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ORIGINAL ARTICLE

SEX DIFFERENCES IN THE TRAUMA-RELATED SYMPTOMS – A PILOT STUDY

POLNE RAZLIKE U SIMPTOMIMA IZAZVANIM TRAUMOM – PILOT ISTRAŽIVANJE

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ABSTRACT

Introduction: During the year 2014, a part of the population from Serbia was exposed to floods. After natural disasters and other types of extreme trauma, some people will be more affected by trauma than others. How women and men differ, in the symptoms that can manifest after the exposure to extreme trauma, is still an open question.

Aim: To evaluate if there are differences in the severity of trauma-related symptom clusters between the sexes (re-experiencing, avoidance, negative cognitions and mood, and arousal; according to DSM V) and in experiencing negative emotional states (depression, anxiety, stress).

Material and methods: Forty healthy volunteers from Obrenovac (25 women and 15 men) were administered with three instruments: The Life Events Checklist – LEC-5, PTSD checklist for DSM V – PCL-5 and Depression Anxiety Stress Scale – DASS.

Results: The majority of subjects reported floods as the major lifetime trauma (72.5%). Despite the relatively low level of the post-traumatic symptom intensity (5.02 ± 4.99), women exhibited significantly higher total post-traumatic symptom severity scores in comparison to men ($p < 0.01$) and higher severity of trauma re-experiencing symptoms ($p < 0.01$). Sex differences were neither observed in other trauma-related symptoms clusters, nor in the severity of current depression, anxiety and stress symptoms.

Conclusion: In the non-clinical sample, with only a sub-threshold level of post-traumatic symptoms, the most prominent difference between sexes was found in relation to re-experiencing and this finding is consistent with the results obtained from clinical samples. Future studies are needed, in order to examine whether trauma-focused treatments can be gender-tailored and to which extent they might prevent the full-blown post-traumatic stress disorder.

Key words:

posttraumatic stress disorder,
trauma,
sex differences,
depression,
floods

SAŽETAK

Uvod: Tokom 2014. godine deo stanovništva Srbije bio je izložen poplavama. Nakon prirodnih nepogoda ili drugih snažnih trauma, osobe koje su doživele traumatsko iskustvo mogu da reaguju na različite načine. Na koji način se razlikuju reakcije osoba muškog u odnosu na osobe ženskog pola pitanje je na koje i dalje nema definitivnog odgovora.

Cilj: Ispitati postojanje polnih razlika u izraženosti simptoma povezanih sa traumatskim iskustvima (ponovno proživljavanje traume, izbegavanje stimulusa koji podsećaju na traumu, negativna kognicija i raspoloženje, povišena razdražljivost) prema DSM-V, kao i prema intenzitetu negativnih emocionalnih stanja (depresija, anksioznost, stres).

Materijali i metode: Četrdeset zdravih, odraslih dobrovoljaca (25 žena i 15 muškaraca) ispitani su upotrebom tri instrumenta procene: Upitnikom o životnim događajima za DSM-V (LEC-5), PTSP upitnikom za DSM-V (PCL-5), kao i Skalom depresivnosti, anksioznosti i stresa (DASS).

Rezultati: Najveći broj osoba je identifikovao poplave kao dominantnu životnu traumu (72,5%). Uprkos relativno niskom nivou intenziteta posttraumatskih simptoma ($5,02 \pm 4,99$), osobe ženskog pola su imale izraženije ukupne simptome u vezi sa traumom ($p < 0,01$), kao i izraženije specifične simptome ponovnog proživljavanja traume ($p < 0,01$). Nije pronađena razlika između polova u izraženosti drugih simptoma vezanih za traumu, kao ni u izraženosti simptoma depresivnosti, anksioznosti i stresa.

Zaključak: U uzorku opšte populacije, sa supkliničkim nivoima posttraumatskih simptoma, najznačajnija razlika između polova je pronađena u izraženosti simptoma ponovnog proživljavanja traume. Ovaj nalaz je u skladu sa rezultatima dobijenim iz kliničkih uzoraka, a od daljih istraživanja se očekuje da daju odgovore na pitanja da li tretmani fokusirani na traumu mogu da budu prilagođeni polu i do koje mere mogu da spreče razvoj „pune“ kliničke slike posttraumatskog stresnog poremećaja.

