

Clinical Manifestation of Snakebite in Patients Referred to Afzalipour Hospital in Kerman - Southeastern Iran

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Abstract

Background: Snakebite is a medical emergency that frequently occurs in different countries. Considering the incidence of annual snakebite in Iran, this study deals with the epidemiology of snakebite in hospitalized patients. Epidemiological data of patients can improve proper and timely treatment of snakebite

Methods: This retrospective descriptive-analytical study was performed using census sampling of snakebite patients. The statistical population included all patients referred to Afzalipour Hospital in Kerman from 2016 to 2018. After collecting data, the results were analyzed using chi-square and paired t-test.

Results: A total of 36 snake bites were reported, 28 males and 8 females. The highest frequency was in the age range of 21-40 years. Local complications included pain 55.5, swelling 36.9, erythema 36.1, skin ecchymosis 13.9, tenderness 8.3, and bleeding 1%. Systemic symptoms included nausea and vomiting 16.6, headache 2, drowsiness 2, and 72.4 without symptoms. Out of 36 patients, 8 had compartment syndrome and 4 patients required fasciotomy. Chi-square test showed a significant relationship between bite and sex, bite and season.

Conclusion: Local and systemic symptoms of patients indicate that Viperidae snakes are more likely to cause bites in this province. Snakebites have been more commonplace among men and in the age group of socially active people and more in summer. The development of treatment protocol by experienced and eager physicians with Local and systemic manifestation of venom caused by venomous snakes in the region is essential.

Keyword: Snake bite, Clinical manifestations, Iran

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INTRODUCTION

Snakes are reptiles and in terms of morphological and behavioral characteristics, they have been considered by humans the most. Their presence in nature and human encounters has caused different and contradictory fears and beliefs in different countries [1-4]. There are about 3700 species of snakes in the world that live in different habitats around the world. About 10% of snakes are venomous. The frequency of snakebites varies due to the distribution and dispersal of species in the continents of the world [5]. Geographically, most deaths from snakebites occur in South and Southeast Asia and sub-Saharan Africa [6]. Snakebites are reported to occur in the United States, Africa, Asia, Europe, and Australia [9,7,8]. Most mortality of snakebites have been reported in Asia. India has the highest number; In India, 200,000 snakebites occur each year [10, 11]. Most

bites occur in the tropics, where snakes are abundant and people have a place to work or rest and sleep outside the home [12]. Of these, about 50,000 people die from venomous snakes. 97% of bites occur in rural areas. 23% of mortality occurs during treatment [13-16]. The cobra alone kills 14,000 people every year. According to statistics, a total of 100 countries in 21 geographical regions around the world are affected by snakebites [17,18]. Both venomous and non-venomous snakes bite in self-defense. In addition to venom poisoning, people may experience pain, discomfort, bacterial and fungal infections locally or generally [19]. The risk of a venomous snake species is determined by multiple factors such as: venomous properties, clinical manifestations such as nausea and vomiting, other systemic complications from stings, fatal stings, long-term consequences, availability of antibodies as well as population size, which may vary from region to region [20,21]. Snakes are one of the major

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environmental animals that play an essential role in ecological balance due to their non-medical importance, therefore, they should also be considered in terms of ecological balance. Unconscious human behavior and killing in different societies and regions of the world have increased the extinction risk of these animals. These misconducts can cause irreparable damage to the ecosystem [19]. Iran has provided habitats for many animals with its diverse climate. Among them, poisonous animals that are part of the ecosystem have a high abundance. The vast and tropical province of Kerman in southeastern Iran is one of the habitats of these poisonous animals (Figure 1), whose bites may affect the health of some people.

