating scale; 1 – score 0–3 (mild pain); 2 – score 4–6 (moderate pain); 3 – score 7–10 (severe pain). Analgesic dose: 1 – 50 mg; 2 – 100 mg; 3 – 150 mg. Statistical significance: Pearson's χ^2 and Fisher›s exact test were used for categorical data; for quantitative data (duration of intake), the Kruskal–Wallis test and Mann–Whitney U test were applied; p_1 – level of significance for comparisons between subgroups 1.1 and 1.2; p_2 – between subgroup 1.1 and group 2; p_3 – between subgroup 1.2 and group 2
Source: compiled by the authors of this study

the tendency toward prolongation of pain syndrome during the outpatient stage.

DISCUSSION

The results of the present study confirm the modern biopsychosocial model of pain, according to which the intensity of postoperative pain syndrome (PPS) is determined not only by the extent of surgical trauma but also by a complex interaction of psychoemotional and social factors.

Analysis of the psychoemotional profile of patients revealed a clear relationship between social context and anxiety levels. The highest levels of state and trait anxiety were observed in internally displaced persons (subgroup 1.1), reflecting the cumulative effect of prolonged psychotraumatic stress. The statistically significant differences between all groups (p<0.001) indicate that current living conditions in a war-affected environment are a dominant factor in the formation of an anxious psychoemotional background.

Establishing a cause-and-effect relationship between psychological status and pain intensity was a key objective of the study. Our findings demonstrate that patients with higher anxiety levels (subgroups 1.1 and 1.2) had statistically higher NRS scores compared with women residing abroad (group 2). This supports the hypothesis that elevated stress load lowers the pain threshold and modulates the neuroendocrine response of the organism [11, 12].

Pharmacological validation of the results showed that the pattern of analgesic consumption directly

correlates with the psychoemotional profile. In Group 2 (lower anxiety levels), a greater proportion of women achieved adequate analgesia with the minimal dose of dexketoprofen (50 mg) compared with subgroups 1.1 and 1.2, where a predominance of maximum daily doses (150 mg) was observed and additional administration of paracetamol was required in a subset of patients. This indicates that psychoemotional destabilisation necessitates intensified analgesic management despite an identical surgical intervention.

The prognostic significance of the identified factors was further analysed using ROC curves. The obtained results allow differentiation between the influence of anxiety and depression on different characteristics of pain. State anxiety proved to be the most powerful predictor of acute pain intensity. This is likely due to the fact that the current emotional state directly modulates the rapid nociceptive response, enhancing pain signal perception at the cortical level. Depression, while not directly affecting pain intensity, demonstrated high predictive value for the duration of pain syndrome in the outpatient period. This suggests that depressive disorders, associated with impaired central antinociceptive mechanisms, contribute to pain prolongation and increase the risk of chronification [13–15].

Thus, the obtained data indicate the necessity of a personalised approach to postoperative analgesia in patients, taking into account their psychoemotional status. The identified patterns suggest that preventive correction of state anxiety may reduce the peak intensity of postoperative pain syndrome, whereas treatment of depressive states is important for preventing prolonged pain and improving rehabilitation outcomes in patients living under conditions of chronic stress.

CONCLUSIONS

The study demonstrated that conditions of acute and chronic wartime stress in Ukraine significantly modulate pain perception even during minimally invasive surgical techniques such as hysteroscopic myomectomy.

Thus, according to our results, state anxiety is associated with the highest predictive ability for postoperative pain intensity, while depression shows high prognostic significance for pain duration (prolongation of pain). In contrast, trait anxiety is associated with somewhat lower postoperative pain intensity, and high levels of depression are not associated with pain intensity. These findings may indicate different mechanisms of influence of psychoemotional factors on the development of acute and prolonged pain after hysteroscopic myomectomy.

