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65039, ДП УкрНДІ медицини транспорту
м. Одеса, вул. Канатна, 92
e-mail nymba.od@gmail.com
Наш сайт - www.medtrans.com.ua

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Address of the editorial office

Address of the editorial office
65039, SE UkrNDI for medicine of transport
Odessa, str. Kanatna, 92
e-mail nymba.od@gmail.com
Our website - www.medtrans.com.ua; herald.org.ua

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G. S. Manasova^{1,2}, O. V. Zhovtenko¹, G. V. Shpatakovskaya³, I. V. Shpak^{2,1},
M. V. Shapoval^{1,2}, Ya. O. Stasy², K. O. Kalnooka²

PREVALENCE AND SEVERITY OF ANXIETY SYMPTOMS AMONG PREGNANT AND POSTPARTUM WOMEN IN UKRAINE DURING THE WAR: AN OBSERVATIONAL COHORT STUDY

¹Odessa National Medical University, Odessa, Ukraine;

²Municipal non-profit enterprise Maternity Hospital No. 5 of the Odessa City Council;

³Odessa State University of Internal Affairs

Authors information

Gulsym Manasova <https://orcid.org/0000-0002-1600-5215>.

Olesja Zhovtenko <https://orcid.org/0000-0002-7600-6578>.

Gertruda Shatakovska <https://orcid.org/0009-0009-0225-9431>

Igor Shpak <https://orcid.org/0000-0001-9239-5609>.

Nikolay Shapoval <https://orcid.org/0000-0002-1087-2609>.

Yana Stasii <http://orcid.org/0000-0003-2623-860X>.

Katerina Kalnooka <http://orcid.org/0009-0006-9977-1594>

Summary. Manasova G. S., Zhovtenko O. V., Shpatakovskaya G. V., Shpak I. V., Shapoval M. V., Stasy Ya. O., Kalnooka K. O. **PREVALENCE AND SEVERITY OF ANXIETY SYMPTOMS AMONG PREGNANT AND POSTPARTUM WOMEN IN UKRAINE DURING THE WAR: AN OBSERVATIONAL COHORT STUDY.** Pregnancy and the perinatal period are vulnerable stages for the development of anxiety disorders, even in peacetime, with depressive states being a relatively common issue. The full-scale war can significantly intensify the psycho-emotional burden on this group of women.

Objective. To assess the prevalence and severity of anxiety among pregnant and postpartum women amidst the war in Ukraine and to analyze differences based on their region of residence and the intensity of Active hostilities zone (AHZ).

Materials and methods. An observational cohort cross-sectional study was conducted in an anonymous online survey (Google Forms), which included socio-demographic data and the Beck Anxiety Inventory (BAI). In the period from April 7 to December 31, 2022, 828 women were surveyed, divided into three groups: I - in the AHZ (n = 156; 18.9%), II - in Ukraine outside AHZ (n = 570; 68.9%), III - abroad (n=102; 12.3%).

Results. Clinically significant anxiety (BAI ≥ 16) was detected in 52.6% of women in group I, 36.1% in group II and 36.3% in group III, differences between groups were significant ($\chi^2=14.29$; $p=0.00079$). Over-exertion in the AHZ was associated with an increased risk of anxiety, equaled with women in the AHZ (OR=1.96; 95% CI 1.37–2.80; $p<0.01$) and in Ukraine (OR=1.96; 95% CI 1.17–3.25; $p<0.05$). There was no difference between groups II and III (OR=0.99; 95% CI 0.64–1.54; $p=0.97$). The highest average BAI scores were recorded in group I (17.46 ± 6.93 points), in group II (13.86 ± 6.66) the score was higher than in group III (12.77 ± 6.57); the differences between the groups were statistically significant ($p<0.001$) and dependent on the area of residence ($\chi^2 = 33.35$; $p < 0.001$). A moderate effect size was observed for the impact of hostilities when comparing women from active combat areas with those residing outside these zones (Hedges' $g = 0.53$).

Conclusions: The level and prevalence of anxiety in the perinatal period are clearly associated with the direct impact of hostilities. The data obtained justify the need for routine screening for anxiety disorders and the integration of psychosocial support into the system of perinatal care in wartime conditions.