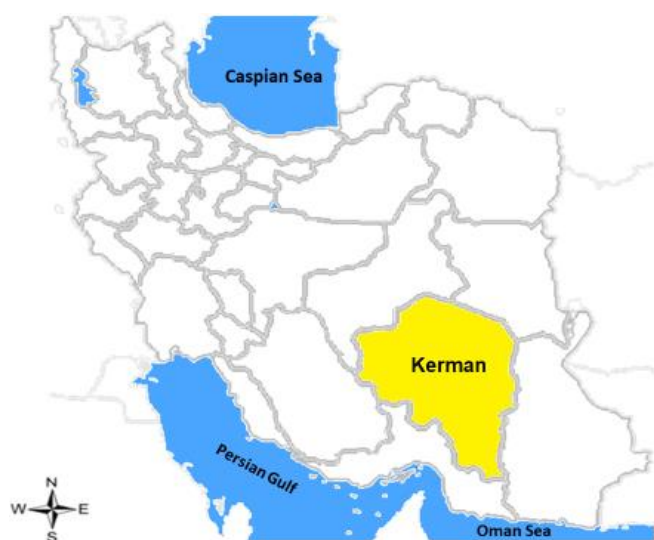


Figure 1. Geographical location of Kerman province in the map of Iran

Given the fact that the data of snakebites in Kerman province has not been properly reported and investigated, so far, the epidemiological study of these victims in Kerman province was sought out in this article. Clinical investigation of venomous snakebites in each area can help the health care system and clinical toxicologists of high-risk areas that organize their treatment protocols based on the conditions and species in each region.

METHODS

This retrospective study was performed based on the available data of snakebites from 2016 to 2018. The statistical population of the study included all patients, who referred to Afzalipour Hospital in Kerman with a history of snakebites. The criteria for the inclusion of patients in the study was only snakebite and did not include the bites or stings of other venomous animals. Sampling was done by census method. Clinical signs including edema, pain, burning, redness, blisters, necrosis, gangrene at the site of the bite, and laboratory findings including thrombocytopenia, coagulation disorders, and other evidence in favor of snakebite were investigated. If the snakebite was not present or the history

and clinical signs of other bites such as bee, spider, and centipede be raised, were excluded. The data collection tool was a checklist that included parameters of age, sex, occupation, season of poisoning, local symptoms of the bite including pain, edema, redness, blisters, necrosis, gangrene, systemic symptoms, laboratory findings, severity of bites and complications of snakebites including deaths and hospitalization in the ICU. After completing the checklist by extracting from patients' files, the data obtained from the study were categorized. Research ethics codes were observed for all patients in the study. Quantitative data were described using mean and standard deviation and qualitative data were shown using frequency tables and data analysis. Data were categorized and analyzed using SPSS software and Chi-square and paired t-tests.

RESULTS

The results of this study showed that during the years 2016 to 2018, the number of patients with complaints and symptoms of snakebites was 36. Of these, 28 (77.8%) were male and 8 (22.2%) were female. The age of the victims varied between 5 and 65 years. The highest frequency of patient age, was 40-21 years (Table 1). Chi-square test showed a significant relationship between snakebites and sex as well as between bites and age (P value <0.05). The highest frequency of snakebites was 64% in summer, followed by 25% in spring and 11% in autumn (Figure 2). Chi-square test showed a significant relationship between snakebite and season (P value <0.05). The highest snakebite rates were related to Kerman 38%, Baft 27, Jiroft 22, Zahedan 6.5 and Qala-e-Ganj, Bam, and Sirjan cities with a total of 8.5%.

Additionally, the results of Chi-square test showed a significant relationship between snakebites and the city (P value <0.05). The study showed that 25% of patients had referred to the hospital before 6 hours, 28% 6 to 24 hours, 11% more than 24 hours after snakebite. For the remaining, the time of hospitalization has not been specified. Pre-hospital cares were as: cutting and sucking the bite site in 3 cases, close the tourniquet above the bite site in 8 cases, banded in 6 cases, and no action was taken on the remaining 19. Local symptoms included pain 55.5%, swelling 36.9, erythema 36.1, cutaneous ecchymosis 13.9, tenderness 8.3, and bleeding 1% (Figure 2). Chi-square test did not show a significant relationship between snakebite and local complications (P value <0.016). Figures 3 and 4 show the swelling and erythema with a difference in size in the legs, caused by snakebites (Figures 3 and 4).