REFERENCES

1. Bolton D. A revitalized biopsychosocial model: core theory, research paradigms, and clinical implications. Psychol Med. 2023;53(16):7504–11. doi: 10.1017/S0033291723002660. DOI
2. Johnson MI. An integral vision of pain and its persistence: a whole-person, whole-system, salutogenic perspective. Front Pain Res (Lausanne). 2025;6:1641571. doi: 10.3389/fpain.2025.1641571. DOI
3. Ohnesorge H, Günther V, Grünewald M et al. Postoperative pain management in obstetrics and gynecology. J Turk Ger Gynecol Assoc. 2020. doi: 10.4274/jtgga.galenos.2020.2020.0024. DOI
4. Small C, Laycock H. Acute postoperative pain management. Br J Surg. 2020;107(2):e70–80. doi : 10.1002/bjs.11477.
5. Sorrentino F, Petito A, Angioni S et al. Impact of anxiety levels on the perception of pain in patients undergoing office hysteroscopy. Arch Gynecol Obstet. 2021;303(4):999–1007. doi: 10.1007/s00404-020-05885-9. DOI
6. Bilginer C, Punduk M, Cetin A et al. Factors influencing surgical anxiety and postoperative pain: a comprehensive evaluation of psychological and gynecological determinants. BMC Womens Health. 2025;25(1):103. doi: 10.1186/s12905-025-03623-4. DOI
7. Gerstl B, Kehag E, Mallinder H et al. Psychological and emotional profiles of Australian uterine transplant potential recipients: a comparison with international trials. Acta Obstet Gynecol Scand. 2025;104(3):528–39. doi: 10.1111/aogs.14974. DOI
8. Wang S, Barrett E, Hicks MHR et al. Associations between mental health symptoms, trauma, quality of life and coping in adults living in Ukraine: a cross-sectional study a year after the 2022 Russian invasion. Psychiatry Res. 2024;339:116056. doi: 10.1016/j.psychres.2024.116056. DOI
9. Shatilo VB, Antoniuk-Shcheglova IA, Bondarenko OV et al. Markers of psycho-emotional stress in women of the Kyiv region during the Russian-Ukrainian war. Fiziol Zh. 2023;69(4):3–10. doi: 10.15407/fz69.04.003. DOI
10. Reznichenko HI, Smiian SA, Reznichenko YH et al. The state of the neuroendocrine system, mental health and quality of life in women of reproductive age under martial law. Int J Endocrinol (Ukraine). 2025;21(6):607–13. doi: 10.22141/2224-0721.21.6.2025.1620. DOI
11. Salas-González J, Heredia-Rizo AM, Fricke-Comellas H et al. Patterns of pain perception in individuals with anxiety or depressive disorders: a systematic review and meta-analysis. J Pain. 2025. doi: 10.1016/j.jpain.2025.105530. DOI
12. Osaki JD, Oliveira MAP. Impact of pelvic pain on perceived stress and inflammatory markers in women with deep endometriosis. J Clin Med. 2024;13(10). doi: 10.3390/jcm13102927. DOI

13. Glette M, Stiles TC, Jensen MP et al. Impact of pain and catastrophizing on the long-term course of depression: the HUNT study. PAIN. 2021;162(6):1650. doi: 10.1097/j.pain.0000000000002168. DOI
14. Werneck AO, Stubbs B. Bidirectional relationship between chronic pain and depressive symptoms in middle-aged and older adults. Gen Hosp Psychiatry. 2024;89:49–54. doi: 10.1016/j.genhosppsych.2024.05.007. DOI
15. Bonilla-Jaime H, Sánchez-Salcedo JA, Estevez-Cabrera MM et al. Depression and pain: use of antidepressants. Curr Neuropharmacol. 2022;20(2):384–402. doi: 10.2174/1570159X19666210609161447. DOI

CONFLICT OF INTEREST
The Authors declare no conflict of interest

CORRESPONDING AUTHOR
Olena O. Lytvak
Center of innovative healthcare technologies
5 Verkhnia St., 01104 Kyiv, Ukraine
e-mail: 0506902242@ukr.net

ORCID AND CONTRIBUTIONSHIP
Olena O. Lytvak: 0000-0001-5362-670X A C E F
Liliia I. Martynova: 0000-0003-4190-3292 B D
Dmytro O. Govsieiev: 0000-0001-9669-0218 A B E

A – Work concept and design, B – Data collection and analysis, C – Responsibility for statistical analysis, D – Writing the article, E – Critical review, F – Final approval of the article

RECEIVED: 02.02.2026
ACCEPTED: 01.06.2026