

## Original Article

# Epidemiology of Scorpionism in Iran during 2009

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### Abstract

**Background:** Scorpion sting is a major health problem in Iran. The aim of current study was to measure the incidence rates of scorpion stings, mortality, recovery, and affected age groups. The results of treatment with and without anti venom also were considered in the entire country during 2009.

**Methods:** All the data were collected from emergency section of different hospitals and then were analyzed by related software. The responsibility of such data collection and surveillance is related to the Department of Violence and Injury, Ministry of Health and Medical Education of Iran.

**Results:** A total incidence of 59.5/100000 was found for the 12-month period. During the study period the most and the least cases were reported from Khuzestan and Mazandaran Provinces with incidence of 541 and 0 per 100000 respectively. Totally 40220 anti venom vials were used, i.e., the ratio of 91 vial/ 100 affected cases. The stings occur mainly in rural areas (57.7%). Young people with the age group of 15–24 years old were the most victims of stings. The mortality and recovery rates of cases who had received anti venom less than 6 h of stings were calculated as 0.01% and 99.9% respectively.

**Conclusion:** The high incidence of scorpion stings in Iran especially in Khuzestan suggests the necessity of preventive programmes for decreasing the incidence. Such programmes could start by community educating in the high prevalent areas. In addition prompt and local treatment is particularly important for infants and pre-school children.

**Keywords:** Epidemiology, Scorpion, Iran

### Introduction

Scorpions are venomous arthropods, members of the class Arachnida. These animals are found in all continents except Antarctica, and are known to cause problems in tropical and subtropical regions. Scorpion stings and their consequences represent an important cause of emergency, in particular pediatric, in many countries (Chippaux et al. 2008). The epidemiology of the scorpionism in the world is poorly investigated. Accidents caused by scorpion stings are a relatively common event in subtropical and tropical countries and can cause lethal envenomation in humans, especially in children (Ismail 1995).

The clinical symptoms in scorpion sting are typically varied, depending on factors such as scorpion's species, amount of injected venom, season, age and physical conditions of injured patient that may be weak as brief local responses or as dangerous as severely physiological changes that are led to death (Magurie 2001, Sogleland et al. 2004).

The Iranian scorpion fauna consists of over 44 named species from 23 genera in two families, Buthidae and Scorpionidae. In Iran, similar to other parts of the world, there are a few known species of scorpions responsible for severe envenoming. At least seven

species have been implicated in envenoming of humans and considered medically important. *Hemiscorpius lepturus* (Hemiscorpionidae), is the most medically important scorpion in Iran (Zarei et al. 2009).

Even though scorpions are abundant in many parts of Iran, envenomation arising from scorpion stings is not fully defined from the clinical signs, symptoms and epidemiological aspects. So the aim of this study was to appraisal these aspects of the topic.

## Materials and Methods

The initial data including age, sex, signs and symptoms, site of biting, and final outcome of the patients were derived and recorded in a previously prepared questionnaire by emergency section of hospitals of 42 universities of Medical Sciences from the whole parts of Iran and then were analyzed by related software, Excell 2009, Excell Maritime Carriers Ltd, USA.

## Results

All together, 44366 cases of scorpionism were recorded during 2009. Of these, 42.3 % was related to urban and remaining in rural districts. The males with 51.8 % were the most affected gender. The age group of 15–24 years was by far the most commonly affected group (21.8%), however, the least num-

ber of patients with 5.1% belonged to the age group of more than 65 years. Table 1 shows age and sex distribution of patients stung by scorpion in Iran in 2009. Of 44336 scorpion stung, 8998 (19.2%) observed on head and trunk, 18898 (40.3%) on hand and 18991(40.5%) on leg areas (Table 2). The average incidence of scorpionism was estimated 59.5 per 100000, however, the highest and the lowest affected cases were observed in Khuzestan and Mazandaran provinces with incidences of 541 and 0 per 100000 individuals, respectively. Other four provinces including Hormozghan, Sistan and Baluchistan, Boshehr and Ilam with incidences of 153.9, 136.1, 127 and 123 per 100000 persons were the next important scorpionism priority within the country respectively.

The times elapsed between sting and injection of anti venom were less than 6 hour for 56.6% of cases, 6–12 hour for 21% of cases, more than 12 hours for 11% of cases and the rest of individuals had not received any anti venom.

