Original Article

A Retrospective Study on Snakebite Victims in a Tertiary Referral Center

*Nasim Zamani [1], Leila Modir-Fallah Rad [1], Kambiz Soltaninejad [2], Shahin Shadnia[*1]*

ABSTRACT

Background: Snakebite is a serious public health problem in the world. The annual incidence of snakebites ranges from 4.5-9.1 in 100,000 population in Iran. With regard to diversity of envenomation profiles in different geographical parts of Iran, the aim of this study was to determine the demographical data, clinical and laboratory findings, and the outcome of the snakebite victims referred to a tertiary referral hospital.

Methods: In this retrospective, cross-sectional study in Loghman Hakim Hospital Poisoning Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran, during a four-year period from March 2007 to March 2011. The demographic data, clinical manifestations, paraclinical findings, treatments performed before hospital admission, time elapsed between the bite and hospital admission, total dose of antivenom and the patients' outcomes were investigated.

Results: Seventy cases (58 males, 12 females) were evaluated. Most of the cases (79%) were older than 20 year old. The most common bite site was upper extremity (67%). Most of the patients were admitted within 5 h after the snakebite. The most common local and systemic manifestations were swelling (90%), pain (81.4%), nausea and vomiting (24.3%). Leukocytosis (35.7%) and thrombocytopenia (25.7%) were the most common laboratory abnormalities. Most of the patients (97.1%) were treated with antivenom. Fifty percent of the patients only received 3-5 vials of antivenom. The mortality rate was 1.4%. Necrosis of the toes and compartment syndrome were the only serious complications.

Conclusion: The findings emphasize the importance of early admission to the hospital and treatment with antivenom to avoid morbidity and mortality.

Keywords: Antivenins, Iran, Snake Bites, Snakes, Snake Venoms.

INTRODUCTION

Snakebite is a serious health problem that can cause a wide range of complications in patients. World Health Organization reports 500,000 snakebites and between 30,000 to 40,000 snakebite deaths each year in the world, from which, 25,000-35,000 deaths occur in Asia [1]. In Iran, the annual incidence of snakebites ranges from 4.5-9.1 in 100,000 population [2].

There are nearly 69 species of snakes in Iran, and 25 spices are considered venomous and eight spices are semi-venomous [3]. Viperidae family including *Vipera lebetina*, *Echis carinatus*, *Pseudocerastes persicus*, *V. albicornuta*, *Agkistrodon halys* and Elapidae family especially *Naja naja oxiana* are responsible for most of the venomous snakebite in Iran [3, 4]. The type of

snake, the season, and the amounts of the toxin injected via the bite are factors affecting the clinical presentation and the severity of sign and symptoms [3, 5].

The clinical manifestations of Elapidae snakebites are small fang marks, pain (less common compared to the viperidae bite), swelling (less significant compared to the viperidae bite), nausea, vomiting, ptosis, drowsiness, anxiety, general fatigue, diplopia, cold perspiration, tremor, dyspnea due to paralysis of the respiratory muscles, abdominal pain, and diarrhea [3, 5]. Viperidae bites cause severe and immediate pain, rapid spreading of the swelling, necrosis of the bite site, nausea, vomiting, abdominal pain, diarrhea, hypotension, coagulopathy, and bleeding. Renal failure is not common and if

1. Department of Clinical Toxicology, Loghman Hakim Hospital Poison Center, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
2. Department of Forensic Toxicology, Legal Medicine Research Center, Legal Medicine Organization, Tehran, Iran.
*Corresponding Author: E-mail: shadniatrc@sbmu.ac.ir

happens, is due to hypotension, and deposit of hemoglobin, myoglobin, and fibrin in the renal tubules [3, 5].

Administration of snake antivenom (monovalent or polyvalent) is the main treatment modality in snakebite victims [5]. In Iran, one monovalent and one polyvalent antivenom are produced. The polyvalent antivenom can neutralize the venom of five different common venomous snakes including *V. lebetina*, *E. carinatus*, *P. persicus*, *V. albicornuta*, and *A. halys* [6]. Based on the national treatment guidelines, in cases of mild, moderate and severe Viperidae bites, 3-5, 6-10 and 11-20 vials of antivenom are required, respectively. In cases of Elapidae bites, the recommended dose of antivenom is 5-6 vials up to a maximum 10 vials [5]. With regard to the diversity of envenomation profiles in different geographical parts of Iran, we aimed to evaluate the demographic characteristics, clinical and paraclinical manifestations of snakebites in victims referred to a tertiary poisoning center in Tehran, the capital of Iran, during a four-year period. The results of this study would help to increase the knowledge of health care providers to provide better management.

