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Evaluation of Vicarious PTSD among Children of Sardasht Chemical Warfare Survivors 20 Years after Iran-Iraq War

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Abstract: Post-Traumatic Stress Disorders (PTSD) was reported before in 90% of chemical warfare survivors. Traumatic experiences could affect on the life of other family members, too. Clinical experiences and frequent observations demonstrated more psychological problems in families with a member affected by chemical agent. The aim of this study is to evaluate the frequency of vicarious PTSD among the children of Iraqi chemical attack survivors. In a descriptive, Cross-sectional study, we enrolled 286≥15 years old single children of chemical attacks survivors as case and also 242 ages and sex matched normal civilian from the same city, Sardasht as the control group. PTSD in both groups was assessed by applying Mississippi Questionnaire. Mississippi scale for PTSD among the children of the Sardasht chemical attack survivors was 128.88±13.92 and 108.34±22.7 in the control group ($p<0.05$). There was no significant difference in the Mississippi scale among different sex and age groups. This study demonstrated higher rates of PTSD among children of Sardasht chemical attack survivors compared with control group, suggesting the need to follow up and treat severe cases.

Key words: Post-traumatic Stress Disorder (PTSD), vicarious trauma, chemical victims, children, Iran-Iraq war

INTRODUCTION

After WW[2], the most extensive chemical attacks ever occurred, in violation of the Geneva Protocol 1952, Iraqi-Iran war occurred during 8 years. UN fact finding team confirmed the use of mustard gas as well as nerve agents against Iranian troops. According to Iranian government estimates, Iran sustained approximately 387 chemical attacks (by rocket, air, or artillery) during 8 years war (Cordesman, 1998). Iraq not only used chemical weapons against Iranian military targets, but also frequently targeted residential areas, especially along the border towns and villages. According to the statistics of Bonyad-e Janbazan, there are at least 34000 chemical warfare victims (disabled) recognized in Iran until now, (Tavallaie *et al*., 2004) which takes almost 37 million USD annually to treat physical complications of this huge population of victims.

Sardasht is a small Iranian city in northwestern Iran, with a 10 km distance from the Iran-Iraq border, which exposed during the war to both high intensity conventional warfare (60 times) and to chemical weapons. In June 1987, this Kurdish town was bombarded with four 250 kg sulfur mustard warheads that exploded in the center of town and approximately 4500 residents were exposed to it (Hashemian *et al*., 2006).

There are several studies which evaluated the trauma-related mental health problems among veterans and war victims. But there is paucity of studies to evaluate Post-traumatic stress disorders in Chemical warfare victims.

Tavallaie *et al*. (2004) reported PTSD in 90% of Iranian chemical warfare victims. Romano and King (2001) demonstrated anxiety disorders in 57% of soldiers, exposed to chemical and biological agents. Anxiety disorders reported to be more frequent in Iranian chemical warfare victims in comparison with other disabled veterans (Haghdadi and Parchami, 1993; Mohammadi and Noori, 1993). High prevalence rates of symptoms of depression, anxiety and PTSD were seen in the post-war Afghanistan (Cardozo *et al*., 2004; Scholte *et al*., 2004). Others studies performed in war zones such as Kosovo (Cardozo *et al*., 2004), Bosnia (Mollica *et al*., 2007) and Northern Uganda (Vinck *et al*., 2007) confirms these results. De Jong *et al*. (2001) reported rate of PTSD symptoms of 37% in Algeria, 28% in Cambodia, 18% in Gaza and 16% in Ethiopia. This study demonstrated specific patterns of risk factors for PTSD in different settings and countries (De-Jong *et al*., 2001).

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Post-Traumatic Stress Disorder not only affects the quality of life of chemical warfare victims, but also has a large influence on their families and environment (Devilly, 2002). Evaluations shows more mental health problems in the family members of disabled veterans (Radfar *et al*., 2005), but yet the mental consequences of experiencing chemical attack on the children of chemical warfare victims was not investigated before.

Vicarious trauma is also referred to as a secondary trauma. First, it was reported in clinicians who worked with traumatized individuals, whether they worked with victims of child maltreatment, domestic violence, victims of torture, or victims of large-scale disasters (Sabin-Farrell and Turpin, 2003).