Totally 40220 anti venom vial were used, indicates the coverage of 91 vial/100 affected cases. The yellow scorpion was easily identified by the patients (54.6%). Moreover, stings were occurred during the night.

The mortality and recovery rates of cases with and without anti venom, was evaluated (0.03, 99.97%) and (0.11, 99.89%) respectively. According to results, the mortality rate of affected cases was 0.04% (19/44366).

**Table 1.** Epidemiological characteristics of cases stung by scorpions in Iran, 2009

Age (yr)	Male	Female	Totally	%
0–4	1656	1296	2952	6.7
5–9	1756	1428	3184	7.2
10–14	1830	1675	3505	7.9
15–24	4899	4770	9669	21.8
25–34	4788	4659	9443	21.3
35–44	3360	3211	6571	14.8
45–54	1868	1743	3611	8.1
55–64	1654	1500	3154	7.1
>65	1153	1120	2273	5.1
<b>Totally</b>	<b>22064</b>	<b>21402</b>	<b>44366</b>	<b>100</b>

**Table 1.** Continued...

TAI* (hours)	Patients (n)	%	recovery (n)	%	Mortality (n)	%
<6	25052	56.47	25048	56.46	4	0.009
6-12	8690	19.58	8686	19.57	4	0.009
>12	5248	11.84	5243	11.83	5	0.010
WAI**	5376	12.11	5370	12.10	6	0.012
<b>Totally</b>	<b>44366</b>	<b>100</b>	<b>44347</b>	<b>99.96</b>	<b>19</b>	<b>0.04</b>

\*Time of anti venom injection after stung

\*\*Without anti venom injection

**Table 2.** Features of scorpion stings among the studied cases in Iran, 2009

Characteristics	Patients (n)	%
<b>Sting site</b>		
<b>Head and trunk</b>	6477	14.6
<b>Hand</b>	18898	42.6
<b>Leg</b>	18991	42.8

## Discussion

Envenomings by scorpion stings are also an important, yet neglected, health issue in many parts of the world, particularly in the extreme Northern and Southern parts of Africa, the Middle East, Southern states of USA, Mexico and parts of South America, and the Indian sub-continent.

The true incidence of scorpion sting envenoming is not known because many cases do not seek medical attention. However, it has been estimated that there are approximately 1 million stings per year. In Mexico alone, 250,000 scorpion stings are reported yearly, but fatalities have declined from 2,000 to less than 50 per year following widespread distribution of antivenoms (WHO 2007). In Tunisia 40,000 stings, 1,000 hospital admissions and 100 deaths are reported each year. There is a high incidence in other parts of Northern Africa, the Middle East (notably Iran), India and Latin America (WHO 2007).

In this study 44366 scorpion stings were registered in 2009 and in comparison with 2002 (37535 cases), we observed notably increasing on incidence of scorpion sting in Iran.

Different studies have shown varied age distribution for scorpion stings. Children from 9 to 15 years old were more frequently affected

(54.1%) than other age groups (38.8% for 3 to 8 years old, and 7.1% for 0 to 2 years) (Adiguzel et al. 2007). This result was not the similar with our study. The age groups of 15–24 years were by far the most commonly affected.

In the present study, male victims predominated over females (51.8% versus 48.2%). Several authors assign similar results to more activity displayed by boys than by girls (Hernandez 1997). However, there was no difference in severe cases between the sexes. Other studies indicated that males, with their outdoor activities had more contact with scorpions than females (16–18), while other reports indicated that females accounted for the majority of victims (Bergman 1997, Forrester 2004, Ozkan 2006).

In the current study, hands and legs were the most affected parts of the body (85.4 %), a frequency that is not very different from those reported by other authors who showed that hands, arms, feet and legs were more frequently stung than other body parts (Farghly 1999, Gordillo 2000, Silva et al. 2000, Al-Sadoon 2003, de Roodt et al. 2003).

Our study also showed that the majority of scorpion stings occur in July and August, during the hot season of the year. This is in accordance with data from the medical literature (Abroug 1994, Touloun 2001, Soulaymani 2004).

