



## Post-traumatic Stress Disorder amongst Internally Displaced Pregnant Females

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### Authors' contributions

*This work was carried out in collaboration between both authors. Author AI designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author MK managed the literature searches, analyses of the study results. Both authors read and approved the final manuscript.*

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### ABSTRACT

**Aims:** The study was aimed to assess the association of post-traumatic stress disorder with pregnancy and birth outcomes amongst pregnant females internally displaced from the south-east of Ukraine.

**Study Design:** Observational study.

**Place and Duration of Study:** The study was conducted at City Maternity Hospital № 2 in Odessa (Ukraine), during 2014-2015.

**Methodology:** There were 83 women observed in the 36-40 weeks of gestation including 23 internally displaced pregnant women who previously lived in the zone of war conflict in the eastern part of Ukraine. Individual interviews were used among pregnant women and followed by analysis of the course of pregnancy, childbirth, postpartum and newborn state.

**Results:** Post-traumatic stress disorder frequency is 34,8% for internally displaced females and the anxiety level is significantly higher (44.1±0.9 scores on PA scale and 45.4±0.9 scores on RA scale)

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among females from the war conflict zone than among other pregnant. The frequency of pregnancy and birth complications is strongly associated with the psycho-emotional state of pregnant female. Thus 47.8% of internally displaced females had the threat of pregnancy termination and 73.9 – risk of premature birth. 56.5% of them had anemia of I-II degree of severity and 21.7% - mild preeclampsia in the second half of pregnancy

**Conclusion:** The study of the role and impact of psycho-emotional status is of particular importance in assessing the prognosis of pregnant women at risk, which certainly includes women suffering from post-traumatic stress disorder.

*Keywords: Maternal-fetal medicine; complications; post-traumatic stress disorder; prolonged pregnancy.*

## 1. INTRODUCTION

The armed conflict in the south-east of Ukraine began in March 2014 and is still continuing. According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the number of documented deaths caused by the war as of 27 July 2015 was at least 6,832 and 17,087 were injured [1]. Furthermore, the actual number of victims could be even higher.

Hundreds of thousands Ukrainians have fled to their neighbouring countries since the current conflict began. In August 2015 there were 911,500 persons registered in Russia, 126,400 – in Belarus, 68,200 – in Poland, 1760 - in Romania [2,3]. The total amount of internally displaced persons (IDP) exceeded 1,300,000 (19.08.2015) [2]. 66% of adult IDPs are females who flee the conflict zone with heavy responsibilities, with their children, and often with elderly relatives as well. Many of them were pregnant at the moment of their escape or became pregnant after relocation to the new place.

By the official records in the first half of 2015, internally displaced females gave birth to 95 infants. For the general amount of IDPs from Southern East this rate is corresponded as 1 birth per 322 registered cases.

However, majority of these females experienced suffering from posttraumatic stress disorder (PTSD). This condition routinely occurs in approximately 10% of women in their lifetime, with one-third of episodes lasting more than five years [4].

The theoretical issues of PTSD development include the assessment of the role of various risk factors enhancing the probability of PTSD occurrence e.g. approved history of psychological illness (depression and anxiety in the past, family history of mental disorders),

hormonal imbalance, traumatic brain disease and neuroendocrine disorders, other social, environmental and psychological factors [5].

Existing stress theories of PTSD include the transactional model emphasizing the appraisal and coping in stress responses [5,6]. Slade et al. [7] developed the conceptual framework including predisposing, realizing and maintaining factors relating to the external, internal and interactional exposures.

Diagnosis criteria of PTSD include re-experiencing the event avoiding feelings, people or places associated with the traumatic event, having hyperarousal state characterized with such symptoms as irritability, impulsiveness, anger, insomnia, nightmares, aggression, constant feeling of being in danger and difficulties of concentrating [4]. Key clinical features of PTSD are provided in the Table 1.

Due to the relatively high prevalence of PTSD in young women and the chronic nature of the illness, many women may experience PTSD symptoms during pregnancy. However in the case of the armed conflict the occurrence of PTSD became much higher than in safer conditions of living.