Key words: pregnancy; perinatal period; anxiety disorders; Beck Anxiety Inventory;

Реферат. Манасова Г. С., Жовтенко О. В., Шпатаковська Г. В., Шпак І. В., Шаповал М. В., Стасій Я. О., Кальноока К. О. **ПОШИРЕНІСТЬ І ТЯЖКІСТЬ СИМПТОМІВ ТРИВОЖНОСТІ СЕРЕД ВАГІТНИХ ТА ЖІНОК У ПІСЛЯПОЛОГОВОМУ ПЕРІОДІ В УКРАЇНІ ПІД ЧАС ВІЙНИ: ОБСЕРВАЦІЙНЕ КОГОРТНЕ ДОСЛІДЖЕННЯ.**

¹Одеський національний медичний університет, Одеса, Україна; ²Комунальне некомерційне підприємство Пологовий будинок № 5 Одеської міської ради; ³Одеський державний університет внутрішніх справ, e-mail: GULSUM0911@gmail.com. Вагітність і перинатальний період є вразливими щодо розвитку тривожних розладів навіть у мирні часи і депресивні стани є досить поширеною проблемою. Повномасштабна війна може суттєво посилювати психоемоційне навантаження у цієї групи жінок.

Мета. Оцінити поширеність і рівень тривожності у вагітних та породіль в умовах війни в Україні та проаналізувати відмінності залежно від зони проживання й активності бойових дій (АБД).

Матеріали та методи. Проведено обсерваційне когорт не поперечне дослідження шляхом анонімного онлайн - опитування (Google Forms), яке включало соціально – демографічні дані та шкалу тривожності Бека (BAI). У період з 7 квітня по 31 грудня 2022 року опитано 828 жінок, яких розподілено на три групи: I — у зоні АБД (n=156; 18,9%), II — в Україні поза зоною АБД (n=570; 68,9%), III — за кордоном (n=102; 12,3%).

Результати. Клінічно значущу тривожність (BAI ≥ 16) виявлено у 52,6% жінок I групи, 36,1% — II та 36,3% — III груп, відмінності між групами значущі ($\chi^2=14,29$; $p=0,00079$). Перебування в зоні АБД асоціювалося з підвищеним ризиком тривожності порівняно з жінками поза зоною АБД (OR=1,96; 95% CI 1,37–2,80; $p<0,01$) та за межами України (OR=1,96; 95% CI 1,17–3,25; $p<0,05$). Різниця між II та III групами не встановлено (OR=0,99; 95% CI 0,64–1,54; $p=0,97$). Найвищі середні показники BAI зафіксовано в I групі (17,46 \pm 6,93 бала), у II групі (13,86 \pm 6.66) показник був **вищим**, ніж у III (12,77 \pm 6.57); відмінності між групами були статистично значущими ($p<0,001$) та залежними від зони перебування ($\chi^2 = 33,35$; $p < 0,001$). Розмір ефекту впливу бойових дій між жінками із зон АБД та поза ними був помірним (Hedges' $g=0,53$).

Висновки. Рівень і поширеність тривожності в перинатальному періоді асоціюються з безпосереднім впливом бойових дій. Отримані дані обґрунтовують необхідність рутинного скринінгу тривожних розладів і інтеграції психосоціальної підтримки в систему перинатальної допомоги в умовах війни.

Ключові слова: вагітність; перинатальний період; тривожні розлади; шкала тривожності Бека.

I. Introduction

One of the problems of mental health in the perinatal period is anxiety with possible negative consequences for the mother and the child. According to some data, depressive disorders in pregnant women occur in 12.3% - 20.7% of women, while in the population their frequency is 8.7%. According to Dennis, C.L. et al. (2017), the prevalence of anxiety symptoms within 1 to 24 weeks occurs in 22.9% of pregnant women and 15.0% of women in the postpartum period. Limited attention is paid to this aspect of perinatal psychology [1, 2, 3].

High-risk pregnancy is an independent risk factor for impaired mental health. In 68% of pregnant women of this cohort, psychosomatic manifestations in the form of emotional instability, nervousness, tachycardia, fever and general fear of a negative outcome are noted [4, 5].

Additional factors that increase anxiety include low education, precarious financial security, loneliness, and crisis situations. During the COVID-19 pandemic, the incidence of anxiety and depression in pregnant women was three times or more higher than in the general population [6, 7, 8].

Anxiety in the antenatal period is associated with the risk of preterm birth and low birth weight infants [9]. Prenatal stress also influences the development of internalizing problems of the autism spectrum with somatic symptoms in the child [10].

