

Acute and Delayed Stress Symptoms Following Snakebite

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Abstract

Background: Overwhelming life experiences can trigger stress disorders including acute stress disorder (ASD) and post-traumatic stress disorder (PTSD). The objective of this study was to investigate the frequency of and predictive factors for ASD and PTSD in snakebite victims.

Methods: In this study, snakebite victims who were admitted to Mashhad Medical Toxicology Centre, Imam Reza Hospital, Iran, from 1st November 2010 to 30th April 2012 were enrolled. Psychiatric symptoms of patients were evaluated after stabilization of patients' clinical condition. Structured Clinical Interview for DSM-IV Axis I Disorder questionnaire was used for interviewing the patients. Patients underwent 4 scheduled psychiatric interviews on admission, 3 weeks post-bite, 6 weeks post-bite and 6 months post-bite.

Results: Fifty-three patients (74% men) were included in the study with mean (SD) age of 33.6 (15.0) years. Patients were given psychological consultations during the study while they received no psychiatric medication. The set of efforts to avoid activities, places, or people that arouse recollections of the trauma was the most common symptom found in all visits. Re-experience was the most common class of symptoms in all visits. On admission and the 3rd week post-bite, 36% and 15% of patients had ASD. Moreover, 8% of patients developed PTSD and only 4% of patients developed chronic PTSD. ASD on admission ($P < 0.001$), ASD in 3rd week ($P = 0.02$) and PTSD ($P = 0.01$) were developed in patients with significantly younger ages. In addition, the presence of ASD on admission ($P < 0.001$), ASD in 3rd week ($P = 0.003$) and PTSD ($P = 0.003$) was significantly higher in female gender.

Conclusion: Snakebite is not only an emergency medical problem, but also is a traumatic event that can cause stress disorders. It is prudent to refer all snakebite victims, especially women in younger ages, to psychiatric specialist for better evaluation and psychological treatments.

Keywords: Acute Stress Disorder; Iran; Post-Traumatic Stress Disorder; Psychiatry; Snake Bite

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INTRODUCTION

Overwhelming life experiences including animal attacks, especially if they are unpredictable or uncontrollable, can trigger stress disorders including acute stress disorder (ASD) and post-traumatic stress disorder (PTSD) (1,2). Symptoms of stress disorders after an animal attack include re-experiencing the trauma (thoughts and distressing dreams about the attack), persistent avoidance of thoughts or situations associated with animal attack (reluctance or refusal to existence, actively avoiding environments that the attack occurred), numbing of emotional responsiveness (greatly reduced or absence of emotions, feeling detached from other people), and increased physical arousal (exaggerated startle, irritability, disturbed sleep) (1,2). In clinical practice, symptoms of ASD and PTSD are the same and the difference is in the duration of the symptoms (1). If the set of stress symptoms resolves within less than a month, it can be considered as ASD; however, if it remains afterwards, it should be called PTSD and if PTSD lingers for more than 6 months, it would be chronic PTSD (1).

Snakes are widely distributed animals in almost all countries, except south and north poles (3). According to a global estimate, nearly 5 million bites occur each year worldwide, causing 1.2 million envenomation and considerable morbidity and mortality (3). Due to outdoor activities, adults are more likely to be the victim of a snakebite (4,5). Iran is a country with about 5000 snake bites per year (6). Rapid transportation of the victims and the availability of a potent antivenom in hospitals have changed the morbidity associated with snake bites, in Iran (6). However, antivenom therapy does not have any impact on subsequent psychiatric disorders. The psychiatric consequences of snakebite may negatively influence the quality of life of patients and their families (7,8). Furthermore, some studies showed that traumatic experiences can impair brain function in different ways and cause late-onset presentations (9).

It has been shown that ASD can be an early predictive indicator of PTSD following animal bite, especially in children (8). A brief cognitive behavioral treatment may be able to prevent the progression of ASD to PTSD (10,11).

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These findings emphasize the importance of early assessment of ASD symptoms and generally psychiatric visits for snakebite victims.

The objective of this study was to investigate the frequency of and predictive factors for ASD and PTSD in snakebite victims.

