

## Evaluation of secondary post traumatic stress disorder in chemical warfare victims' children

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### Abstract

**Aims:** Post Traumatic Stress Disorder is a problem which affects both victims and their families' quality of life, and experiencing Injury by each family member can affect other members of the family. This study was performed to evaluate the symptoms of secondary Post Traumatic Stress Disorder among chemical warfare victims' children.

**Methods:** This descriptive-analytical cross-sectional study was performed on 528 residents of Sardasht in year 2009. All chemical warfare victims' children of Sardasht were evaluated in order to enter the study as case group. 5 districts of Sardasht were selected using cluster random method, from which 600 families were selected using systematic random method. Totally, 528 were eligible to take part in the study (286 as case group and 242 as control group). Presence of secondary Post Traumatic Stress Disorder symptoms was evaluated in both groups, using Mississippi questionnaire. Data was analyzed by SPSS 14.

**Results:** The total Mississippi score was  $128.88 \pm 13.92$  in chemical warfare victims' children and  $108.34 \pm 22.70$  in control group ( $p < 0.05$ ). The total Mississippi score in chemical victims (case group's fathers) was higher than control group's fathers ( $p < 0.05$ ). Scores showed no significant differences between different age groups and genders.

**Conclusion:** Fathers' Post Traumatic Stress Disorder due to chemical warfare transfers to their children and must be prevented and treated as a serious problem.

**Keywords:** Secondary Post Traumatic Stress Disorder, Chemical Victims

### Introduction

The most widespread chemical attacks have happened in the eight-year war between Iraq-Iran (1980-1988), despite 1925 Geneva protocol. Using chemical weapons by Iraq against Iran resulted in death of thousands of civilians and non-civilians and it left one hundred thousand wounded behind, which most of them still suffer from chemical complications. Saddam regime left ten thousands casualties using these weapons against those Iranians who were not prepared against the chemical attack. Thousands of people died immediately following the chemical gases' exposure and many injured, still suffering from its destructive, long-term, and progressive side effects [1]. According to Martyr foundation and Isaargaran Affairs, there are about 34000 chemical victims or veterans in Iran [2].

In various chemical attacks of Iraq, Sardasht which is a Kurdish city in north-west of Iran (West Azerbaijan) was attacked by 4 bombs of 250Kg sulfur mustard in the summer of 1987. This attack injured about 4500 individuals. Severe skin burns, eye injury, and breathing problems are all some of the most frequent complication of being exposed to these weapons [3, 4, 5].

Mental disorders in those soldiers, who have been participated in wars, is not a new issue. The soldiers who have been participated in Vietnam War, suffered from mental and behavioral changes. After this War, the concept of Post-traumatic Stress Disorder (PTSD) was explained [6]. Figley believes that PTSD affect the mental status of other members of the family through the empathy among family members and affected person. He calls this phenomenon the secondary trauma reaction to the disaster [7, 8].

It is obvious that a war can cause PTSD in primary and secondary victims. The clinical course of PTSD is not clear, but this disorder can continue for months or even years after the traumatic incident [9]. In different conducted studies on chemical victims, PTSD symptoms has been reported in more than 90% of the chemical veterans and in another study, the anxiety disorders has been reported in more than 57% of chemical veterans [11]. Anxiety symptoms, irritability, and frequent nervousness have been shown in chemical veterans more than in veterans' families [12], and anxiety symptoms in chemical victims have been more than other victims [13, 14].

PTSD is one of disorders that affect not only the veteran's quality of life, but also, his society and

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family. Researchers' clinical experiences and frequent observations show that the veterans' families suffer from more psychological problems [15].

Since PTSD symptoms or other reactions to the trauma change the behavior of the affected person, so, the experience of trauma in one of the family members can affect the other members of the family. When the reaction to trauma is severe and is not treated for a while, can cause major problems for the family. When one of the family members, reacts to trauma, other family members react to trauma in another way, as well. The family members may react mildly or severely [16, 17]. The affected person is not only disrupted mentally, but also the family environment gets vulnerable affected by his symptoms [18, 19].