Increased emotional instability and a restructuring of social values are characteristic of the mental health of pregnant women even in peacetime. In armed conflicts, when basic needs for safety are violated and life is constantly threatened, chronic antenatal psychological stress develops, leading to a subsequent risk of perinatal and postnatal complications [11, 12, 13].

In a full-scale war, anxiety levels are expected to increase in women during pregnancy and the postpartum period, especially among those living in the active hostilities zone (AHZ) compared to those outside the AHZ or abroad.

Taking into account the above, **the aim** of the study was to assess the prevalence and level of anxiety among pregnant and postpartum women in the context of war in Ukraine and to analyze the differences between groups depending on the zone of residence.

II. Research methodology

2.1. Study design

An observational, cross-sectional cohort study was conducted from April 7, 2022, to December 31, 2022, at the Maternity Hospital No. 5 of the Odesa City Council.

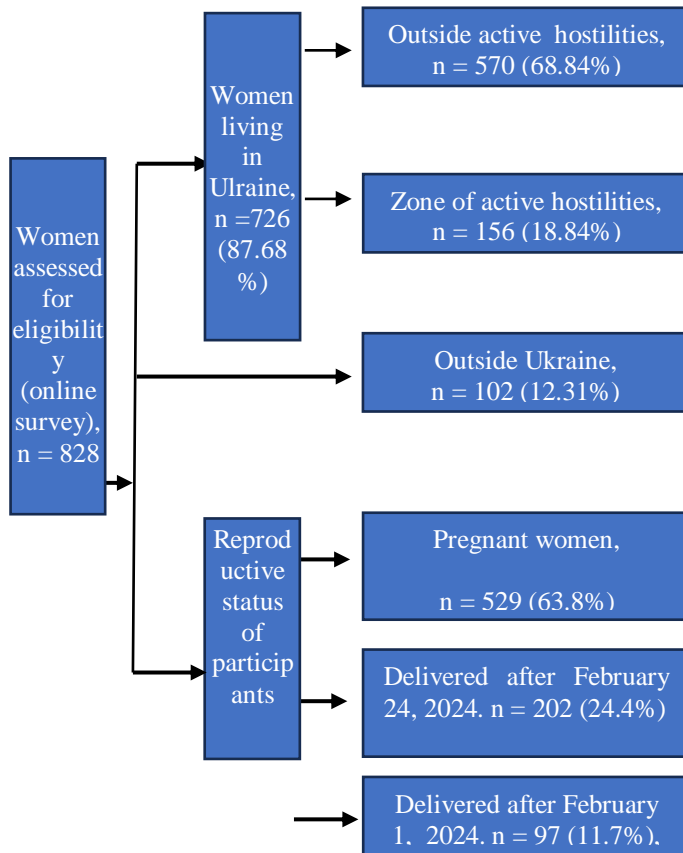
Inclusion criteria: Ukrainian women in the perinatal period who were in Ukraine or abroad due to temporary emigration. Depending on their zone of residence, participants were divided into three clinical groups: Group I – women who were in the AHZ in Ukraine; Group II – women in Ukraine outside the AHZ; and Group III – women who were abroad.

Data were collected through a self-assessment survey using a structured questionnaire, specially developed in Google Forms, which included sociodemographic characteristics and the Beck Anxiety Inventory (BAI). The questionnaire was distributed during routine office visits, as well as through social media and messaging apps.

2.2. Participants

The study included 828 women. Of these, 528 (63.8%) were at various stages of pregnancy, 203 (24.5%) had given birth during the war, and 97 (11.7%) had given birth after February 1, 2024. At the time of the survey, 156 women (18.9%) were in areas of AHZ in Ukraine, 570 (68.9%) resided in Ukraine outside of AHZ, and 102 (12.3%) were outside Ukraine. (Fig. 1).

A. Study Flow.



B. Study Outcome.

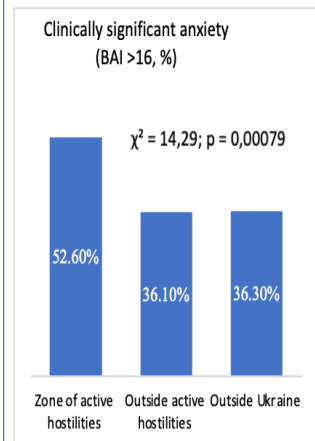


Fig. 1. Study flow and distribution of clinically significant anxiety by zone of residence.