Some authors demonstrated that gestational diabetes and hypertensive disorders of pregnancy are more common among women veterans deployed in service of operations in Afghanistan and Iraq [8]. Swedish authors found associated elevated risk for pregnancy complications and preterm birth in war refugees [3]. There was described the association between prenatal maternal objective stress, perceived stress, preterm birth and low birthweight amongst 47 women exposed to life-threatening rocket attacks during armed conflicts [9]. Similar data were published about survivors of war conflicts in other countries [1,8,9].

**Table 1. PTSD criteria accordingly to DSM-5 [4]**

<b>Criterion</b>	<b>Description of components</b>
1	<ul style="list-style-type: none"> <li><input type="checkbox"/> Directly experiencing the traumatic event(s)</li> <li><input type="checkbox"/> Witnessing, in person, the event(s) as it occurred to others</li> <li><input type="checkbox"/> Learning that the traumatic event(s) occurred to a close family member or a friend</li> <li><input type="checkbox"/> Experiencing repeated or extreme exposure to aversive details of the traumatic event(s); this does not apply to exposure through media such as television, movies, or pictures</li> </ul>
2	<p>The persistent reexperiencing of the event in one of several ways:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Thoughts or perception</li> <li><input type="checkbox"/> Images</li> <li><input type="checkbox"/> Dreams</li> <li><input type="checkbox"/> Illusions or hallucinations</li> <li><input type="checkbox"/> Dissociative flashback episodes</li> <li><input type="checkbox"/> Intense psychological distress or reactivity to cues that symbolize some aspect of the event</li> </ul>
3	<p>The presence of 1 or both of the following:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Avoidance of thoughts, feelings, or conversations associated with the event</li> <li><input type="checkbox"/> Avoidance of people, places, or activities that may trigger recollections of the Event</li> </ul>
4	<ul style="list-style-type: none"> <li><input type="checkbox"/> Inability to remember an important aspect of the event(s)</li> <li><input type="checkbox"/> Persistent and exaggerated negative beliefs about oneself, others, or the world</li> <li><input type="checkbox"/> Persistent, distorted cognitions about the cause or consequences of the event(s)</li> <li><input type="checkbox"/> Persistent negative emotional state</li> <li><input type="checkbox"/> Markedly diminished interest or participation in significant activities</li> <li><input type="checkbox"/> Feelings of detachment or estrangement from others</li> <li><input type="checkbox"/> Persistent inability to experience positive emotions</li> </ul>
5	<p>The evidence of 2 or more of the following conditions:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Irritable behavior and angry outbursts</li> <li><input type="checkbox"/> Reckless or self-destructive behavior</li> <li><input type="checkbox"/> Hypervigilance</li> <li><input type="checkbox"/> Exaggerated startle response</li> <li><input type="checkbox"/> Concentration problems</li> <li><input type="checkbox"/> Sleep disturbance</li> </ul>
<p>The remaining 3 criteria are as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The duration of symptoms is more than 1 month</li> <li><input type="checkbox"/> The disturbance causes clinically significant distress or impairment in functioning</li> <li><input type="checkbox"/> The disturbance is not attributable to the physiological effects of a substance or other medical condition.</li> </ul>	

Some studies have implied that rates of PTSD are higher in pregnant women than in non-pregnant ones [10,11]. Some researchers have hypothesized also that the unique psychological and physical aspects of pregnancy may exacerbate symptoms of PTSD [4,11]. However currently in Ukraine there was no experience how to provide maternity care for pregnant females suffering from PTSD.

The study was aimed to assess the association of post-traumatic stress disorder with pregnancy and birth outcomes amongst pregnant females internally displaced from the south-east of Ukraine.

## **2. MATERIALS AND METHODS**

### **2.1 Setting**

The study was conducted at City Maternity Hospital № 2 in Odessa (Ukraine), during 2014-2015.

### **2.2 Subjects of the Study**

There were 83 women observed in the 36-40 weeks of gestation. The following clinical groups were identified:

Group I - Included 23 pregnant women who lived in the eastern part of Ukraine

and during anti-terrorist operations were relocated to Odessa, where they gave birth to their children in maternity hospital No 2;

Group II - Included 30 pregnant women who lived in the Odessa region and were observed at the place of residence;

Group III - Included 30 pregnant women who resided and were registered in female health center No 3 of maternity hospital No 2, Odessa.