Secondary traumatic stress is defined as psychogenic reaction to a traumatic experience of another one who is important for that person (Figley, 1998; Fullerton and Ursano, 1997). Symptoms of secondary or vicarious trauma are extremely similar to the symptoms of directly affected ones, including nightmares about the directly traumatized person, insomnia, irritability, loss of emotions, fatigue and etc. (Figley, 1998). Physical symptoms include headache, ear problems, predisposition to infectious diseases, alcohol, drugs and tobacco abuse (Bell, 2003; Koic *et al*., 2002).

Most of crises occurred around the world are human-made, such as wars, political conflicts and etc. it is demonstrated that war have more negative effects on children (Guha-Sapir and Van-Panhuis, 2003).

After WWĐ, it is suggested that children living with their parents were influenced to fewer amount by war, but this hypothesis rejected in 1990 decade, because later studies demonstrated more clear and precise sense of danger and reaction to that among children.

Children were influenced by crises depending on their age and developmental state. Behavioral reactions, such as Post-traumatic stress disorder, or anti-social behaviors are most common symptoms among children. During and after wars, direct and indirect trauma affects on the coping ability of children (Najjarian and Barati-Sade, 2000).

Children of veterans were more likely to show psychological disorders and PTSD. The most common form of these disorders was ADHD (Fairbank *et al*., 1993; Kalantari *et al*., 1993; Rutter and Quinton, 1984). There are few studies worldwide which investigated mental health consequences of exposure to chemical agents. Some available articles disclosed post-traumatic stress disorder (PTSD) symptoms: in a sample of World War Đ (WWĐ) veterans exposed to mustard gas, 50% experienced partial or full lifetime PTSD nearly one third met the criteria for full current PTSD 50 years after the exposure (Ford *et al*., 2004; Jankowski *et al*., 2004; Schnurr *et al*., 1996, 1997).

Another study about Mental disorders in people exposed to chemical agents focused on 1995 Sarin terrorist attack in which More than 5,000 passengers on Tokyo subway trains were injured with toxic chemicals including the nerve gas sarin (Kawada *et al*., 2005). Seventeen percent of samples met the criteria for PTSD 5 years after attack (Ohtani *et al*., 2004).

Vafaei and Seidy (2003) demonstrated more depression among Iranian chemical warfare victims than other disabled victims of Iran-Iraq war (which called Janbaz in Persian).

The aim of this study is to evaluate the secondary post-traumatic stress disorder among children of victims of Iraq's chemical warfare against Iran almost 20 years after bombardment of Sardasht.

MATERIALS AND METHODS

In May 2008, in a descriptive Cross-sectional study, we enrolled 528 individuals in two categories: (1) 286≥15 years old single children of chemical attacks survivors as case and (2) 242 ages and sex matched normal civilian from the same city, Sardasht as the control group. We had measured the PTSD among the fathers (150 chemical victims as fathers of case group and 156 fathers of control group) too, to determine probable relationships of self-reported PTSD among war victims and their children.

In order to assign case subjects, all records related to Chemical attack victims who were available in Shahid and Isargaran Affairs Bonyad in Sardasht city were reviewed by the study group. There were 1336 recognized and registered chemical warfare victims in Sardasht. Children of the victims who met the inclusion criteria were enrolled. Our inclusion criteria included having father experienced Chemical warfare during Iran-Iraq war, having a family (including father, mother and at least one ≥15 years old single child), absence of chronic illness or malignancy in other family members, absence of other chemical warfare victims or disabled persons in the family and finally declaring consent to participate in the study. 176 families met the criteria to include in our study, among which 150 families (85.2% of target population) had accepted to participate in the study.

We assigned 156 families as the Control group. They were selected by systematic randomized sampling method from among population of the Sardasht city. The criteria of selecting control group were similar to the case group, excepting that the family father should have no evidenced exposure to chemical agents during the chemical warfare.