Figure legend. Panel A illustrates the study flow and distribution of participants according to zone of residence and reproductive status. Panel B shows the proportion of women with clinically significant anxiety (BAI >16) across zones of residence. Women residing in the zone of active hostilities demonstrated a significantly higher prevalence of anxiety compared with women outside active hostilities and outside Ukraine (χ^2 test, $p = 0.00079$).

2.3. Assessment of anxiety level

The BAI was used to assess anxiety levels, which is a validated self-report instrument for determining the severity of anxiety symptoms and is widely used in clinical and population studies [14]. The scale consists of 21 items that reflect somatic and cognitive manifestations of anxiety (e.g., heart palpitations, trembling, feeling tense, fear). Each item is rated on a 4-point scale from 0 (“not at all bothered”) to 3 (“very bothered”), depending on the intensity of symptoms during the last week. The total score can range from 0 to 63. The level of anxiety was interpreted according to the recommended threshold values: 0-7 points — minimal anxiety level, 8-15 — mild, 16-25 — moderate, 26-63 — severe. A BAI ≥ 16 is considered clinically significant.

2.3. Statistical analysis

Statistical analysis was performed using Microsoft Excel programs (Google Forms, Google Sheets), the online platform Social Science Statistics and the R program for data visualization [15,16].

For quantitative variables, mean values and standard deviations ($M \pm SD$) were calculated. Categorical variables were presented as absolute and relative frequencies (n, %). Normality of distribution of quantitative indicators was assessed using the Shapiro-Wilk test; for comparison of results between groups, nonparametric analysis of variance according to Kruskal-Wallis was used. For analysis of distribution of anxiety levels by categories (minimal, mild, moderate, severe), Pearson's χ^2 -test was used.

To initially assess the associations between the area of residence and clinically significant anxiety (BAI > 16), a univariate (unadjusted) logistic regression analysis was conducted, calculating odd ratios (OR) and 95% confidence intervals (95% CI). Place of residence was entered as a categorical variable, with women living outside Ukraine serving as the reference (control) group. The effect size of the impact of hostilities on anxiety levels was determined using Hedges's coefficient. Results were considered statistically significant at $p < 0.05$.

III. Results

The age distribution of the participants revealed that 18.5% (153) of the women were under 25 years old, 63.6% (527) were aged 26–35, and 17.8% (147) were aged 36–45. At the time of assessment, 63.8% (529) were pregnant, 11.7% (97) had delivered between February 1–24, 2022, and 24.4% (202) after February 24.

85.4% (698) of the participants were officially married, 8.9% (74) were in a civil partnership, and 7.8% (56) were single. The characteristics of the study participants by anxiety level according to the BAI are presented in Table 1.

Table 1. Distribution of women according to Beck scale indicators depending on the zone of residence

Residential area	AHZ (I group) n = 156, (aбс.ч/ %)	Outside the AHZ (II group) n = 570, абс.ч/ %)	Outside Ukraine (III group) n = 102, абс.ч/ %)
Beck scale			
BAI ≤ 16	74 (47.4%)	364 (63.85%)	65 (63.7%)
0 - 7 points	6 (3.85)	89 (15.61)	26 (25.49)
8 - 15 points	68 (43.59)	275 (48.25)	39 (38.24)
BAI ≥ 16	82 (52.6%)	206 (36.1%)	37 (36.3%)
16 - 25 points	66 (42.31)	172 (30.18)	33 (32.35)
26 - 63 points	16 (10.26)	34 (5.96)	4 (3.92)

Footnotes: AHZ - Active hostilities zone, BAI — Beck Anxiety Inventory

Clinically significant anxiety (BAI ≥ 16) was detected in 52.6% (82) of women in Group I, compared with 36.1% (206) and 36.3% (37) in Groups II and III, respectively. Regression analysis

showed that area of residence was independently associated with an increased risk of a BAI score ≥ 16 (Table 2).