Table 1. Frequency, mean and standard deviation of snakebite based on patient age

Snakebite age category	Snakebite		Average	Standard deviation
	Abundance	Percentage		
Less than 6 year	4	11/1	25/81	8/34
20-6 year	6	16/7		
Years 21-40	20	55/6		
Over 40 years	6	16/6		

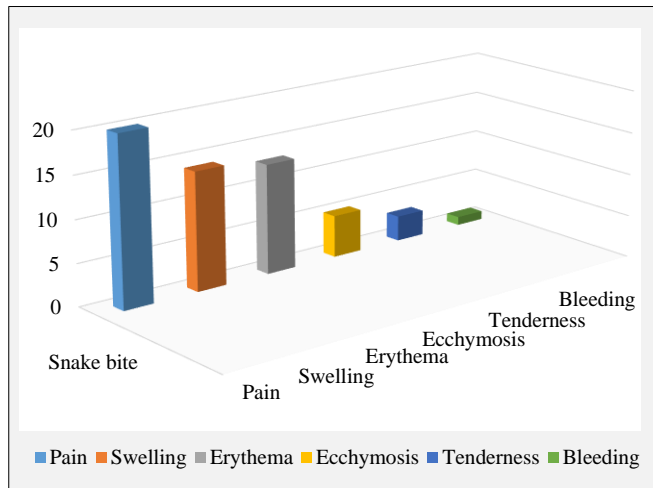


Figure 2. Frequency chart of local symptom in snakebite patients

Table 2. Mean and standard deviation of test results at the time of admission and discharge in snake bite patients

	Laboratory data	Average	Standard deviation
admission	BUN mg/dl	26/21	6/24
	Cr mg/dl	.77	.18
	Na meq/l	140/13	42/05
	K meq/l	4/50	2/26
	AST IU/l	23/75	2/06
	ALT IU/l	27/25	6/18
	ALP IU/l	139/66	8/48
	PTT Sec	33/34	6/05
	PT Sec	14/35	5/06
	INR	1/24	.77
	WBC 10*3/ul	9/40	2/78
	Hb g/dl	12/73	1/51
	Plt 10*3/ul	252/14	2/21
	PH	7/36	0/05
	PCO2 mmHg	33/43	3/18
	HCO3 mEq/l	20/13	6/53
	CPK ng/ml	308/69	7/23
LDH ng/ml	31/2	8/24	
discharge	BUN mg/dl	24/33	1/52
	Cr mg/dl	0/6	0/43
	Na meq/l	137	27/23
	K meq/l	3/96	0/20
	PTT Sec	34/62	7/13
	PT Sec	13/93	2/85
	INR	1/24	0/55
	WBC 10*3/ul	8/23	3/33
	Hb g/dl	11/45	2/11
	Plt 10*3/ul	206/98	12/95
CPK ng/ml	82	1/45	

Systemic symptoms of snakebite included nausea and vomiting 16.6%, headache 2%, drowsiness 2%, and 72.4% without systemic symptoms. Table 2 shows the laboratory data and standard deviation at the time of admission and discharge (Table 2). The mean of each variable (Mean), the number of observations (N), the standard deviation (Std.Deviation) and the standard error of the mean (Std. Error Mean) can be seen in table 2. The means for the pair of variables seem to be somewhat close to each other. On the other hand, the variance or standard deviation for some variables is not much different. Paired t-test does not show a significant relationship between test results at the time of admission and at the time of discharge. Table 3 shows the mean of vital signs and standard deviation in bitten snake patients at the time of admission. (Table 3). The mean of vital sign and laboratory data was in normal range. The average number of days hospitalized in snakebite patients was 2.53 days. Out of 36 snakebite patients, 8 had compartment syndrome and 4 patients required fasciotomy. Anti-venom was indicated in 19 (52.8%) cases. None of the snakebite patients died.