Measurement of outcomes: PTSD in both groups was assessed using Mississippi Questionnaire. The Mississippi Scale for Combat-Related PTSD is widely used in the assessment of post-traumatic stress disorders. We had measured the PTSD among the fathers (chemical victims) too, to determine probable relationships of self-reported PTSD among war victims and their children. The M-PTSD is a 39-item self-report measure that assesses combat-related PTSD in veteran populations. Items sample DSM Ø symptoms of PTSD and frequently observed associated features (substance abuse, suicidality and depression). Respondents were asked to rate how they feel about each item using 5-point, Likert-style response categories. Ten positively framed items were reversed, scored and then responses were summed to provide an index of PTSD symptom severity which can range from 39-195.

This Scale developed by Kean *et al.* (1988) and revised by Norris and Perilla (1996). Norris and Perilla (1996) High cross-language stability was demonstrated be Norris before (Norris). The Persian version validated by Goodarzi (2003) . for the Iranian population (2003) with a high internal consistency (Cronbach α = 0.91).). High internal consistency and cross-cultural validity was noted by Goodarzi (2003). Up to 65 score determined Mild, 65-130 determined Moderate and more than 130 score was considered as severe self-reported PTSD. This instrument was selected because it had a combat-related background.

Statistical analysis: We used SPSS software ver11.5 to calculate measures of central tendency including Mean and Median and measures of dispersion such as standard deviation and variance in order to analysis the study groups. In order to test the hypothesis, we used parametric methods including Independent t-test, Variance analysis and Correlation test.

RESULTS

In this study we compared case group including 286 children of chemical warfare victims with control group including 242≥15 years old single population using Mississippi questionnaire. Similar Mississippi scores were compared among the fathers (150 chemical victims as fathers of case group and 156 fathers of control group) too.

Among 286 cases, 154 (53.8%) were 15-20 years old, 117 (40.9%) were 21-30 yrs old, 11 (3.8%) 31-40 years old and 2 subjects more than 40 years old. 157 (54.8%) persons were male and 127 (44.4%) were female. There was no significant relationship between Mississippi score and different age or sex groups ($p \geq 0.05$).

Intensity of PTSD was evaluated by this questionnaire as well and demonstrated higher rates of severe cases in the case group compared with the control group (both children and fathers). The Mississippi total score in chemical victims (as case group fathers) was 123.06 and was higher than control group's Mississippi score (112.29) ($p<0.001$).

There was 5.5% severe cases (score≥130) and 93% moderate cases (65-130 scores) among children of chemical warfare victims and 2% severe and 70% moderate PTSD in the control group (Table 1).

29.6% of children of Iraq's chemical attack victims had high intensity penetrating memories, which exists in only 6.9% of controls. In the victims' children group, 78% suffer severe and moderate problems in their personal relationship. This rate was 51.7% in the control group. Among victims' children, 22.4% were severely and 71% were moderately unable to control emotional feelings. These rates are 25.2% and 26.4% in the control group. Lack of severe depression exists among 52.7% of chemical victims' children, which was 39% in the control group (Table 2).

Total Mississippi scores of the chemical victims' children group with a mean score of 128.88±13.92 is significantly higher than the control group with a mean score of 108.34±22.70. ($p<0.05$, T=5.42). Severe penetrating memories were significantly higher in the case group compared with the control group (35.32±6.18 compared to 28.77±7.67, $p<0.05$). According to T-test, problems in

Table 1: Severity of PTSD according to the Mississippi score in case and control groups (children)

Mississippi score	Low	Moderate	High
Case			
Frequency	4.0	254	15.0
Percentage	1.5	93	5.5
Control			
Frequency	67.0	174	5.0
Percentage	27.2	70.7	2.0

Table 2: Comparing total mississippi score and its factors between case and control groups (War victims)

Results	No.	Mean	SD	T	p-value
Total score					
Case	148	123.06	17.19	4.80	0.001
Control	156	112.29	21.73		
Frequently haunted by memories					
Case	150	32.36	7.32	4.33	0.001
Control	156	28.62	7.71		
Problem in personal relationships					
Case	148	29.54	7.26	4.55	0.001
Control	156	25.5	7.18		
Problem in controlling emotional feelings					
Case	150	31.52	4.67	2.85	0.005
Control	156	29.21	8.79		
Lack of depression					
Case	148	29.55	6.39	0.75	0.48
Control	156	28.94	8.56		