Specialists believe that trauma affects the family (even the family members who have not engaged in it directly). Doctors who dealt with traumatic persons of family violence, terror victims, accidents or natural disasters observed Secondary trauma that is known as secondary PTSD for the first time [6]. Secondary Post-traumatic Stress means the psychological reaction to the traumatic experience of a person in another important person [8, 20]. PTSD symptoms are as directly injured person's symptom such as nightmare about the traumatic person, insomnia, decrease of feelings, irritability, and chronic fatigue [8]. It may have physical symptoms such as headache, digestion disorders, and increase susceptibility to infectious diseases and alcohol, drugs and cigarette consumption [21, 22].

The human being creates the most part of the crisis. Wars mostly affect the children [23]. At the end of World Wars, one believed that if parents keep their kids, they would get the least effect from the wars. This hypothesis has been proposed until 1970s. However, the next studies proved that children perceive danger and react to it more clearly and more accurately than their parents do. Children's effectiveness of disasters differs regarding their age, and the level of child development. Behavioral reaction and disorders such as PTSD and specific phobias that emerge by encountering with stressors, and aggression, and social destructive behavior are among the most common symptoms among the children. During the war, direct or indirect trauma influences the child's ability to adaptation [24]. One should mention that the dependability of children to their fathers forms during the first years of life and will intensify during following years [25].

Various studies have shown that the soldiers' kids suffering from PTSD are at more risks of suffering from psychological and behavioral problems and the

most frequent disorder in these children is attention deficit and hyperactivity [26, 27, 28]. Children and teens as one of the vulnerable groups are at the risk of various psychiatric problems [29].

One can expect that parent's mental illness and its consequences such as disorder in personal relations, unemployment, low socio-economical level of the family, and other issues, affect the family organization especially kids and increase the field for their vulnerabilities to behavioral problems. Various studies have shown the role of parents' mental disorders in increasing the rate of children's mental disorders such as hyperactivity, behavioral disorders, escaping from school, anxiety disorders and depression, obsession and urinary incontinence [30]. Therefore, it can be predicted that some of PTSD symptoms are permeated and transmitted from chemical veterans to their children.

Regarding these facts, the present study was conducted aiming at studying and examining the rate, intensity, and types of traumatic reactions of chemical victims' children in comparison to normal people.

## Methods

In this descriptive-analytical, cross-sectional study that has been performed in 2009, five hundred and eighty-six individuals including 286 chemical patients' children who were all single and over 15 years old (as the case group) of Sardasht province and 242 subjects of normal families' children who were single and over 15 years old of this province (as the control group) were compared considering the intensity of PTSD symptoms based on Mississippi questionnaire. Moreover, PTSD symptoms were studied in 150 chemical veterans (fathers of case group) and 156 head of normal household (fathers of control group).

In order to select the case group, all the available files of chemical veterans in Martyr foundation and Isaargaran affairs were reviewed and finally the children of 150 families were selected and studied by census method.

Inclusion criteria included father's exposure with chemical gases, having a complete family including father, mother, and at least one single kid over 15 years old, absence of chronic or malignant disease in other family members and absence of chemical or other physical warfare victims in the family.

The family of 176 chemical war-victims had inclusion criteria and 161 children of these chemical warfare victims participated in this study (91.4%). 11 files excluded at the stage of questionnaires control (due to lack of the listed information).

In order to select the control group families, five areas of Sardasht were selected using cluster random method and 600 families were selected using systematic random method. 35 families did not show any tendency to complete the questionnaire. 387 families did not have the inclusion criteria (absence of martyr or veteran in first-degree relatives of a family, complete family, absence of chronic or malignant diseases in family members).