Table 3. Mean and standard deviation of vital signs at the time of admission

		Average	Standard deviation
vital signs	SBP (mmHg)	109/11	9/74
	DBP (mmHg)	72/5	3/41
	PR	88/05	1/60
	RR	26/62	2/95
	T ©	37/27	0/62
	Spo2 %	95/30	2/46
	BS mg/dl	85/75	8/24

DISCUSSION

The results of the study showed that snakebite is one of the most deadly and medical problems in Kerman province. It was found that most cases occurred in summer and then in spring and autumn, respectively. There are more than 30 species of venomous snakes in Iran that are distributed and densified. They are different in the provinces of the country [7,17, 22,23,24]. Due to the fact the snakes are cold-blooded animals and their activities is affected with ambient temperatures, Therefore, most of their bites in the warm seasons of the year is a common issue that is consistent with the studies of other researchers. The risk of bite is related to the abundance and diversity of regional species, climatic, and environmental parameters such as higher temperatures [16, 25, 26, 27, 28]. Local symptoms and complications in Kerman-bitten snake patients included pain, swelling, erythema, skin ecchymosis, bleeding, and tenderness. It seems that most cases reported to be due to viper bites belonging to the Viperidae family because no snake specimens have been reported for diagnosis in the study data,



Figure 3. A: Swelling and erythema in a snakebite foot (Photo by Dr. Zohreh Oghabian); B: Swelling and size difference in a snakebite foot (Photo by Dr. Zohreh Oghabian)

but the local, systemic symptoms, and laboratory data are consistent with viper bites. Viperidae snakebites, including severe local damage to the bite site, swelling, and erythema usually occur within 10 minutes, which is a valuable sign for diagnosing the type of snake. Local symptoms such as severe local swelling and pain, sometimes accompanied by necrosis, gangrene, blisters, bloody discharge, and superficial thrombosis with gradual spread, discoloration of the skin due to the bites of the Viperidae family have been reported. Systemic symptoms occur often within 20 minutes to a few hours after the bite. anesthesia, muscle fasciculation mainly around the lips, hypotension, weakness, sweating, chills, dizziness, tenderness of the regional lymph nodes, nausea, vomiting, myocardial cells damage, Vascular collapse, sometimes oliguria and coma have been reported. Symptoms of severe intoxication include tachycardia, tachypnea, hypothermia, hypotension, ecchymosis, numbness of the fingers and toes, and muscle fasciculations. Symptoms of critical intoxication include bleeding into the peritoneum and pericardium [29,30]. In high-risk areas, one of the major issues, in the treatment, is recognizing the bite of dangerous types of safe species. By recognizing and distributing different species in each area, appropriate and effective treatment strategies for each species can be achieved. In Iran, the most abundant venomous snakes in terms of the distribution of snake bites are parsley, *Echis carinatus* viper, and Persian horned viper. Therefore, it is necessary to inject anti-venom if these snakes are bitten [17,61]. Children,

especially boys, are more likely to be bitten by curiosity in comparison to others. Children are more vulnerable to snake venom than adults. So, they need more anti-venom. Antidote recommended intravenous infusion the value of intravenous injection of antidote is that the neutralization of the toxin is done quickly. Intravenous administration is easier to diagnose and control allergic symptoms. First, a few drops of the anti-venom should be infused and then wait a few moments for the appearance of allergic effects and symptoms, and in the absence of allergic symptoms, the injection should be continued [30,32]. The implementation of a snakebite management protocol in medical toxicology centers has reduced the total use of anti-venom, anti-allergy interventions, and the length of stay in the hospital [33,34]. In some cases, the Haddad protocol has been recommended as an efficient method for the treatment of snakebite patients in Iran. However, due to the limited sample size and insignificant amounts, this conclusion cannot be accurately accepted. Our study showed that anti-venom is prescribed for patients with relatively severe clinical manifestations, which is consistent with the studies of other researchers. [35,36].

LIMITATIONS

The files of the patients are not complete, therefore, in the future, the files of the arrival and departure of the injured due to the bites of venomous animals, including snakes, should be prepared based on the scientific method.

CONCLUSION

Local and systemic symptoms of snakebite patients show that Vipers are the cause of bites in Kerman province. Snakebites have been more common in men and in the age group of socially active people and more in summer. Given the fact that most cases of bites occur in the warm months of the year, it is necessary to educate people to avoid bites in hot seasons and especially to take care of children. Increasing the awareness of people in the community regarding the bites of venomous animals will reduce these cases. The development of educational programs is also suggested to raise the level of awareness of the people of the region to prevent the bite of these animals and thus reduce physical and psychological damage and economic losses through health officials. Moreover, it is necessary to develop treatment protocols by experienced physicians familiar with the local and systemic clinical manifestations of venomous snakes in the region.

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