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A Hospital-based Study on Scorpionism in Khorram-shahr County, Southwestern Iran

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ABSTRACT

Scorpions are most prevalent in warm environments, particularly in regions considered to be semi-arid. These animals are common in urban and rural areas of Iran. Scorpion sting is one of the major health hazards in the province of Khuzistan. This descriptive cross-sectional research was done to survey the epidemiological features of scorpion stings in Khorram-shahr County during 2007-2009. Epidemiological data were recorded in a questionnaire and analyzed by SPSS software. A total of 903 cases of scorpion envenomation were reported during three years interval. The mean incidence of scorpion stings was 2.4/1000/3 years. Almost 59.5% of cases were men. Although scorpion sting occurred in all months of the year but most of stings were appeared in spring and summer and the least in winter. Most of the stings (34.1%) were seen in persons with 15-24 years old. Among these patients, 69% were from urban areas and 31% from villages. The highest cases of stings (45.3%) occurred in the hands and the least (12.8%) in the head and trunk of the victims. Scorpionism in Khorram-shahr County is a public health problem, which needs to be monitored very carefully.

Key words: Epidemiology, scorpion sting, Iran

INTRODUCTION

Scorpions (Arthropoda: Arachnida) are spread around the world, but hazardous scorpion stings more generally happen in India, Mexico, southwestern regions of the United States, northern and middle parts of Latin America and Middle Eastern countries (Abourazzak *et al.*, 2009; Yilmaz *et al.*, 2013). Dying by scorpions is medical emergency and actual public health problem that can end to decease in several parts of the globe (De Roodt, 2014; Gheshlaghi *et al.*, 2011). Scorpion envenomation following sting of scorpion is a significant cause of mortality, especially in children (Vahdati and Moradi, 2012).

There are 1500 species of these venomous creatures around the globe, with 50 species possessing venom fatal for humans (Canpolat *et al.*, 2008). Every year, minimum 1000000 cases of scorpion sting are reported around the world, more than 3250 of which conclude in mortality (Ozkan *et al.*, 2006). Scorpion venoms are a complex mixture of acidic proteins, neurotoxic proteins, organic compounds and salts (Yilmaz *et al.*, 2013; Karnad, 2009). Scorpions become commonly active at night, hide during the day in crevices, within burrows, under rocks or leaf litter (Nejati *et al.*, 2014).

Annually, nearly 40000-50000 scorpion stings are recorded in Iran, with approximately 19 deaths every year (Mirshamsi *et al.*, 2011; Mozaffari *et al.*, 2013). About 51 species of scorpions have been recorded in Iran, belonging to four families (Buthidae, Scorpionidae, Hemiscorpiidae, Diplocentridae) and 18 genera (Mirshamsi *et al.*, 2011). Iran, with almost 10 venomous species, has the highest number among Middle Eastern countries (Dehghani and Fathi, 2012). *Hemiscorpius lepturus* (Hemiscorpiidae) is the most medically important scorpion in Iran (Zarei *et al.*, 2009).

In the southern areas of Iran, scorpion stings are one of the most major health and medical problems (Saghafipour *et al.*, 2013). The Khuzistan, a province in the southwestern Iran, has the most incidence rate of scorpion sting in Iran (Dehghani and Fathi, 2012). Knowing regarding epidemiologic features s of scorpion stings might lead to the utilization of suitable preventive methods. Therefore, objective of this study was to present the epidemiologic aspects of 903 scorpionism presenting with signs of scorpion poisoning in Khorram-shahr County, Khuzistan Province, from 2007-2009.

MATERIALS AND METHODS

Descriptive cross-sectional research analysis: This descriptive cross-sectional research analyzed the demographic and epidemiologic characteristics of scorpion stung patients in Khorram-shahr County, southwestern Iran. The characteristics of scorpion sting were monitored after physical examination and history-taking. All information was collected by physicians in a researcher-made questionnaire. This questionnaire sheet was completed for each patient. Descriptive information were represented as percentage and frequency with the aid of SPSS software.