MATERIALS AND METHODS

This retrospective cross-sectional study was performed in Loghman Hakim Hospital Poisoning Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran (a tertiary level teaching hospital) during a four-year period From March 2007 to March 2011. The demographic data, clinical manifestations and paraclinical findings including sex, age, bite site, treatments performed before hospitalization, time elapsed between the bite and hospital admission, local and systemic signs and symptoms, white blood cell counts (WBC), platelet (PLT), prothrombin time (PT), partial thromboplastin time (PTT), creatinine (Cr), urine analysis, liver function tests, serum sodium (Na) and potassium (K) levels, total dose of antivenom, and the outcome of the victims were extracted from the patients' medical files. Individual data for patients were kept confidential in all stages of the study.

Based on clinical and paraclinical findings, the severity of envenomation was classified as mild (local swelling without systemic findings), moderate (swelling beyond bite site, systemic manifestations, with/without mild laboratory abnormalities) and severe (spread of swelling to the entire of the affected extremity; sever systemic signs and symptoms, and markedly abnormal laboratory values) [5].

The statistical analysis was performed with SPSS software version 16 (SPSS Inc., Chicago, IL, USA).

The study was approved by Ethics Committee of Shahid Beheshti University of Medical Sciences.

RESULTS

Seventy cases (58 males, 12 females) were evaluated. Most of them (79%) were older than 20 year old and the rest were between the ages of 13-20 years. The most common bite site was upper extremities (67%) followed by lower extremities (30%). In 3% of cases, head, neck and trunk were reported as bite site. Only five patients had made an incision on the bite site before hospital admission. In others, the most frequent treatment before admission was fixation of the affected extremity. Most of the patients were admitted within 5 hours after the snakebite. The most common local signs and symptoms were swelling (90%), pain (81.4%), erythema (32.8%) and ecchymosis (30%). Nausea and vomiting (24.3%), and tachycardia (20%) were the most common systemic manifestations. The main neurological signs were paresthesia (7.1%) and ptosis (1%) (Table 1).

Table1. Local and systemic signs and symptoms of snakebite.

Signs / Symptoms		Number (%)
Local	Swelling	63 (90)
	Pain	57 (81.4)
	Erythema	23 (32.8)
	Ecchymosis	21 (30)
	Necrosis	6 (8.6)
	Burning	4 (5.7)
	Blister	4 (5.7)
	Oozing	2 (2.8)
Systemic	Vomiting	17 (24.3)
	Tachycardia	14 (20)
	Hematuria	9 (12.8)
	Fever	5 (7.1)
	Paresthesia	5 (7.1)
	Hypotension	5 (7.1)
	Diarrhea	2 (2.8)
	Ptosis	1 (1.4)

The most common laboratory abnormalities were leukocytosis (35.7%), thrombocytopenia (25.7%), hematuria (12.8%), and increased PT and PTT (4.2%). Other laboratory tests were within normal range.

Most of the patients (97.1%) were treated with antivenom, but 50% of the patients only received 3-5 vials of antivenom. Just 2.8% of the cases received more than 15 vials of antivenom. In the rest of the patients, the dose of antivenom was between 6-15 vials. In all cases, the route of administration was intravenous infusion.

Only one patient out of 70 died (1.4%). In this special case, the bite site was on the neck and due to immense swelling of the neck and respiratory compromise; a tracheostomy was performed for him. He then developed severe coagulopathy and died because of the complications.

Necrosis of the toes, resulted to amputation, was observed in two cases (2.8%). Two patients underwent surgery for the treatment of compartment syndrome. The other victims (92.8%) recovered without any complications.

DISCUSSION

In accordance with previous studies, we observed a predominance of adult males [3, 4, 7, 8], which could be due to their involvement in outdoor activities. Dehghani et al. reported that the upper extremities were the most common bite site [4], which was in accordance with our results, although, some studies have reported the lower extremities as the most affected sites [3, 8].

In this study, most of the cases were admitted in our hospital within the first five hours after the bite. In other studies, the mean time between snakebite and hospital admission ranged from 0.5 to 12 hours [8-12]. Early admission of the victims in our study could be due to the shorter distance of the accident scene to the hospital and better connectivity in our area. In previous studies, lack of transportation facilities, administration of traditional, and folk medicine rather than coming to the health care units, were described as causes of delayed admissions [8, 11].

In this study swelling, pain, nausea and vomiting were the most common local and systemic findings in the victims, which are in concordance with the results of the other studies [4, 13-15]. Similarly, leukocytosis and thrombocytopenia were the major laboratory findings in our study [8].

Our mortality rate was 1.4%, which was lower than the 2% to 6.7% mortality rate reported by other studies [3, 4, 8]. Rapid referral to the hospital within hours of the snakebite, easy accessibility to hospital care, and availability and administration of appropriate doses of snake antivenom could be considered as major factors for good prognosis in our study.

As this study was conducted retrospectively, the main limitation was incomplete registration of some of the data, which could influence the statistics.

CONCLUSION

The results underestimate the graveness of snakebite problem in Iran; hence, a national and well-planned data registry system to collect related information about all aspects of snakebites in the country is necessary. The findings of this study also emphasize the importance of early admission to the hospital and treatment with proper dose of antivenom to avoid morbidity and mortality.

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