For 187 families who had the inclusion criteria, the questionnaire was completed and at the end, the files of 22 families were excluded in the stages of controlling the questionnaires (due to lack of listed information) and 156 families were studied as the control population.

The main scale of "Mississippi", relating to war, that was developed by Keane, contains 35 questions that its validity and reliability was obtained based on DSM-III (diagnostic and statistical manual of mental disorders) and reclaimed by Norris et al [31].

In the present study, those subjects whose total Mississippi scores were between 35 and 65, categorized in the group of without secondary PTSD symptoms, subjects with scores between 65 and 130, in the group of weak PTSD and subjects with total Mississippi scores between 130 and 195 were placed in the high PTSD score group.

In Lyons et al., the cutoff score of 107 has been suggested for PTSD boundary detection, although points 121, with a higher property and lower sensitivity, recognizes better those individuals who had PTSD criteria from those who lack of these criteria [32]. Iranian researchers added 4 more questions to this main criterion to cover the scale, other symptoms, and accessory specification disorder. Therefore, regarding the main scale of Mississippi relating to war, a 39 question was formed to assess PTSD of normal residents (citizenship scale). The Persian version of Mississippi by Goudarzi in year 2003 was validated. The validity of test was 0.92 based on the internal correlation, 0.92 based on the split-half method, 0.91 based on the retest with one week away, and 0.82 based on parallel test (PTSD autobiographical memory). Four factors of PTSD (thrusting memories, interpersonal relation problems and lack of depression) have been stated separately in this questionnaire. Each question has one score at least and at last five scores and total scores are between 35 and 195 [33]. In this scale, subjects who had total Mississippi score between 35 and 65 categorized in non-symptomatic group of secondary PTSD, subjects who had total scores between 65 and 130 in weak score PTSD group, and subjects with total Mississippi

scores between 130 and 195 in high PTSD group. It should be mentioned that Mississippi questionnaire assesses most stress symptoms resulted from trauma and it does not assess PTSD diagnosis criteria according to DSM.

In order to analyze the data, statistical indicators tend to center; central tendency (average) and dispersion index (standard deviation and variance) are used for descriptive reports and in order to test the hypotheses parametric T test methods, Chi-square and Pearson correlation coefficient were applied.

## Results

No significant difference was found in "Mississippi" scores in age and sex groups in chemical warfare victims' children (Table 1). The average age of the case group was 21.06 years old and for the control group it was 19.26 years old. There was no significant difference in age and sex of the both case and control groups ( $p>0.05$ ).

**Table 1-** The average of "Mississippi" total score separated by age groups and gender in chemical veterans' children (the case group)

Variable	Frequency	Mean	Level of Significance
Age	20 or lower	154	129.09
	21-30	117	128.53
	31-40	11	129.20
	41-50	2	134.50
Gender	Female	157	130.31
	Male	127	127.15

The average of total "Mississippi" scores in chemical war-victims' children was  $128.88\pm 13.92$  and in the control group, this average was  $108.34\pm 22.70$ . The total score and each of the minor scales of "Mississippi" in chemical victims (fathers of the case group) were higher than control groups' fathers.

The difference between two control and case groups was studied in three cut-off points in order to recognize the secondary PTSD. ( $\geq 121$ ,  $120 >$ ), ( $\geq 107$ ,  $106 >$ ), and ( $< 65$ ,  $65$  to  $130$ ,  $130 <$ ). Using the cut-off point 107, two hundred and sixty subjects of the control group (chemical veterans' children), and one hundred and twenty-six subjects of the control group had the secondary PTSD. Moreover, in cut-off point 121, two hundred and four subjects of the case group and eighty-four subjects of the control group had the secondary PTSD symptoms (Table 2).

5.5% of chemical veterans' children had high symptoms of the secondary PTSD, and 93% had weak score of the secondary PTSD, while high and weak secondary PTSD scores were 2% and 70.7% in control group's children, respectively (Table. 3).