Ključne reči:
posttraumatski stresni poremećaj, trauma, polne razlike, depresija, poplave

INTRODUCTION

Floods are among the most common and severe forms of natural disasters. Posttraumatic Stress Disorder (PTSD), related to floods, was found in many countries worldwide (1, 2). During the year 2014, a part of the population from Serbia (especially from Obrenovac and its surroundings) was exposed to severe floods (3). After natural disasters and other severe traumatic exposures, common reaction includes emotional, cognitive and physical manifestations. Some people are more affected by trauma than others and one of the most intensive reactions is full blown disorder - PTSD (4), alongside with the less intensive reactions which could be considered as sub-threshold disorders. Lecic-Tosevski et al. examined the prevalence of PTSD in general adult Serbian population seven years after the exposure to major traumas: bombardment, being expelled from home and participation in combat (5). Their analysis revealed an 18.8% prevalence rate of current PTSD and 32.3% prevalence rate of lifetime PTSD, in a randomly selected sample comprised of 640 adults from the general population.

According to the new DSM-V classification, there are several types of symptoms that can be manifested after the exposure to extreme trauma (6). They are grouped in four syndromes: re-experiencing, avoidance, negative cognition and mood, and arousal. Re-experiencing covers spontaneous memories of the traumatic event, recurrent dreams related to it, flashbacks or other intense

or prolonged psychological distress. Avoidance refers to distressing memories, thoughts, feelings or external reminders of the event and includes persistent evasion of stimuli that remind one of the event. Negative cognitions and mood represent a spectrum that includes persistent and distorted sense of blame, estrangement from others, markedly diminished interest in activities, and inability to remember key aspects of the event. Arousal is associated with difficulties related to sleep, concentration, attention, as well as increased startle response, irritable or aggressive behavior, and reckless or self-destructive behavior.

The large body of literature consistently reports that men experience traumatic events more often than women, but women more often develop PTSD after the experience of a traumatic event (7-9). How women and men differ, in the type of experienced traumatic events, remains an open question. Stuber et al. (10) have focused on gender disparities in PTSD after the September 11, 2001 (9/11) terrorist attacks, and showed that the prevalence of probable PTSD related to 9/11 was not significantly different between women and men. However, they observed that women were significantly more likely to report two types of typical PTSD symptoms: re-experiencing and hyper arousal symptoms.

PTSD is not the only condition that may occur after the trauma. Research into the neurobiological foundations of traumatic experiences (11) suggests that besides PTSD, depression is a possible way of conceptualizing mental suffering, in response to traumatic

stress experiences (12). This has been also found for the comorbidity between PTSD and anxiety (13).

Throughout the article, similarly to Tolin & Foa (14), we are using the term sex rather than gender, since sex represents biological characteristics, while gender represents a much more complex set of socio-psychological representations, beyond our scope.

The goal of this study was to screen for potentially traumatic events in adults from Obrenovac, 18 months after the floods, and to evaluate if there are differences in the four trauma-related DSM-V symptom clusters severity scores between the sexes. Moreover, we aimed to evaluate sex differences in experiencing negative emotional states (depression, anxiety, stress).

We hypothesized that trauma-related symptoms will differ between the sexes and that total severity of trauma-related symptoms will correlate positively with negative affectivity.

MATERIAL AND METHODS

Forty healthy volunteers from Obrenovac (25 women and 15 men) participated in the study. The subjects were recruited by a local advertisement and assessed at Healthcare Center – Obrenovac.

The research was performed as a pilot within a larger study entitled: “The analysis of glutamatergic and glucocorticoid signalization in persons with depression and trauma-related disorders” (“*Analiza glutamatergičke i glukokortikoidne signalizacije kod osoba sa depresijom i poremećajima povezanim sa traumom*”). The application was approved by the Ethic Committee of the Clinical Centre of Serbia, Belgrade and the Ethic Committee of Healthcare Center in Obrenovac. All participants signed a written consent before entering the study.

After consenting, participants underwent a semi-structured interview performed by trained researchers. All participants were screened using The Mini-International Neuropsychiatric Interview (MINI) (15), in order to exclude those with past/present psychiatric disorders and those with prescribed medications on a continual basis.

Two screening tests were used to assess the presence of PTSD symptoms over the past month. The Life Events Checklist for DSM-V (LEC-5) (16) is a self-report measure designed to screen for potentially traumatic events in a respondent’s lifetime, was used to assess trauma exposure, assessing exposure to 16 events

known to potentially result in PTSD or distress,. Four trauma/related symptom domains were measured using PTSD Checklist for DSM-V (PCL-5) (17). The PCL-5 is a 20-item self-report scale that assesses 20 symptoms of PTSD, according to the DSM-V criteria. The scale has demonstrated acceptable reliability and validity. Subscales of the PCL-5 questionnaire correspond to PTSD criteria for re-experiencing (items 1-5), avoidance (items 6-7), negative cognitions and mood (items 8-14), and arousal (items 15-20). Each item is scored on a five-point Likert scale, from 0 (never) to 4 (extremely). A total symptom severity score is obtained by summing the scores. A PCL-5 cut-point of 30-35 score was suggestive for PTSD (17). These assessment tools are not copyrighted, however, we have informed National Center for PTSD before using them in our study.

