
POSTTRAUMATIC STRESS DISORDER AMONG WOMEN AFTER THE WAR IN SARAJEVO: A RATIONALE FOR GENETIC STUDY

Lilijana Oru¹, Lejla Kapur², Naris Pojski², Semra Avaljuga³, Sladjana Ivezi⁴, Pamela Bell⁵

1. Psychiatric Clinic, Clinical Centre, University of Sarajevo;

2. Institute for Genetic Engineering and Biotechnology, University of Sarajevo;

3. Department of Epidemiology and Statistics, Medical School, University of Sarajevo;

4. Psychiatric Clinic "Vrap-e", University of Zagreb;

5. Faculte de Sciences Psychologiques et de l'Education, Universite Libre de Bruxelles;

ABSTRACT

An exposure to extreme trauma events leads to posttraumatic stress disorder (PTSD) in up to 14–50% of war survivors. Recent findings suggest that genetic factors could play a certain role in PTSD development. In order to illustrate this possibility, we present results of a pilot study on gender specific sample of Sarajevo civilians immediately after the war cessation. During the period 1992–1995, Sarajevo civilians experienced continuous life threatening events with a great risk of developing PTSD in such conditions.

Our study included 100 women adjusted to same socio-demographic characteristics. All women were interviewed using Harvard Trauma Questionnaire (HTQ) and divided into two groups (*domestic* and *returnees*) according to exposure length to extreme war life events of six or forty-three months. Above 50% of total analysed sample fulfilled criteria for PTSD. Regarding duration in trauma exposure no significant difference between these two groups were found. The only significant predictor found was physical abuse ($p > 0.01$) that still cannot explain why some women develop PTSD while others not.

Several years after the war, PTSD frequencies are decreased and disorder became chronic and more severe. However, the PTSD prevalence remains high when compared to general population rates. Therefore, Sarajevo population being exposed for almost four years to extreme war life events represents unique model for comparative research on PTSD etiology within the light of latest findings in molecular genetics of PTSD.

Keywords: PTSD, women, war trauma, risk factors, trauma exposure time, physical abuse, genetics;

INTRODUCTION

Posttraumatic stress disorder (PTSD) is an anxiety disorder characterized by intrusive, avoidance and hyperarousal symptoms. PTSD seems to be exceptional compared to other psychiatric disorders, as by definition – there is no PTSD without an extreme environmental

stress. Data suggest that there is a huge discrepancy between trauma exposure rate and PTSD prevalence rate (1).

The risk for PTSD is two times higher among women compared to men (2). There is evidence that severity, type and duration of trauma are significant risk factors for PTSD (3). However, described risk factors could not explain why some trauma survivors develop disorder while others do not. Recent studies suggest that certain biological mechanisms supported by specific genetic predisposition contribute to the individual variability in PTSD susceptibility (4), (5). Epidemiological and formal genetic studies point out the role of genetic factors (6) in PTSD. This could help to elucidate certain individual vulnerability to posttraumatic stress disorder.

Under almost four years siege in Sarajevo (1992–1995), whole civilian population was overwhelmingly exposed to every-day life threat (shelling, sniper-fire, massacres, eye-witnessing of injuries and deaths, loss of close family members, captivity, etc.), making this population unique in that respect. The objective of our pilot study was to demonstrate that environmental stressors, although necessary are not exclusive in etiology of this complex multi-factorial disorder. This supports the idea for research based on polymorphisms within candidate genes encoding for neurotransmission components that could be involved in biology of PTSD (5).

SUBJECTS AND METHODS

A pilot study including one hundred women (age 20–49) survived war trauma in Sarajevo area, were chosen randomly and interviewed by Harvard Trauma Questionnaire (HTQ) for PTSD, Bosnian version (7). They were chosen among women from a municipality social service in Sarajevo-Center according to time related exposure. The instrument was translated and adjusted for B&H population, but not validated at the time of sampling.

None of the interviewed had any psychiatric disorder according to Schedule for Schizophrenia and Affective Disorders - Lifetime Version (SADS-L) (8) or Anxiety disorders prior to trauma experience as confirmed by

interviewing psychiatrist. Each woman experienced some of extreme trauma events listed in the Part I of HTQ. According to the time spent under the siege, subjects were divided into two groups (A and B) as follows: Group A - women, who were exposed to extreme war life events at beginning of the war in Sarajevo (around six months), temporarily resettled to EU countries and have returned to their homes immediately after the war (*returnees*).