Table 3: Comparing total mississippi score and its factors between case and control groups (children)

Results	No.	Mean	SD	SE	T	p-value
Total score						
Case	273	128.88	13.92	0.84	12.26	0.000
Control	246	108.34	22.70	1.44		
Frequently haunted by memories						
Case	277	35.32	6.18	0.37	10.65	0.000
Control	246	28.77	7.67	0.48		
Problem in personal relationships						
Case	282	29.59	3.99	0.23	8.18	0.000
Control	246	25.38	7.16	0.45		
Problem in controlling emotional feelings						
Case	286	32.60	3.93	0.23	7.69	0.000
Control	246	28.00	8.62	0.55		
Lack of depression						
Case	273	31.41	4.96	0.30	7.86	0.000
Control	246	26.17	9.31	0.59		

Table 4: Distribution of post-traumatic stress disorder among children of chemical warfare victims based on father's Morbidity percentage according to Bonyad-Janbazan Morbidity index

Father's morbidity	Children's Mississippi score
<20%	129.12±1.45
20-30%	127.64±1.53
30-40%	125.03±1.94
>40%	138.26±2.80

personal relationship is significantly higher among cases compared with controls (29.59±3.99 compared to 25.38±7.16, $p<0.05$) (Table 3).

Inability to control emotional feelings was more frequent among cases than the controls (32.60±3.93 compared to 28.00±8.62, $p<0.05$). Lack of depression similar to other 3 factors of Mississippi Scale is higher in the cases (31.41±4.92) compared with the controls (26.17±9.31) ($p<0.05$) (Table 4).

DISCUSSION

Comparing the severity of PTSD based on revised Persian Mississippi scale, 5.5% of the children with parents affected by chemical agents had severe levels and 93% had moderate levels of Post-traumatic stress disorder, compared to 2 and 70% in the control group, respectively. All four PTSD criterias (Penetrating memories, Problem in personal relationships, inability in controlling emotional feelings and lack of depression) were high among chemical warfare victims. There was no significant difference between the score of Mississippi scale among different age or sex groups in our study.

In reviewing literature, no article had been published concerning PTSD among children of chemical warfare victims. But there are some studies which show more psychological disorders among children of veterans compared with the control groups. In studies conducted by Kalantari *et al.* (1993), Fairbank *et al.* (1993) and Rutter and Quinton (1984), children of veterans were more likely to show psychological disorders and PTSD. The most common form of these disorders was ADHD. A study conducted by James CL revealed that teenagers with a parent affected mentally (with essential emotional disorder or schizophrenia) showed more psychological disorders than the others (Janes *et al.*, 1983).

Radfar *et al.* (2005) conducted a study about the children of veterans with mental disorders and concluded that their sense of wellbeing was less than the children of veterans without any mental problem. They justified high prevalence of psychiatric symptoms in their study group to be due to the problems and stressors of fathers which not only affect the veteran himself, but also his family (Radfar *et al.*, 2005). All these studies reveal the impact of parents with physical and mental disorders on children which is consistent with our findings.

In the study conducted by Rutter and Quinton (1984) and Earls (1976), Female children of war veterans were more affected by PTSD than male children, yet our study revealed no significant difference in Mississippi scores between different age and sex groups.

The town studied in this research has had some levels of other stressors, including natural disasters and unemployment. Unemployment of family superintendent could make mental and psychological problems by means of lowering socioeconomic status. But all mentioned stressors are equal for the case and control groups in our study.

Sardasht city is one of the main attacked cities and maybe stress level of its general population was high. In Iran, supportive and counseling services are more focus on chemical warfare victims and their children were neglected. Therefore, their children due to lower age need to more attention than others. PTSD such as other mental disorders can inherit as behavioral model between generations and we must more attention to control of PTSD for prevention of its transmission to next generation.

Our study had some limitations; firstly we designed our study on chemical warfare victims who lived in Sardasht city. Our results only can prediction power for these people and next studies must be done for other social, cultural and geographical distribution for covering other chemical warfare victims. Secondly, some of our couples did not feel the questionnaire honestly or did not answer to all of study questions against our request and unfortunately, we must exclude them from our study.

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