The Depression Anxiety Stress Scale (DASS) is a 42 items self-report inventory developed by Lovibond & Lovibond (18). This scale is intended to assess psychological distress along three dimensions: depression, anxiety, and stress. The DASS has been widely used in various studies to assess the symptoms of psychological distress among both clinical and non-clinical samples. Respondents answered on a 4-point Likert scale (0- none to 3-mainly or almost always) regarding how they felt in the past week. In this study, the official version of the translation of DASS in Serbian language, was used.

We used descriptive statistics, Chi square test, T-test and Mann-Whitney nonparametric test to analyze sex differences in socio-demographic characteristics, symptoms of depression, anxiety and stress (DASS), as well as sex differences in symptoms of PTSD (PCL-5). The association between negative affective states and PCL symptoms was assessed by bivariate correlation. The level of statistical significance was set at 0.01.

RESULTS

Socio-demographic characteristics

Sociodemographic characteristics of the study sample are shown in **table 1**. There were no sex differences in age, years of education, marital or employment status.

PTSD related symptoms

The majority of subjects reported floods as the major traumatic event (72.5%), according to LEC-

Table 1. Sociodemographic characteristics of the sample

	M (n=15)	F (n=25)	p
Age (mean ±SD)	32.07 ± 7.44	37.72 ± 10.17	0.055
Years of education (mean ±SD)	12.92 ± 1.81	13.18 ± 2.38	0.714
Marital status – unmarried/married	5/10	8/17	0.931
Employment status – employed/unemployed	9/6	17/8	0.608

5 analysis (68% of females and 80% of males). There were no statistically significant sex differences in the reported major trauma. Other reported traumas were: death or severe disease of a family member (12.5%), war (7.5%), sports injury (2.5%), failure of vitro fertilization (2.5%), and complications during childbirth (2.5%).

The mean total score on PCL was 5.02. The mean scores regarding the symptom clusters were as follows: re-experiencing (Cluster B) was 1.53, avoidance (Cluster C) was 1.23, negative cognition and mood (Cluster D) was 1.05, arousal (Cluster E) was 1.20. Regarding the sex differences (**Table 2**), there were statistically significant results in two domains: PCL-5 total score, as well as PCL-5 cluster B score. Women had significantly higher total PTSD symptom severity scores and higher severity of symptoms of re-experiencing

trauma. There were no sex differences in symptoms of avoidance, negative cognitions and mood, or arousal. Negative affective states and related symptoms

The mean total score of DASS was 15.28 as shown in **Table 3**. Men and women did not differ significantly in DASS mean total scores, nor in mean scores of depression, anxiety and stress subscales.

Correlation between negative affective states and PTSD related symptoms

The correlation between total DASS and PCL-5 scores was high ($r = 0.484$) and statistically significant ($p = 0.002$).

Table 2. Sex differences in PTSD Checklist for DSM-V scores

Score (mean \pm SD)	Total (n=39)	M (n=14)	F (n=25)	p
PCL-5 total score	5.02 \pm 4.99	2.23 \pm 2.11	6.60 \pm 5.46	0.006*
Re-experiencing	1.53 \pm 1.63	0.64 \pm 0.84	2.04 \pm 1.76	0.005*
Avoidance	1.23 \pm 1.72	0.78 \pm 1.18	1.48 \pm 1.93	0.243
Negative cognition and mood	1.05 \pm 1.66	0.35 \pm 0.63	1.44 \pm 1.93	0.107
Arousal	1.20 \pm 1.98	0.50 \pm 0.75	1.60 \pm 2.34	0.132

* $p < 0.01$

DISCUSSION

The results of the present study confirmed the first hypothesis, showing that trauma-related symptoms differ between the sexes and that females have been impacted by consequences of the intense stressful experiences more than males. In the non-clinical sample, with only a sub-threshold level of post-traumatic symptoms, the most prominent difference between sexes was found in relation to re-experiencing, showing that female sex was more prone to develop spontaneous memories of the traumatic event, recurrent dreams related to it, flashbacks or other intense psychological distress. Despite the relatively low level of the post-traumatic symptom intensity, it was shown that women have been experiencing higher overall trauma-related symptoms, as well as a higher frequency of re-experiencing trauma symptoms related mostly to the floods and approximately 1.5 years after, in comparison to men. Moreover, we confirmed the second hypothesis, by showing that the total severity of trauma-related symptoms correlated positively with negative affectivity and that this relation could be evident beyond the levels of clinical samples. However, there were no sex differences in depression, anxiety and stress symptom severity in our sample. Although one of the limitations of this study is its relatively small sample size, by comparing our analysis with the study of psychometric DASS evaluation on a large sample of Serbian student population ($n=1374$), it seems

that we have almost the same levels of negative affective states as the large and representative sample, studied by Jovanovic et al. (19). Similarly to our findings, Jovanovic et al. concluded that there were not any sex differences neither in DASS total scores, nor on the depression, anxiety and stress subscales. Nevertheless, negative affective states do coincide with trauma related symptoms and syndromes, together with this relation, have been repeatedly confirmed (20, 21). For example, when recent study explored the long-term health consequences of a lifetime trauma exposure in general population (22), traumatized individuals were more likely to exhibit higher levels of current depressive symptoms, major depression, current anxiety disorder and psychiatric co-morbidity, with more frequent and more severe health-related outcomes in those with recurrent re-experiencing of events, (i.e. females).