RESULTS

The largest of scorpion stings data was happened in 2007 (39.9%), 2008 (32.8%) and 2009 (27.3%), respectively. The incidence rate of scorpion stings were 2.88, 2.3 and 1.9 per 1000 population during 2007-2009, respectively. Mean incidence rate was calculated 2.4 per 1000 population during the above three years. Among 903 victims who presented to the above-mentioned centers with scorpionism, about 59.5% (n = 537) were males and 40.5% (n = 366) were females. The place of residence was the city center in 623 (69%) cases and rural region in 280 (31%) (Table 1, Fig. 1).

Table 2 shows the most commonly affected extremities in the studied scorpion stings. Scorpion stings were located on the hands in 409 (45.3%) cases, feet in 378 (41.9%) cases and other parts of the body in 116 (12.8%) cases. Patient distribution according to age is given in Table 3 and Fig. 2. Approximately 472 (52.3%) patients were younger than 24 years. Most of the cases were in

Table 1: Distribution of scorpion sting cases by the places of residence in Khorram-shahr County, southwestern Iran (2007-2009)

Years	City		Village		Total	
	No.	%	No.	%	No.	%
2007	234	65.0	126	35.0	360	100
2008	215	72.6	81	27.4	296	100
2009	174	70.4	73	29.6	247	100
Total	623	69.0	280	31.0	903	100

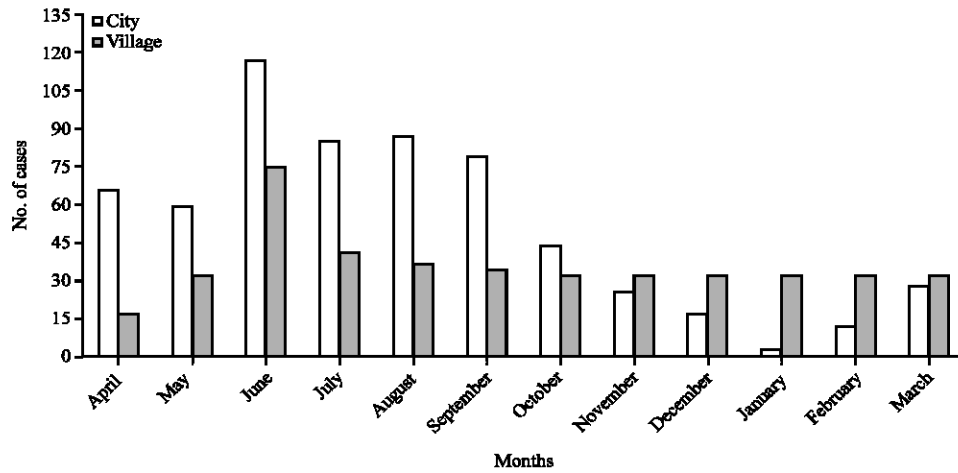


Fig. 1: Distribution of scorpion sting cases by the places of residence and months in Khorram-shahr County, southwestern Iran (2007-2009)

Table 2: Distribution of scorpion sting cases by sting sites on the body in Khorram-shahr County, southwestern Iran (2007-2009)

	Years							
	2007		2008		2009		Total	
	No.	%	No.	%	No.	%	No.	%
Sting sites	No.	%	No.	%	No.	%	No.	%
Heads and trunks	40	11.1	45	15.2	31	12.6	116	12.8
Hands	171	47.5	130	44.0	108	43.7	409	45.3
Feet	149	41.4	121	40.8	108	43.7	378	41.9
Total	360	100.0	296	100.0	247	100.0	903	100.0

Table 3: Distribution of scorpion sting cases by age groups in Khorram-shahr County, southwestern Iran (2007-2009)