**Table 2-** Frequency and subjects' prevalence regarding the Mississippi total score in control and case groups

Group Score↓	Case	Control	Significance level
	Frequency (percent)	Frequency (percent)	
121<	(71.3)204	(34.7)84	0.002
107<	(91.5)260	(52.06)126	0.009

**Table 3-** PTSD final symptoms intensity (based on the "Mississippi" total score average) in separation of control and case groups

Group→ Symptoms' intensity↓	Control	Case
	Frequency (percent)	Frequency (percent)
Weak(65>)	(1.5)4	(27.2)67
Medium(65-135)	(93.0)254	(70.7)174
Severe(130<)	(5.5)15	(2.0)5

**Table 4-** Comparing each of Mississippi scale factors in control and case subjects (children)

Mississippi Scale factors		Mean	SD	T
Total stress disorder symptoms	Case	128.9	13.9	12.26
	Control	108.3	22.7	
Thrust memories	Case	35.3	6.2	10.65
	Control	28.8	7.7	
Problem in relation between individuals	Case	29.6	4	8.18
	Control	25.4	7.2	
Inability in emotional control	Case	32.6	3.9	7.69
	Control	28.1	8.6	
Lack of depression	Case	31.4	4.9	7.86
	Control	26.2	9.3	

For all cases p<0.001

**Table 5-** Comparing each of Mississippi scale factors in chemical victims (case group fathers) and fathers of control group

Mississippi Scale factors		Mean	SD	T	Level of significance
Total score	Veteran	123.06	17.19	4.80	<0.001
	Control	112.29	21.73		
Thrust memories	Veteran	32.36	7.32	4.33	<0.001
	Control	28.62	7.71		
Problem in interpersonal relation	Veteran	29.54	7.26	4.55	<0.001
	Control	25.50	8.18		
Inability in emotional control	Veteran	31.52	4.67	2.85	<0.005
	Control	29.21	8.79		
Lack of depression	Veteran	29.55	6.39	0.75	0.48
	Control	28.94	8.56		

The scores' differences in all three cut-off points in two significant groups and in the group of chemical veterans' children were more than those of the control group were.

The "Mississippi" total score in chemical victims' children was significantly more than that of the control group's children was (p<0.05, t=5.42; Table 4).

Total score and each of Mississippi factors in chemical

victims (case group fathers) was more than that of fathers' control group (Table 5).

## Discussion

In this study, the rate and intensity of the secondary PTSD disorders were analyzed in chemical veterans and their children. If we had any statistical information about the prevalence and intensity of these disorders in normal population of Sardasht, and if we had some determined cut-off point for diagnosing secondary PTSD in this population, we would not use the control group necessarily. Though in order to get some basic information about the rate of these disorders in Sardasht, we analyzed the prevalence and intensity of these disorders in this population.

The studied population in the group of veterans' children included all of those who had the inclusion criteria, and the normal group population, was in fact a random sample of the whole population in Sardasht whose demographic properties, prevalence, and disorders intensity was extendable to whole population of this province (although the inclusion criteria, made the entry of the subjects to the study more limited, and more similar in both groups). In fact, the prevalence and intensity of these disorders in the veterans' children has been compared with the prevalence and intensity of that in the normal population.

The results of the study showed that the secondary PTSD symptoms has been considerably more in chemical victims' children than in the families' children who were not faced with this trauma, although these subjects have experienced other types of military conflicts such as bombings, and other military attacks similar to the traumatic subjects.

In fact, the results indicated the cumulative effect of the chemical weapons in traumatic individuals and mutually increasing of disorders in their families. Particularly, the above-mentioned disorders in chemical victims (case group's fathers) were significantly more than these disorders in the control group's fathers.

There was no significant difference in "Mississippi" score between age groups and in terms of gender. Although we tried to calculate the prevalence of PTSD by use of the different cut-off points, regarding the differences in the cut-off point in this questionnaire based on the country, region and culture, it is suggested to analyze and clinically diagnose the subjects with high score. Therefore, using this questionnaire is suggested for screening.