Group B - women residing in Sarajevo during and after the war (*domestic*) and were exposed to extreme trauma for forty-three months (1992-1996);

Interviews were made immediately after the war cessation with informed consent signed by each participant. Data presented in this paper were analyzed using standard statistical methods.

RESULTS

We found that 55 women of total sample developed PTSD that represent more than half of whole population investigated. The occurrence of PTSD was 53% and 55% in groups A and B respectively. Simple test between percentages confirms that there is not a significant difference in PTSD occurrence between these two groups ($t=0.201$; $p>0.05$). Chi squared test between frequencies of PTSD in observed groups showed no significant difference ($\chi^2=0.040$, $p>0.05$).

There is no significant correlation between trauma time exposure and prevalence of PTSD in the analyzed sample (correlation coefficient = -0.0201 , $p>0.05$) (Figure 1).

Out of 100 interviewed women, 11% were severely physically abused and all of them developed PTSD. Other extreme trauma events did not show to be exclusive for PTSD.

A comparison of PTSD and physical abuse frequencies in total analyzed sample ($N=100$) shows statistically significant

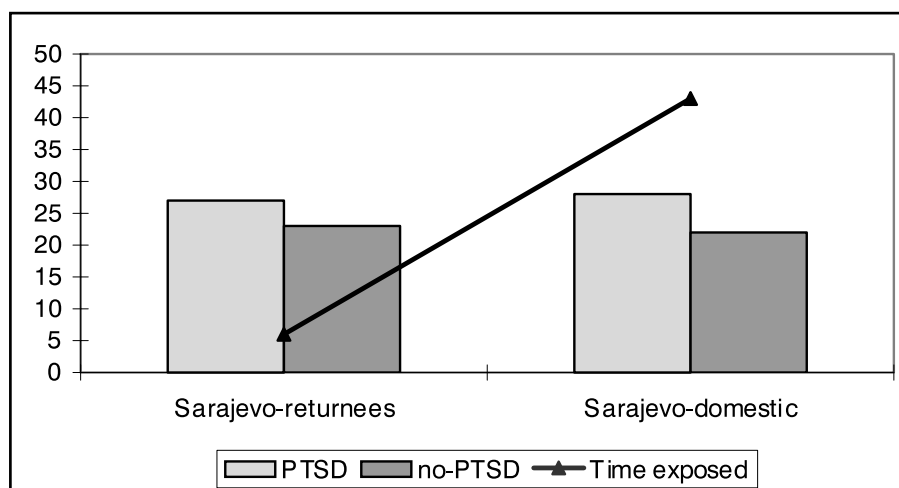
difference ($z=6.617$, $p>0.05$). This result indicates that although significant contributor, physical abuse is not a necessary factor for PTSD. According to a priori hypothesis that if physical abuse was an exclusive predictor, than the frequencies values for PTSD and physical abuse should be approximately the same.

DISCUSSION

PTSD prevalence range 14-50% was reported for war survivor populations across the world (9). During the period 1992-1995, Sarajevo population was under the siege and civilians were permanently exposed to war weapon fire. In our preliminary research high PTSD prevalence was found in both groups (domestic and returnees). These results could be expected since the study was performed immediately after the war cessation. Most of the interviewed woman with PTSD had good social and work function. The other reason for high figures (more than 50%) could be attributed to exclusive woman civilian sample as this gender group have two times higher risk for developing PTSD (10). Interesting results appeared when we compared PTSD frequencies between two groups; no significant difference in PTSD proportions was observed although time exposure to qualitatively same war life events was considerably different. Our results suggest that time exposure could not have crucial impact on PTSD development. However, at the moment of screening long-term exposure effects on chronicity and severity of PTSD could not be evaluated in predictive manner (11).

Two groups were also observed according to socio-demographic characteristics (age, marital status and educational level) with no difference (12). Among other specific extreme life events listed in the HTQ, physical abuse showed to be risk factor for PTSD. Although possibly important risk factor our results could not prove that

Figure 1. Correlation between PTSD and exposure time to war trauma events in two groups of Sarajevo women.



physical abuse is sufficient and necessary for PTSD development. In our study sample we tried to reduce the impact of certain range of variables caused by differences in gender, cultural background, quality of common traumatic environment, lack of pre-morbid psychiatric history which brought in front other factors involved in PTSD. Because only a proportion of war trauma survivors develop PTSD (13) as confirmed here, it raises the question of other intrinsic factors involved in protective mechanisms against PTSD. Latest findings emphasize the hypothesis on biological aspects of PTSD (14). Recently, genetic basis of neurotransmission related to PTSD susceptibility has become an interesting area of research. Association between PTSD and particular gene polymorphisms involved in dopaminergic system was found (15) although these results were not replicated in similar studies (16).