### Conclusion

The present paper is the first comprehensive epidemiological study on injuries related to scorpions' sting in Iran. The high incidence of scorpion stings in Iran especially in Khuzestan suggests the necessity of preventive programmes for decreasing the incidence. Such programmes could start by educating those affected by scorpion stings on how to avoid further stings. In addition early and local treatment is particularly important for infants and preschool children. Works on behaviour of scorpions in the region and different control measure are also recommended.

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### References

- Abroug F, Nouria S, Saguiga H (1994) Envenimations scorpioniques: avancées chimiques, physiopathologiques et thérapeutiques [Monograph]. pp. 1–68.
- Abroug F, Nouria S, Saguiga H (1994) Envenimations scorpioniques: avancées chimiques, physiopathologiques et thérapeutiques. Paris: Édition Arnette-Blackwell, (Monographie, éditée par la Société de Réanimation de Langue Française).
- Al-Sadoon MK, Jarrar BM (2003) Epidemiological study of scorpion stings in Saudi Arabia between 1993 and 1997. *J Venom Anim Toxins Incl Trop Dis*. 9(1): 54–64.
- Adiguzel S, Ozkan O, Inceoglu B (2007) Epidemiological and clinical characteristics of scorpionism in children in Sanliurfa, Turkey. *Toxicon*. 49(6): 875–880.
- Bergman NJ (1997) Clinical description of *Parabuthus transvaalicus* scorpionism in Zimbabwe. *Toxicon*. 35(5): 759–771.
- Chippauxa JP, Goyffonb M (2008) Epidemiology of scorpionism: A global appraisal. *Acta Trop*. 107: 71–77.
- De Roodt AR, Garcia SI, Salomon OD, Segre L, Dolab JA, Funes RF, de Titto EH (2003) Epidemiological and clinical aspects of scorpionism by *Tityus trivittatus* in Argentina. *Toxicon*. 41(8): 971–977.
- Farghly WM, Ali FA (1999) A clinical and neurophysiological study of scorpion envenomation in Assiut, Upper Egypt. *Acta Paediatr*. 88(3): 290–294.
- Forrester MB, Stanley SK (2004) Epidemiology of scorpion envenomations in Texas. *Vet Hum Toxicol*. 46(4): 219–221.
- Gordillo ME, Bugliolo AG, Delloni A (2000) Escorpionismo en pediatria. *Arch Argent Pediatr*. 98(5): 296–303.
- Hernandez IHF (1997) Picadura de alacran. *Epidemiologia*. 11(1): 1–2.
- Ismail M (1995) The scorpion envenoming syndrome. *Toxicon*. 33(7): 825–858.
- Maguire JH, Spielman A (2001) Ectoparasite infestations and arthropod bites and stings. In: Braunwald E, Fauci AS, Kasper DL, Hauser SL, Longo DL, Jameson JL, eds. *Harrison's Principles of Internal Medicine*. 15th ed. McGraw-Hill, New York, USA.
- Ozkan O, Adiguzel S, Yakistiran S, Cesaretli Y, Mehmet O, Karaer Z (2006) *Androctonus crassicauda* (Olivier 1807). Scorpionism in the Sanliurfa prov-

- inces of Turkey. Turk Parazitol Derg. 30(3): 239–245.
- Silva RLM, Andrea M, Amorim TK (2000) Envenomation by *Tityus stigmurus* (Scorpiones: Buthidae) in Bahia, Brazil. Rev Soc Bras Med Trop. 33(3): 239–245.
- Solegland ME, Fet V (2003) High-level systematics and phylogeny of extant scorpions (scorpions: Orthosterni). Euscorpius. 11: 157–175.
- Soulaymani- Bencheikh R, Semlali I, Ghani A, Badri M, Soulaymani A (2004) Implantation et analyse d'un register des piqûres de scorpion au Maroc. Revue Santé Publ. 3(16): 487–498.
- Touloun O, Slimani T, Boumezzough A (2001) Epidemiological survey of scorpion envenomation in southwestern Morocco. J Venom Anim Toxins. 7(2): 199–218.
- World Health Organization (2007) Report of a Consultative Meeting on Rabies and Envenomings: A Neglected Public Health Issue. WHO.
- Zarei A, Rafinejad J, Shemshad K, Khaghani R (2009) Faunistic study and biodiversity of scorpions in Qeshm Island (Persian Gulf). Iran J Arthropod-Borne Dis. 3(1): 46–52.

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