Age groups	Years							
							Total	
	2007		2008		2009			
	No.	%	No.	%	No.	%		
0-4	20	5.6	17	5.7	15	6.1	52	5.8
5-9	23	6.4	19	6.4	13	5.3	55	6.1
10-14	20	5.6	26	8.8	11	4.5	57	6.3
15-24	134	37.2	96	32.4	78	31.6	308	34.1
25-34	90	25.0	68	23.0	65	26.3	223	24.7
35-44	44	12.2	32	10.8	28	11.3	104	11.5
45-54	9	2.5	24	8.1	24	9.7	57	6.3
55-64	15	4.1	7	2.4	9	3.6	31	3.4
>65	5	1.4	7	2.4	4	1.6	16	1.8
Total	360	100.0	296	100.0	247	100.0	903	100.0

the 15-24 (34.1%) and 25-34 (24.7%) age groups. The majority of scorpion stings took place in the spring (40.6%) and summer (40%) (Table 4), mainly from June to August, with a peak in June (21.3%) (Table 5, Fig. 1 and 3).

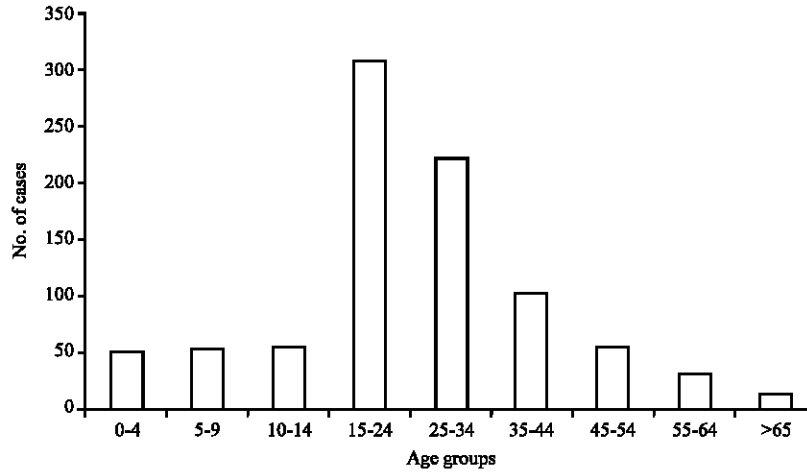


Fig. 2: Age distribution of scorpion sting cases in Khorram-shahr County, southwestern Iran (2007-2009)

Table 4: Distribution of scorpion sting cases by seasons in Khorram-shahr County, southwestern Iran (2007-2009)

Seasons	Years							
	2007		2008		2009		Total	
	No.	%	No.	%	No.	%	No.	%
Spring	160	44.4	117	39.5	89	36.0	366	40.6
Summer	140	38.9	112	37.8	110	44.6	362	40.0
Autumn	49	13.6	44	14.9	28	11.3	121	13.4
Winter	11	3.1	23	7.8	20	8.1	54	6.0
Total	360	100.0	296	100.0	247	100.0	903	100.0

Table 5: Distribution of scorpion sting cases according to the months, Khorram-shahr County, southwestern Iran (2007-2009)

Months	Years							
	2007		2008		2009		Total	
	No.	%	No.	%	No.	%	No.	%
April	33	9.2	35	11.8	15	6.1	83	9.2
May	45	12.5	24	8.2	22	8.9	91	10.1
June	82	22.8	58	19.6	52	21.0	192	21.3
July	44	12.2	30	10.1	52	21.0	126	14.0
August	62	17.2	32	10.8	29	11.7	123	13.6
September	34	9.4	50	16.9	29	11.7	113	12.5
October	24	6.7	27	9.1	16	6.5	67	7.4
November	12	3.3	9	3.0	11	4.5	32	3.5
December	13	3.6	8	2.7	1	0.4	22	2.4
January	2	0.6	3	1.0	0	0.0	5	0.5
February	1	0.3	8	2.7	7	2.9	16	1.8
March	8	2.2	12	4.1	13	5.3	33	3.7
Total	360	100.0	296	100.0	247	100.0	903	100.0