### 2.3 Data Collection

In addition to general clinical methods of examination, there were conducted individual interviews using questionnaires and testing among pregnant women, followed by analysis of the course of pregnancy, childbirth, postpartum and newborn state [7].

Other socio-demographic information was missing, i.e., the family network, the economic condition, year of schooling. Difficulties to obtain these data could be considered as a limit of the study. However the mothers didn't differentiate along these parameters so it was mentioned in the participants' characteristics.

Diagnosis of PTSD was based on DSM-5 criteria [4]. Predicting the risk of perinatal and maternal morbidity was conducted by A. Coopland (1977) under the orders of the Ministry of Health of Ukraine №620 from 29.12.2003 "About in-patient maternity and neonatological care in Ukraine" [12].

Additionally, we use standardized psychological test battery included Eysenck Personality Inventory test, Spielberger's STAI and the test of self-esteem of the individual stress [13].

### 2.4 Statistical Analysis

Statistical data processing was performed using the software package Statistica 12.6 (Dell StatSoft Inc., USA).  $\chi^2$ -test and one way ANOVA were used for assessing the statistical differences between groups. The association between the frequency of pregnancy and birth complications and psycho-emotional state of pregnant female was assessed using correlation analyses by Pearson [14].

## 3. RESULTS

From October 2014 to December 2015 we included 83 pregnant females in the 36-40 weeks

of gestation (Table 2). Reasons for not included were represented with the refuse to sign consent form and preeclampsia. The age of pregnant women was ranged from 18 to 37 years, mean age was  $27.8 \pm 1.5$  years. Most of the women had completed secondary education (39.5%) and secondary special education (35.9%), the smallest of the subjects were women with higher education (24.6%).

Chronic pyelonephritis in remission was dominated - 17 cases (20.5%) among extragenital diseases in surveyed pregnant women; anemia was detected in 15 cases (18.1%), diseases of the cardiovascular system - in 9 cases (10.9%); gastrointestinal disease - in 6 cases (7.2%); obesity (I-II) - in 4 (4.8%) cases; varicose veins of the lower extremities and external genitalia - in 3 (3.6%) cases.

The age at menarche was within 11-13 years and averaged as  $12.3 \pm 1.2$  years. In 53.0% of women, the menstrual cycle was not disordered with an average duration of  $27.4 \pm 0.4$  days.

There were 39 (46.9%) primiparae and 44 (53.1%) deutiparae of the total number of women. Tobacco use among pregnant women was recorded only in 5 cases (6.0%).

Regarding PTSD we found its symptoms were found in 8 (34.8%) cases in I group. No cases of PTSD were recorded in II and III group. Eysenck's test results showed that choleric (41 or 49.4%) and sanguine (32 or 38.6%) personality types were prevalent among surveyed women (Table 3). Much less phlegmatic (6 or 7.2%), and melancholic (4 or 4.8%) females were found. Number of respondents with different psychotypes in comparable clinical groups was not different ( $p=0.62$ ).

Trait (TA) and state (SA) anxiety in all clinical groups were within the frame of average level of anxiety. The highest rates were recorded in the females with PTSD - up to 50.0 scores. However, the pregnant females from IDP (I group) have  $44.1 \pm 0.9$  scores on TA scale and  $45.4 \pm 0.9$  scores on SA scale. These values are much higher than  $39.3 \pm 0.8$  scores on TA and  $44.3 \pm 0.7$  scores on SA in II group, and, correspondingly  $38.8 \pm 1.1$  and  $42.8 \pm 0.9$  scores in III group (for TA: Group 1 vs Group 2: Diff=-4.8000, 95%CI=-8.1253 to -1.4747,  $p=0.0026$  vs Group 1 vs Group 3: Diff=-5.3000, 95%CI=-8.6253 to -1.9747,  $p=0.0008$  and for SA: Group 1 vs Group 2: Diff=-1.1000, 95%CI=-4.0047 to

1.8047,  $p=0.6391$  vs Group 1 vs Group 3: Diff=-2.6000, 95%CI=-5.5047 to 0.3047,  $p=0.0887$ ).

The highest rate of tolerance to stress was also characteristic for IDPs, this index was equal to  $36.7\pm 2.8$  scores whereas patients of II group got  $44.2\pm 2.2$  and III group got  $39.2\pm 3.4$  scores correspondingly ( $df=2$  var=395.3  $F=1.73$   $p=0.18$ ).