Studies after different types of natural disasters are showing that gender moderates the endorsement in almost all DSM-5 PTSD criteria (23). It remains unclear whether the most important issue concerning natural disaster induced psychological trauma is the degree of disaster exposure, a particular type of exposure, or self-perception of the importance of event (24).

The meta-analysis on the relation between sex and different types of trauma conducted by Tolin & Foa (14), concluded that women are more likely than men to develop PTSD across virtually every type of traumatic event studied. It appears that once the traumatic event has

occurred, irrespective of the type of trauma, women are more likely to develop PTSD than their male counterparts. Similarly, when Spiric et al. examined gender differences in psychological consequences of victims of war torture in the population of former Yugoslavian countries, they found that women had more frequent and severe symptoms of PTSD (25). Our study supports these findings. When assessing PTSD symptoms in a sample of motor vehicle accidents survivors, Fullerton et al. reported significantly higher rates of endorsement for all re-experiencing and most of the avoidance, numbing, and arousal symptoms in females (26). They found that women were at greater risk for the specific re-experiencing symptoms of intense feelings of distress in situations similar to the motor vehicle accident and physical reactivity to memories of the motor vehicle accident. Even though the traumatic event in this case was not natural disaster, our results are similar.

The findings that women are more likely to develop PTSD, irrespective of the type of trauma, may have implications for studying potential biological differences in male/female responses to trauma. Although the exploration of underlying mechanisms for the observed sex differences is beyond the scope of this study, it is important to note some of the potential explanations, such as inherent biological sex differences in hormonal status (estradiol and testosterone) that seem to influence emotional memory (including trauma-related memory) consolidation (27) and impact fear inhibition (28), or the presence of sexually dimorphic activity in key fear network regions (amygdala, hippocampus, anterior cingulate cortex and ventromedial prefrontal cortex), which could influence the complex PTSD-related psychophysiology (29).

Our results came from the small sample of volunteers, which could be associated with certain selection bias and cannot ideally represent the general population, nevertheless, potential implications of our findings could be applicable both for the research and for the clinical practice. Since one of the core features of PTSD is re-experiencing trauma, an observation that female sex is more prone to these types of symptoms could influence the design of more specific therapeutic protocols with respect to the sex. For example, a study by Holz et al. (30) found that cortisol mediates PTSD-relevant memory processes, particularly intrusive memories of re-experiencing trauma. The authors showed that cortisol inhibited the retrieval of perceptually primed material in a traumatic context, so they proposed cortisol as a potential pharmacological help in reducing intrusive memories. Alongside with HPA and cortisol related mechanisms, there are multiple pathways to storage and control fear-inducing memories and investigation in this domain is progressing (31-33).

Better understanding of sex differences in PTSD pathophysiology and symptom- maintenance, in both clinical and sub-clinical population, might assist in developing enhanced, more personalized treatments to address sex-specific neurobiological targets. Treating trauma related symptoms at the subclinical level may result in a larger and more rapid symptom reduction, thus sex-specific interventions applied earlier in the developmental trajectory of the disorder might be highly beneficial (34). However, future studies are needed to examine whether trauma-focused treatments can be tailored in relation to sex and to which extent it might prevent full-blown PTSD.

Table 3. Sex differences in Depression Anxiety Stress Scale scores

Score (mean \pm SD)	Total (n=38)	M (n=15)	F (n=23)	p
DASS total score	15.28 \pm 13.19	12.00 \pm 8.13	17.56 \pm 15.49	0.192
Anxiety	3.57 \pm 4.07	3.06 \pm 3.82	4.52 \pm 4.67	0.203
Depression	3.81 \pm 4.72	3.06 \pm 3.45	4.30 \pm 5.42	0.540
Stress	8.00 \pm 6.32	5.86 \pm 3.64	8.91 \pm 7.08	0.261

Acknowledgment

The authors would like to thank to research assistants Sanja Andric MD, Milica Jovicic MD, Katarina Maksimovic MD and Marina Mihaljevic MD, who contributed significantly in the data acquisition and assisted in the interpretation. We would also like to thank our colleagues from Healthcare Centre Obrenovac, with whom we collaborated with satisfaction.

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