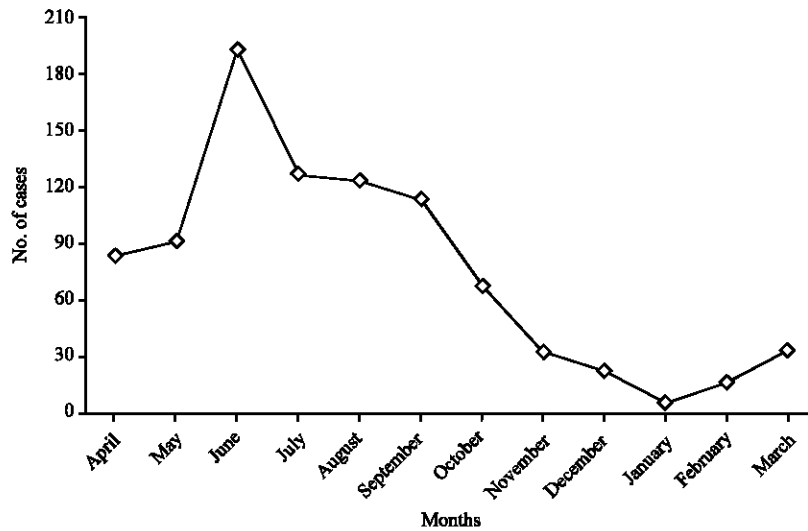


Fig. 3: Monthly trend of scorpion sting cases by months in Khorram-shahr County, southwestern Iran (2007-2009)

Table 6: Distribution of scorpion sting cases by the interval hours after scorpion stings and injection of antivenin of scorpions in Khorram-shahr County, southwestern Iran (2007-2009)

Interval between sting and anti-venom injection (h)	Years						Total	
	2007		2008		2009			
	No.	%	No.	%	No.	%	No.	%
	<6	329	91.3	273	92.2	240	97.2	842
6-12	20	5.5	14	4.7	6	2.4	40	4.4
>12	11	3.2	9	3.1	1	0.4	21	2.4
Total	360	100.0	296	100.0	247	100.0	903	100.0

The interval hours after scorpion stings and injections of antivenin of scorpions were recorded as: 93.2% after 0-6 h, 4.4% after 6-12 h and 2.4% after more than 12 h (Table 6). The scorpion stung persons treated by scorpion antivenin serum including intra-venin (69.7%) and intra-muscular (30.3%) injections. Within the study, a total of 1003 vials of antivenin of scorpions were applied, i.e., the ratio of 111.07 vial/100 affected patients.

DISCUSSION

The clinical picture of scorpion envenomation depends on the anatomical site of the sting and the patient's weight, health status and age. However, stings are more prevalent in males and adults, fatality is greater in children (Yilmaz *et al.*, 2013; Tuuri and Reynolds, 2011). Scorpion sting is an important public health problem in Iran, especially in the southwest and south regions.

All together, 903 patients of scorpionism were recorded in Khorram-shahr County during 2007-2009. In the current study, the men with 59.5% were the most affected sex. A study from Iran reported men victims predominated over women (51.8% against 48.2%) (Rafizadeh *et al.*, 2013). In agreement with the present results, two studies in Behbahan, Masjed-soleyman and Mahshahr Counties (southwestern Iran), showed that about 51.3, 54.4 and 63.6% of the patients were males,

respectively (Kassiri *et al.*, 2014a, b, 2015). These researches indicated that men, with their outside activities had more contact with scorpions than women. On the contrary, three investigations from the United States, Australia and Turkey reported that women were more commonly stung than men (Yilmaz *et al.*, 2013).