In analyzing the course of pregnancy (Table 3), it was found that amongst women of I group almost half of the women - 11 cases (47.8%) had the threat of pregnancy termination and 17 cases (73.9%) – the threat of premature birth. The reason for the threat of abortion, as a rule, was isthmio-cervical incompetence - 5 cases (21.7%), which was adjusted using obstetric pessary. Besides, the threat of preterm labor often occurs against a background of polyhydramnion - 7 cases (30.4%). A typical complication in different periods of pregnancy in patients in this group was anemia of I-II degree of severity - 13 cases (56.5%), as well as there was an acute respiratory infection - 9 cases (39.1%). Pregnancy proceeded against the backdrop of mild preeclampsia in the second half of pregnancy in 5 cases (21.7%).

The structure of complications of pregnancy in women of II clinical group was somewhat different. A high proportion of pregnant women in this group were persons with a history of obstetric and gynecological history (a history of fetal malformation, stillbirth, early infant mortality, placental abnormalities and premature detachment).

Thus, the threat of premature birth in women in this group was significantly ( $\chi^2=3.11$   $p=0.04$ ) lower - 15 cases (50.0%) only. Unlike the previous, this group of pregnant women had less cases of anemia - 9 cases (30.0%), mild preeclampsia - 4 cases (13.3%).

For group III there was characteristic minimum number of pregnancy complications (Table 4). The most common complications of pregnancy in III group were anemia (8 cases - 26.6%) and pyelonephritis (7 cases - 23.3%).

An analysis of birth outcomes showed that all patient groups had deliveries at term - after a vaginal birth to 71 pregnant women (85.5%). Surgical delivery was applied in 12 women (14.5%).

**Table 2. Sociodemographic characteristic of the respondents**

Indices	I group (n=23)	II group (n=30)	III group (n=30)	p-value
Age	27.8±1,6	27.9±1,4	27.5±1,4	0.95
Education				
Master degree OR Doctor of Philosophy	4 (17.4%)	6 (20.0%)	6 (20.0%)	0.91
Bachelor degree	1 (4.3%)	1 (3.3%)	2 (6.7%)	0.81
Special secondary education	9 (39,1%)	13 (43.3%)	11 (36.7%)	0.76
Secondary education	9 (39,1%)	10 (33.3%)	11 (36.7%)	0.96

**Table 3. Psycho-emotional profiles of participants**

Indices	I group (n=23)	II group (n=30)	III group (n=30)	P value
Post-traumatic stress disorders (abs., %)	8 (34.8)	-	-	0.002
Eysenck Personality Inventory (abs., %)				
Choleric	13 (56.5)	13 (43.3)	15 (50.0)	0.50
Sanguine	9 (39.1)	11 (36.7)	12 (40.0)	0.92
Phlegmatic	1 (4.3)	3 (10.0)	2 (6.7)	0.80
Melancholic	-	3 (10.0)	1 (3.3)	0.34
Trait Anxiety, scores (M±m)	44.1±0.9	39.3±0.8	38.8±1.1	0.98
State Anxiety, scores (M±m)	45.4±0.9	44.3±0.7	42.8±0.9	0,98
Tolerance to stress, scores (M±m)	36.7±2.8	44.2±2.2	39.2±3.4	0,98
Threat of pregnancy termination	11 (47.8%)	-	-	0.002
Threat of premature birth	17 (73.9%)	15 (50.0%)	-	0.28

**Table 4. Pregnancy complications and birth routes in the clinical groups**

Indices	I group (n=23)	II group (n=50)	III group (n=50)
Threat of pregnancy termination (abs., %)	11 (47.8)	6 (20.0)	-
Threat of preterm birth (abs.,%)	17 (73.9)	15 (50.0)	-
CS (abs., %)	7 (30.4)	4 (13.3)	1 (3.3)

Based on the analysis, the reasons for caesarean section in group I found that surgical delivery was performed in 7 patients (30.4%). Indications for caesarean section were a scar on the uterus and the denial of women from vaginal delivery - 2 cases; the failure of the uterine scar - 1 case; antenatal fetal distress - 1 case; intrapartum fetal distress in the I stage of labor - 1 case; premature rupture of water in conjunction with IVF twins -1 case; cerebral palsy with moderate right hemiparesis - 1 case.