Table 2. Frequency of clinically significant anxiety depending on the zone of residence

Residential area	BAI (abs.n., expected n., χ^2)		RR, OR, 95% CI
	BAI: 0 - 15 points	BAI: 16-63 points	
AHZ (I)	74 (94.77) [4.55]	82 (61.23) [7.04]	I vs II: 1.45, 1.96, 1.37-2.8, $p < 0.01$
Outside AHZ (II)	364 (346.27) [0.91]	206 (223.73) [1.41]	I vs III: 1.45, 1.95, 1.17-3.25, $p < 0.05$
Outside Ukraine (III)	65 (61.96) [0.15]	37 (40.04) [0.23]	II vs III: 1, 0.99, 0.64-1.54, $P = 0.97$
Total number	503 (60,74%)	325 (39,25%)	

Footnotes: BAI — Beck Anxiety Inventory; χ^2 — Pearson's criterion; RR — relative risk; OR — odds ratio; CI — confidence interval.

The distribution of anxiety levels across residence zones differed significantly ($\chi^2 = 14.29$; $p = 0.00079$). Women residing in the AHZ demonstrated a significantly higher frequency of clinically significant anxiety (BAI ≥ 16) and a lower frequency of minimal anxiety than expected. In contrast, women outside the AHZ more often showed low anxiety levels. Among participants residing outside Ukraine, the distribution did not significantly differ from expected values.

Univariate logistic regression showed that residence in the AHZ was associated with a higher risk of clinically significant anxiety compared with residence outside the AHZ (RR = 1.45; OR = 1.96, 95% CI 1.37–2.80; $p < 0.01$) and residence outside Ukraine (RR = 1.45; OR = 1.96, 95% CI 1.17–3.25; $p < 0.05$). No significant difference in anxiety risk was observed between women residing outside the AHZ within Ukraine and those living abroad (OR = 0.99, 95% CI 0.64–1.54; $p = 0.97$) (Fig. 2).

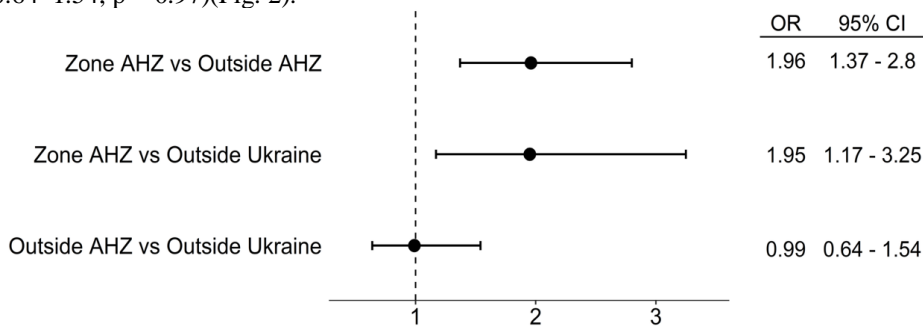


Figure 2. Forest plot of odds ratios (OR) for clinically significant anxiety (BAI > 16) by zone of exposure

Forest plot of odds ratios (OR) with 95% confidence intervals for clinically significant anxiety (BAI > 16) according to zone of residence. Women residing in active combat zones demonstrated significantly higher odds of anxiety compared with women outside combat zones and those residing outside Ukraine, while no significant difference was observed between women outside combat zones and refugees.

The highest mean anxiety score (17.46 ± 6.93) was observed among women residing in the AHZ. Anxiety levels were lower among women living in Ukraine outside the AHZ (13.86 ± 6.66) and lowest among refugees (12.77 ± 6.57). The between-group difference was statistically significant ($H = 42.139$; $p < 0.001$). The comparison between women in and outside the AHZ demonstrated a moderate effect size (Hedges' $g = 0.53$).

Clinical categorization of anxiety severity according to the Beck scale also revealed significant differences by residence zone ($\chi^2 = 33.35$; $p < 0.001$). (Table 3).

Table 3. Clinical types of anxiety depending on the zone of residence

Residential area	Anxiety level (abs.n., expected n., χ^2)			
	Minimal	Mild	Moderate	Severe
AHZ	6 (22.80) [12.38]	68 (71.97) [0.22]	66 (51.06) [4.37]	16 (10.17) [3.34]
Outside AHZ	89 (83.30) [0.39]	275 (262,97) [0,55]	172 (186.56) [1.14]	34 (37.17) [0.27]
Outside Ukraine	26 (14.91) [8.26]	39 (47.06) [1.38]	33 (33.38) [0.00]	4 (6.65) [1.06]
Total number of women	121(14.61%)	382 (46.14%)	271 (32.7%)	54 (6.52%)

Footnotes: AHZ - Active hostilities zone, χ^2 — Pearson's criterion

Women in the AHZ more frequently exhibited moderate and severe anxiety and less frequently minimal anxiety than expected, whereas women residing outside Ukraine most often demonstrated minimal anxiety.