METHODS

Setting and patients

In this study, snakebite victims who were admitted to Mashhad Medical Toxicology Centre (MTC), Imam Reza Hospital, Iran, from 1st November 2010 to 30th April 2012 were enrolled. The victims were prospectively followed during 6 months post-bite. The exclusion criteria comprised of decreased level of consciousness in the first day of bite, development of deep dermal necrosis or compartment syndrome, previous psychiatric diseases, speech disorders, history of psychotropic drug use and ages less than 8 years. Deep dermal necrosis and compartment syndrome were excluded because of possible prolonged complications that may affect the patients' psychologic status. Data including socio-demographic features (age, gender), date of bite, anatomic location of the bite and treatments were collected from all patients. A detailed psychiatric history was also obtained.

Psychiatric evaluation

All patients were treated according to internal protocol of snakebite management in MTC (6,12). Psychiatric symptoms of patients were evaluated after stabilization of patients' clinical condition. Structured Clinical Interview for DSM-IV Axis I Disorder (SCID1) questionnaire was used for interviewing the patients (1). Patients underwent 4 scheduled psychiatric interviews on admission (1st visit), 3 weeks post-bite (2nd visit), 6 weeks post-bite (3rd visit) and 6 months post-bite (4th visit). The psychiatric evaluation forms were completed by an experienced psychiatrist after each session.

Psychiatric findings of patients were determined according to the guidelines of the revised fourth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (1). According to DSM-IV-TR diagnostic criteria, diagnosis of PTSD requires 6 criteria including criterion A which is exposure to a traumatic event, criterion B or "re-experience" of the trauma which means recurrent recollection the event with intense distress, criterion C or "avoidance" which means persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness, criterion D or "hyper-arousal" which means high levels of anxiety and irritability, criterion E which denotes the duration of the disturbance and criterion F which implies the functional dysfunction resulted from the event.

Criterion B is sub-classified into 5 symptoms and it is positive for a victim when one of them is present. Criterion C includes 7 symptoms and a victim requires three of them to fulfill the criterion. Criterion D is also sub-classified into 5 symptoms and is positive when a victim shows two of them. In this study, all patients had criterion A and F as they were faced with the snake attack and they experienced

decline in social and occupational functioning.

ASD was considered for a patient who had criteria B,C and D for less than 1 month, PTSD was considered if the patient had criteria B,C and D for less than 6 months and chronic PTSD was considered if he had these 3 criteria for over 6 months.

Ethics and statistical analysis

The study was approved by the ethical committee of Mashhad University of Medical Sciences, Iran. Informed written consent was obtained from all patients.

The chi square test was used to analyze the impact of gender, age groups and severity of envenomation on development of ASD and PTSD. Analyses were done by using SPSS for Windows version 11.5 (SPSS Inc .Chicago, IL). P values of less than 0.05 were considered as significant.

RESULTS

Socio-demographic features

Seventy-one snakebite patients, in total, were enrolled. Eighteen cases were excluded including 6 cases due to self-discharge before psychiatric consult, 2 cases due to previous long-term use of psychotropic drugs, 1 case due to compartment syndrome, 5 cases due to failure to follow up and 4 cases due to being less than 8 years old. Finally, 53 patients (74% men) were included in the evaluations accounting for 27% of all animal bites whom referred to the MTC during the study period. Mean (SD, min-max) age of patients was 33.6 (15.0, 9-78) years. All patients were Iranian.

Treatments

All victims were hospitalized and were given medical care according to the department clinical protocols, that among them 48 patients (90.5%) received antivenom therapy (severe), and the other 5 received only supportive treatments (mild). After discharge, the patients were followed for 6 months and during this period psychologic consultations (stress management) were provided for them at each visit while they received no psychiatric medication.

Psychiatric evaluations

Frequency of each psychologic symptom according to DSM-IV-TR is shown in table 1. In criterion B, recurrent and intrusive distressing recollections of the event, in criterion C, efforts to avoid activities, places, or people that arouse recollections of the trauma and in criterion D, difficulty falling or staying asleep were the most common symptoms in all visits. Exaggerated startle response was not found in any patient at each visit (Table 1). The set of efforts to avoid activities, places, or people that arouse recollections of the trauma was the most common symptom found in all visits.