4 patients (13.3%) from II group were treated by cesarean section. Cesarean section in this group was made for the following indications: abruptio placentae - 1 case; clinical discrepancy of the size of the fetal head and the mother's pelvis - 1 case; two uterine scars - 1 case; a scar on the uterus in conjunction with burdened obstetric history (stillbirth) - 1 case.

In the III clinical group cesarean section was done in the case of PROM in combination with a mixed breech presentation.

Newborns in all observation groups were born in satisfactory condition, as evidenced by the Apgar's score - an average of 1 minutes ( $8,0 \pm 0,1$ ) score for 5 minutes ( $8,3 \pm 0,1$ ) points. The average weight of newborns is ( $3320 \pm 50$ ) grams.

It should also be noted that the most frequent complaints were about pulling and regular abdominal pain in the sacrum and lower back, premature rupture of membranes, sleep disturbance, anxiety, arrived at the hospital the women in group I, while the female group III frequently acted in hospital with the beginning of labor. Antenatal hospitalization for women was carried in II clinical group, in order to develop tactics of birth and select the method of delivery.

75% of pregnant women of all groups were treated with epidural (EDA) anesthesia taking into account the obstetric situation, in order to treat pathological preliminary period discoordination labor for pain relief in labor and cesarean section. In Group I there was the largest number of women who was given EDA (19 cases - 82.6%). It should be noted that regardless of the psycho-emotional state of the patients, most of them are reluctant to run by birth under the EDA. This is explained by the fact that most patients are well informed about modern methods of pain relief in labor. To date, the use of EDA achieves prolonged analgesia without adverse effects on the woman and her child. Creating an optimal level of analgesia for mothers makes it possible for them to consciously and actively participate in the childbirth in the absence of expressed pain, to avoid negative impact on the utero-placental blood flow and uterine activity.

#### 4. DISCUSSION

This study was intended to assess the association of post-traumatic stress disorder with pregnancy and birth outcomes amongst pregnant females internally displaced from the south-east of Ukraine.

It was shown that almost 50% of group I had high risk of premature birth and the frequency of pregnancy complications is the highest amongst other groups. This group included women that lived during anti-terrorist operations, and all of them have great PTSD incidence. On the other hand, rehabilitation of pregnant women in a state of PTSD should take in the consideration that some medications are contraindicated during the pregnancy. Thus the awareness about the risk of PTSD amongst refugees and internally displaced females is important for early diagnosis and proper medical and psychological rehabilitation.

We found the strong positive correlation between the frequency of pregnancy and birth complications and level of stress amongst internally displaced females –  $r=0.69$ . Thus the study support the hypothesis that internally displaced females had higher risk of the complications of pregnancy and birth.

The important result in this study is that it is in accordance with the literature [1,2,5-11] showing that war is strongly associated with PTSD and females are the most vulnerable group of population for any military conflict. In this study we analyzed the diagnosis of PTSD but not only

particular symptoms through the impact of event scale. On the other hand, it was included a very small number of subjects and is the great limitation of the study.

In our opinion, the study of the role and impact of psycho-emotional status is of particular importance in assessing the prognosis of pregnant women at risk, which certainly includes women living in the war zone in the south-east of Ukraine. This approach allows us to individualize the approach for each woman, to influence the psycho-emotional state of the patient in time, if necessary, to carry out labor pain relief, taking into account both the obstetric situation and the individual personality and clinical-psychological characteristics of women, and to reduce the rate of complications in various obstetrical situations.

## 5. CONCLUSION

Obtained results demonstrates that PTSD frequency is 34,8% for internally displaced females and is casuistic for general population. The anxiety level and poor tolerance to the stress is significantly higher among females from the war conflict zone than among other pregnant females. The correlation between the frequency of pregnancy and birth complications and level of stress was strong ( $r=0.69$ ) so we could recommend to screen the psycho-emotional state of pregnant females from the risk groups during their services in female health centers.

## CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this paper accompanying images'.

## ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee (LEC MH No 2, protocol No 1 issued on 12.09.2014) and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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