IV. Discussion

Pregnancy and the perinatal period are particularly vulnerable stages for anxiety disorders [1,2]. Under conditions of armed conflict, chronic stress, social instability, and security threats, the risk of psycho-emotional disturbances increases substantially [11–13]. [11, 12, 13].

Using the Beck Anxiety Inventory, we assessed the prevalence and severity of anxiety among 828 Ukrainian women in the perinatal period during the first year of the full-scale war, stratified by residence in an active hostilities zone (AHZ), outside the AHZ within Ukraine, or abroad. Our findings demonstrated a strong association between area of residence and psychosomatic manifestations of anxiety.

Women residing in the AHZ had significantly higher BAI scores than those living outside the AHZ (1.3-fold difference) and those abroad (1.4-fold difference). The odds of clinically significant anxiety were nearly twofold higher among women in the AHZ (OR = 1.96). In contrast, no significant difference was observed between women living outside the AHZ in Ukraine and those residing abroad (OR = 0.99), underscoring the impact of direct exposure to hostilities. The between-zone comparison revealed a moderate effect size (Hedges' $g = 0.53$).

These findings align with previous research identifying armed conflict as a major risk factor for mental health disorders in vulnerable populations, including pregnant women [11, 12, 13].

Residence in the AHZ may therefore be considered an independent risk factor for psycho-emotional destabilization during pregnancy. Moreover, pregnancy itself—particularly when complicated—may act as an additional vulnerability factor, amplifying the cumulative burden of war-related stress [4].

The absence of statistically significant differences in anxiety prevalence between women outside the AHZ in Ukraine and those abroad (36.1% vs. 36.6%) suggests that direct exposure to active hostilities, rather than geographic displacement per se, is the primary driver of increased psychosomatic symptoms. This interpretation is consistent with literature indicating that armed conflict, disrupted healthcare systems, adverse social conditions, and large-scale crises such as the COVID-19 pandemic increase the risk of anxiety disorders during pregnancy [5, 11, 13].

In such contexts, the development of comprehensive, multidisciplinary support systems with family involvement is essential [8]. Thus, the anxiety gradient we identified in pregnant and recently delivered women reflects the dose-dependent effect of chronic war-related stress, in which physiological and psychological changes in the perinatal period go beyond normal limits, which allows us to draw a few conclusions.

V. Conclusions

The key finding of this study is the association between anxiety levels and the intensity of military operations, suggesting that war functions not only as a background stressor but also as a significant risk factor for anxiety disorders during the perinatal period.

The high prevalence of anxiety among Ukrainian women during wartime underscores the need for early psychological screening and the integration of structured psycho-emotional support into perinatal care using validated assessment tools. Timely identification of anxiety symptoms and may contribute to preserving maternal well-being and reproductive health in settings affected by

armed conflict.

Strengths and limitations.

Strengths include a large sample size, stratification by intensity of hostilities, and use of the validated Beck Anxiety Inventory, enabling risk gradient assessment. Reporting ORs, 95% CIs, and effect sizes support both statistical and clinical interpretation. A limitation is the absence of biological stress markers (e.g., hormonal indices), which could enhance diagnostic precision.

Practical implications.

Findings support integrating mental health screening into perinatal care, particularly for women in active combat zones. Maternal health protection should be prioritized in humanitarian responses through accessible, scalable, trauma-informed psychosocial support programs.

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Authors' contribution:

- **G.S. Manasova:** research concept, general guidance, analysis of results, Writing – original draft, Writing – review & editing.
- **O.V. Zhovtenko:** data collection, statistical processing, translation into English
- **G.V. Shatakovska:** data collection, analysis of results, forming conclusions.
- **I.V. Shpak:** management, analysis of results
- **M.V. Shapoval:** analysis of results, Writing – review & editing
- **Ya. O. Stasii:** data collection, Software, Visualization.
- **K.O. Kalnooka:** data collection, Software

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Written informed consent was obtained from patients to participate in the study, process personal data and their further use.

Data Availability Statement

Data are available upon reasonable request from the authors.

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Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) for language editing, clarification of scientific English. After using this tool, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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