Table 2 demonstrates the frequencies of three classes of symptoms according to DSM-IV criteria. Re-experience was the most common class of symptoms in all visits. Hyper-arousal was the second commonest class of symptoms in the first visit while it was replaced with avoidance at 2nd, 3rd and 4th visits (Table 2). The frequency of all class of symptoms declined significantly to very low levels during the study period (Figure 1). The frequency of subjects

Table 1. Frequency of psychological symptoms according to DSM-IV-TR

Criterion (class of symptoms)	Subclasses of symptoms	1st visit	2nd visit	3rd visit	4th visit
B (Re-experience)	Recurrent and intrusive distressing recollections of the event	89%	68%	45%	19%
	Recurrent distressing dreams of the event	36%	17%	11%	4%
	Acting or feeling as if the traumatic event were recurring	42%	30%	23%	8%
	Intense psychological distress at exposure to cues with similar aspects to the event	36%	9%	6%	4%
	Physiologic reactivity upon exposure to cues with similar aspects to the event	28%	15%	0%	4%
C (Avoidance)	Efforts to avoid thoughts, feelings, or conversations associated with the trauma	81%	51%	47%	19%
	Efforts to avoid activities, places, or people that arouse recollections of the trauma	93%	74%	57%	28%
	Inability to recall an important aspect of the trauma	11%	11%	11%	8%
	Markedly diminished interest or participation in significant activities	32%	17%	9%	8%
	Feeling of detachment or estrangement from others	8%	5.7%	0%	0%
	Restricted range of affect	21%	0%	2%	0%
	Sense of foreshortened future	13%	4%	0%	0%
D (Hyper-arousal)	Difficulty falling or staying asleep	76%	38%	19%	6%
	Irritability or outbursts of anger	58%	0%	0%	0%
	Difficulty concentrating	49%	15%	9%	4%
	Hyper-vigilance	15%	0%	0%	0%
	Exaggerated startle response	0%	0%	0%	0%

Table 2. Frequency of the DSM-IV-TR criteria for stress disorders following snakebite

Criterion	1st visit	2nd visit	3rd visit	4th visit	P value*
Criterion B	48 (91)	41 (77)	32 (60)	12 (23)	<0.001
Criterion C	19 (36)	13 (25)	8 (15)	6 (11)	0.01
Criterion D	35 (66)	8 (15)	4 (8)	2 (4)	<0.001
Full criteria	19 (36)	8 (15)	4 (8)	2 (4)	<0.001

* Analyzed with chi square

who completed all criteria of stress symptoms are also listed in table 2 which shows that at 1st and 2nd visits, 36% and 15% of patients had ASD. In addition, 8% of patients developed PTSD and only 4% of patients developed chronic PTSD.

Analysis of factors

Univariate analyses of impact of patients' demographic factors on development of stress disorders are summarized in table 3. As it can be seen, ASD on admission ($P < 0.001$), ASD in 3rd week ($P = 0.02$) and PTSD ($P = 0.01$) were developed in patients with significantly younger ages. Only two patients developed chronic PTSD that both of them were women and were younger than those with incomplete criteria of stress disorders, though the difference was not significant.

In addition, the presence of ASD on admission ($P < 0.001$), ASD in 3rd week ($P = 0.003$) and PTSD ($P = 0.003$) were significantly higher in female gender.

DISCUSSION

Snakebite is a life-threatening traumatic event that mostly affects rural populations (4,5). With the development of antivenom therapy and wound nursing care, clinical morbidities and mortality rate have been significantly reduced (4-6,12). Nevertheless, this therapeutic success has not been effective on psychologic morbidities. In this study, we found that ASD in the first days post-bite is a relatively common finding which involves about one-third of patients. Moreover, PTSD can develop in less than ten percent of patients and it can remain in the form of chronic PTSD in only 4% of patients.