High prevalence of the secondary PTSD in chemical

victims' children in different cut-off points indicates the higher level of this disorder in these subjects regardless of the cut-off point score. As it was mentioned in results section, regarding the cut-off points 130, 121, and 107; 5.5, 71.3, and 91.5% of chemical veterans' children have the secondary PTSD symptoms more or less, respectively. With the highest cut-off point, the test specificity increases and the sensitivity for diagnosing the symptoms will decrease. In other studies, the lower scores have been suggested as cut-off point. Even in a study, Lauterbach, Vrana, King and King have defined the scores from 81.8 to 82.9 as the boundary for diagnosing the secondary PTSD [34], scores of 107, and 121 have been used as the cut-off point for the test [32]. Most of the studied subjects in this research have scores between 121 and 130 that is higher than other researches.

Another important point that blazons the effect of chemical weapons on the severity of disorders is that the studied subjects in both control and case groups were all native who lived in one area and other war experiences have been similar in both groups. Therefore, although no one can definitively talk about the higher probability of chemical weapons effect, the results of this study creates this hypothesis in minds.

In eight-year Iraq-Iran war, in addition to tolerate the chemical attacks, Sardasht was attacked for dozens of times by bombs. This volume of air attacks can justify the high rate of disorders in control group (despite of lower disorders in comparison with the case group).

The study of Hashemian et al. showed the effects of applying chemical weapons on Iranians' psychological health in three levels of facing with war, two decades after Iraq-Iran war. The citizens of the regions such as Oshnavieh (facing with low intensity) who have been bombarded less than ten times by bombs explosion were compared with the citizens of those regions such as Piranshahr (facing with high intensity) who have been bombarded 25 to 60 times with bombs explosion and finally they have compared with the third group i.e. Sardasht citizens who in addition to high facing have been attacked by chemical attacks. In comparison with the two first groups, Sardasht citizens had a high PTSD [5]. In this study, the criterion of family selection has not been the facing of head of household with chemical gases and the studied population, has been a random sample of this city. Therefore, high rate of PTSD in this study can justify high rate of the disorders in the control group.

The research group did not succeed to find any study, which specifically can analyze PTSD intensity in chemical veterans' children. However, the psychiatric disorders in warfare victims' children (having physical

injury except chemical victim) have been analyzed more than control group's subjects in various studies. The study that has been done by Kalantari, Fairbank, and Rutter et al. showed that soldiers' children suffered from PTSD are at the higher risk of suffering from mental and behavioral problems, and the most frequent disorders in these children are hyperactivity and attention deficit [26, 27, 28].

In Jame's study showed that teenagers who have an ill parent (through diagnosis of basic emotional disorders or schizophrenia) have more psychiatry disorders in comparison with the control teens [35].

In the study of Radfar et al. in veterans' children whose fathers suffer from psychological disorders, feel less healthy than other veterans' children who did not suffer from any psychological disorders [15].

Ghahari et al. in a study has shown that disorders in martyrs' children, father-deprived and veteran were more than disorders in normal children [36]. All the above-mentioned studies indicate the effect of physical and mental disorders of parents on children, which approve the obtained results of our study. In the conducted studies by Earls and Rutter et al. PTSD soldiers' male children has been more affected [25, 28], while in our study there was no significant difference in "Mississippi" score between age groups and gender. According to the conducted study, one can state that the psychological effects resulted from wars permeate to borders beyond one generation and next generation(s) can be affected by them. However, before that the disorders turn into communication and behavioral patterns among generations, one should proceed to prevent and treat them and prevent the behavioral pattern continuity transfer among generations.

## Conclusion

The symptoms of the secondary PTSD were more in chemical veterans' children in Sardasht compared to the children of normal parents.

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