Seven years after the war in Primary Health Care setting in Bosnia and Herzegovina, the prevalence of PTSD decreased five times in comparison with result presented in this paper. Severe forms of PTSD mainly co-morbid with other anxiety disorders, depression, alcohol and substance abuse was found (Kapetanovic and Oruc 2003; unpublished data).

Having in mind the preliminary findings on PTSD in Sarajevo and current prevalence in Bosnia and Herzegovina there is a strong argument for extended research. In that sense, Sarajevo population being exposed for almost four years to extreme war life events represents unique model for comparative research on PTSD aetiology within the light of latest findings in molecular genetics of PTSD.

REFERENCES

- (1) Kessler R.C., Sonnega A., Bromet E., Hughes M., Nelson C.B. Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry*. 1995;52(12):1048-1060
- (2) Pulcino T., Galea S., Ahern J., Resnick H., Foley M., Vlahov D. Posttraumatic stress in women after the September 11 terrorist attacks in New York City. *J Womens Health (Larchmt)*. 2003;12(8):809-820.
- (3) Steel Z., Silove D., Phan T., Bauman A. Long-term effect of psychological trauma on the mental health of Vietnamese refugees resettled in Australia: a population-based study. *Lancet*. 2002;360(9339):1056-1062.
- (4) Yehuda R. Biology of posttraumatic stress disorder. *J Clin Psychiatry*. 2000;61 Suppl 7:14-21.
- (5) Segman R.H., Cooper-Kazaz R., Macciardi F., Goltser T., Halfon Y., Dobroborski T., Shalev A.Y. Association between the dopamine transporter gene and posttraumatic stress disorder. *Mol Psychiatry*. 2002;7(8):903-907.
- (6) Lyons M.J., Goldberg J., Eisen S.A., True W., Tsuang M.T., Meyer J.M., Henderson W.G. Do genes influence exposure to trauma? A twin study of combat. *Am J Med Genet*. 1993;48(1):22-27.
- (7) Mollica R.F., Caspi-Yavin Y., Bollini P., Truong T., Tor S., Lavelle J. The Harvard Trauma Questionnaire. Validating a cross-cultural instrument for measuring torture, trauma, and posttraumatic stress disorder in Indochinese refugees. *J Nerv Ment Dis*. 1992;180(2):111-116.
- (8) Endicott J., Spitzer R.L. Schedule for Schizophrenia and Affective Disorders -Lifetime Version. 1st Edition. New York: N.Y. State Psychiatric Institute; 1978.
- (9) Summerfield D. The effect of conflict on civilian populations. In: Black D., Newman M., Harris-Hendriks J, Mezey G. *Psychological Trauma: A developmental Approach*. 1st Edition. London: Gaskell; 1997.
- (10) Glover D.A., Powers M.B., Bergman L., Smits J.A., Telch M.J., Stuber M. Urinary dopamine and turn bias in traumatized women with and without PTSD symptoms. *Behav Brain Res*. 2003;144(1-2):137-141.
- (11) Seedat S., Niehaus D.J., Stein D.J. The role of genes and family in trauma exposure and posttraumatic stress disorder. *Mol Psychiatry*. 2001;6(4):360-362.
- (12) Oruc L., Avaljuga S., Spratt K.F., Bell P. The impact of war trauma on female population in Bosnia and Herzegovina: Demographic Characteristics. *Med. Arhiv*. In press.
- (13) Yehuda R. Biological factors associated with susceptibility to posttraumatic stress disorder. *Can J Psychiatry*. 1999;44(1):34-39.
- (14) Yehuda R., Davidson J. *Clinician's Manual on Posttraumatic Stress Disorder*. 1st Edition. London: Science Press; 2000.
- (15) Young R.M., Lawford B.R., Noble E.P., Kann B., Wilkie A., Ritchie T., Arnold L., Shadforth S. Harmful drinking in military veterans with post-traumatic stress disorder: association with the D2 dopamine receptor A1 allele. *Alcohol Alcohol*. 2002;37(5):451-456.
- (16) Gelernter J., Southwick S., Goodson S., Morgan A., Nagy L., Charney D.S. No association between D2 dopamine receptor (DRD2) "A" system alleles, or DRD2 haplotypes, and posttraumatic stress disorder. *Biol Psychiatry*. 1999;45(5):620-625.