It has been reported that about 25% of people after a traumatic event may develop PTSD and in overall 1-9.2% of general population can be conformed to full criteria of PTSD in their lifetime (13). No gross epidemiologic study on the prevalence of PTSD in general population of Iran

Table 3. Analysis of impact of demographic factors on development of stress disorders post-snakebite

Stress disorder		Age, mean (SD)	Male : Female, n (%)
ASD on admission	Present (n = 19)	24.1 (10.5)	8 (21) : 11 (79)
	Absent (n = 34)	38.8 (14.6)	31 (79) : 3 (21)
	P value	<0.001*	<0.001**
ASD in 3rd week post-bite	Present (n = 8)	22.8 (12.3)	2 (5) : 6 (43)
	Absent (n = 45)	35.5 (14.7)	37 (95) : 8 (57)
	P value	0.02*	0.003**
PTSD	Present (n = 4)	15.5 (7.5)	0 (0) : 4 (29)
	Absent (n = 49)	35.0 (14.5)	39 (100) : 10 (61)
	P value	0.01*	0.003**
Chronic PTSD	Present (n = 2)	17.5 (10.6)	0 (0) : 2 (14)
	Absent (n = 51)	34.2 (14.8)	39 (100) : 12 (86)
	P value	0.12*	---***

* Analyzed with independent samples t-test

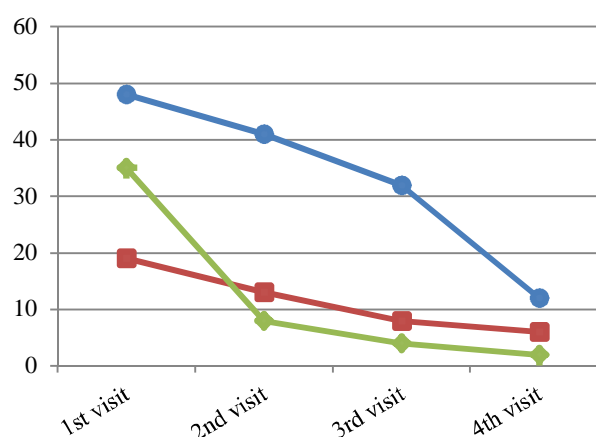
** Analyzed with chi square test

*** Less than expected count in variables, insufficient for analysis with chi square test

has been conducted and most studies in this field were focused on Iranian survivors and veterans of Iraq-Iran war (14,15). Thus, little is known about the range of PTSD prevalence in Iranian people.

It is not completely known why some patients develop PTSD and some of them not, but it was proposed that the intense, aggressive characteristic of the animal attack is a trigger (16). Nevertheless, in a study by Peters et al., it was found that even a minor dog bite may lead to PTSD (17). In a study on snakebite victims by Williams et al., it was shown that 21.6% of the patients had chronic PTSD and 23% of them had depressive symptoms that were significantly higher than healthy controls (18). However, in the present study, the rate of chronic PTSD was much lower. The higher incidence of PTSD in the abovementioned study may be related to retrospective method of collecting data, and also the severer nature of envenomations compared to this study. Besides, our patients received psychiatric consultations in 4 visits during the six months post event. This may have an effect on reducing their stress symptoms. Bisson et al. also highlighted the positive role of psychological therapies on controlling the PTSD (19). Correspondingly, some studies showed that despite a brief psychological treatment cannot ameliorate ASD, but it is able to prevent subsequent progression to PTSD (16,20).

Our findings showed that women are more prone to stress disorders following snakebite events and even PTSD and chronic PTSD can only be seen in women. Hidalgo et al. and Bokszczanin also emphasized on the role of female gender on development of PTSD (13,21). In addition, younger ages were found as a significant factor for stress disorders in the present study. Bokszczanin demonstrated the same results (21). However, Norris et al. questioned the role of age and bound it to cultural context of the patients as they found younger Mexicans, middle aged Americans and

**Figure 1.** Changes in class of stress symptoms according to DSM-IV-TR during 6 month post-snakebite.

Re-experience (—●—), Avoidance (—■—), Hyper-arousal (—◆—)

older Poles were more vulnerable to PTSD (22).

LIMITATIONS

Species of the offending snakes were not identified in the present study. Also, the effect of economic status on the development of PTSD was not investigated.

CONCLUSION

Snakebite is not only an emergency medical problem, but also it is a traumatic event that can cause stress disorders. It is prudent to refer all snakebite victims, especially women in younger ages, to psychiatric specialist for better evaluation and psychological treatments.

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