In present study, almost 69% of the persons stung were occurred in urban areas. Yilmaz *et al.* (2013) reported that 79.7% of the scorpion victims were found in villages. In other report, 74.4% patients have been recorded from rural regions (Saghafipour *et al.*, 2013). Furthermore, Talebian and Doroodgar (2006) reported 58.3% of cases were residing in rural regions (Talebian and Doroodgar, 2006). These results were not the similar with present study. In agreement with our result, the findings of Pipelzadeh *et al.* (2007) and Vazirianzadeh *et al.* (2008) reported 60% of stings in the urban areas (Karami *et al.*, 2013). Cracked and old houses in addition inappropriate construction materials provide an appropriate surroundings for these creatures.

The largest rate of stings occurred among the 15-24 year old individuals (34.1%). This agrees with the results in Kashan (central of Iran), Ahvaz (southwestern Iran) and Ramhormoz (southwestern Iran) (Karami *et al.*, 2013; Dehghni *et al.*, 2010). This represents that age is a risk factor in scorpion stung cases. This is because this age group is more active in the region. Yilmaz *et al.* (2013) reported that the greatest of patients were between 19-49 years; 16,9% were above 50 years of age, while 21.8% were children. In a study in Kashan County, children less than nine years old were the most commonly affected group (36.5%) (Talebian and Doroodgar, 2006). This is considered that this high incidence rate of scorpion stings amongst children originates from their venture-taking conduct and greater inquiring nature, like that they wear their clothes and shoes and pick up stones without scrutiny for these animals.

Data collected in the present study revealed that of 903 scorpion stings, about 45.3% occurred in upper extremities and 41.9% in lower extremities. In agreement with current results, Yilmaz *et al.* (2013) reported that scorpion stings most commonly involved the upper limbs (61.8%). Epidemiologic investigations have revealed that stings are more prevalent in the upper and lower extremities (Yilmaz *et al.*, 2013; Gheshlaghi *et al.*, 2011; Saghafipour *et al.*, 2013; Rafizadeh *et al.*, 2013; Kassiri *et al.*, 2014a, b, 2015; Pipelzadeh *et al.*, 2007; Shahbazzadeh *et al.*, 2009). The cause for a greater incidence rate of scorpion stings that involve the hands and feet include persons putting on sandals throughout hot months, the cultivation based procedure of life in the rural regions, checking for scorpions at indoor with naked hands, walking about neglectfully and with naked feet, elevating stones neglectfully and farming workers laboring in the farms insecure. Scorpion stings to the other body parts commonly happen while wearing clothes or during sleep.

We also found that a maximum of scorpion stings happened during the spring (40.6%) and summer (40%). This finding is in accordance with previous surveys that concluded the seasonal variation of stings in Iran (Nejati *et al.*, 2014; Saghafipour *et al.*, 2013; Rafizadeh *et al.*, 2013; Kassiri *et al.*, 2014a, b, 2015; Talebian and Doroodgar, 2006; Karami *et al.*, 2013). Meanwhile, Yilmaz *et al.* (2013) reported that a majority (76%) of scorpion stings took place during the summer.

In the current study, the scorpion stung people treated by scorpion antivenin serum including intra-venin (69.7%) and intra-muscular (30.3%) injections. Shahbazzadeh *et al.* (2009) reported that nearly 97.6% of cases were administered antivenom via intramuscular injection. Also, Nejati *et al.* (2014) found that most of cases (51.6%) were injected with intramuscular antivenom. In Karami *et al.* (2013) study, reported that patients treated by scorpion antivenin serum including intra-venin (7.70%) and intramuscular (92.30%) injections. In this study, approximately 93.2%

of patients were treated six hours after the scorpion sting. In agreement with this finding, Nejati *et al.* (2014) and Karami *et al.* (2013) reported that most patients (42.3 and 70.3%, respectively) were treated 6 h after the sting.

CONCLUSION

The results of this study have shown that scorpion stings is an important health problem in this region and increasing knowledge of residents regarding the prevention ways of stings is recommended. Also, stings were more common among males and the extremities were the most common site for scorpion stings.

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