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A Cross-sectional Study on Scorpionism in Masjed Soleyman County, Southwestern Iran

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ABSTRACT

In Iran, scorpions are the important causative agents of toxication and deaths among venomous animals. Understanding about their epidemiologic characteristics could lead to the utilization of suitable preventive methods. Therefore, with the aim of contributing to basic knowledge on scorpion sting as acommon health problem, epidemiological features of scorpionism have been investigated in Masjed Soleyman County, Khuzestan Province, South west of Iran, over a two year period (2006-2007). This is a descriptive study which was done in Masjed Soleyman County. All the patients which were referred to Masjed Soleyman health services centers were assayed. Some data about epidemiologic and demography parameters were collected and recorded bya physician in a questionnaire. Then, these information were analyzed in SPSS by using descriptive statistics. During the period of study, 11169 cases of scorpion stings had been reported to Masjed Soleyman health services centers. Of total 11169 studied patients 54.4% were male. Feet (39.3%) and hands (37%) were the most common body part affected. The highest incidence of envenoming occurred during the first three months of the year, with the highest peak in May (14.4%). The most cases occurred during spring (36.8%) and summer (33.8%) seasons. Our experience indicates that scorpionism appeared with more frequency in the urban areas (79.6%). In all, 20.4% of individuals were from rural regions. Scorpion stings have been mostly seen in individuals of the age of 15 and over (77.4%). In this study, 14% of the stings were in children aged up to 10 years while those aged 44 and over constituted only 18.6% of the reported accidents. About 10.5 and 50.8% of envenomed cases were due to black and yellow scorpions, respectively. A good control plan for this region should be observed all year long, particularly ago or during the greater risk periods. As regards scorpion envenoming is of a seasonal feature in Masjed Soleyman County, it is possible to forespeak the greater incidence periods and take the relevant measures.

Key words: Epidemiology, incidence rate, scorpion envenoming, Iran

INTRODUCTION

Scorpions (Arachnida: Scorpionida) are venomous arthropods that have lengthy been beloved to humans chiefly due to their potency to give painful and sometimes fatal stings. Scorpions are nocturnal (this conduct assists they control water and temperature balance, major functions for survivorship in arid habitats) and predatory animals that eaten a variety of arthropods. These animals expend their days where it is wet and cool beneath tree bark, rocks (Fig. 1), wood or other objects on the land and in holes (Fig. 2) where they seek or

Fig. 1: Cavities in rocks as an appropriate shelter for scorpions in highlands (Prepared by H. Kassiri)

expect for bait. Several species of scorpions digtunnels in the soil (Fig. 3). Scorpions may arrive buildings and homes when their dominion has been disordered.

Totally, over 1500 species of scorpions (in 18 families and nearly 80 genera) in both the old and new worlds have been identified. Of the 1500 species of scorpion only approximately 50 species were explaind to have a sting which can be fatal to humans (Zarei *et al*., 2009; Warburg and Polis, 1990; Ozkan and Karaer, 2003; Mullen and Durden, 2002; Khaghani *et al*., 2006; Williams, 1987; Chippaux and Goyffon, 2008).

It has been estimated that there are nearly 1000000 scorpion stings per year (WHO, 2008). Many epidemiologic researches on scorpion envenomation have been done in countries, suchas Mexico, Brazil, Tunisia, Morocco, Algeria and Iran (Keegan, 1980). In Mexico, the annual incidence is high with about 250000 scorpion stings (WHO, 2008). In Morocco, the annual incidence is approximately 50 scorpion stings per 100000 people (Bencheikh *et al*., 2003). In Algeria, the annual incidence is 170 scorpion stings per 100000 inhabitants (Benguedda *et al*., 2002). In Tunisia, the annual incidence of the scorpion stings is 420 per 100000 individuals leading to about 40000 stings and 50 deaths a year (Njah *et al*., 2001; Mansour, 2001).

Scorpion sting is a common important health problem in Iran particularly in south and south-western of Iran (Zayerzadeh *et al*., 2011). According to the reports of the national strategy against scorpion sting, approximately about 50000 patients are reported each year, in Iran that put Iran in the second grade after Mexico (Kassiri *et al*., 2012a). The maximum of mortality and cases of the scorpion stings have happened in Khuzestan Province, a Southwest province of Iran (Vazirianzadeh *et al*., 2013). The most rates of annual incidence of stings per 100000 inhabitants are 1563, 1290 and 8260 in provinces of Khuzestan, Kohkiloye-Boyerahmad and Ilam. About 60% of all scorpion stings derive from Khuzestan Province (Dehghani *et al*., 2009). Figure 4 shows distribution of potential risk regions by scorpion sting envenoming in Iran.

Fig. 2: Holes within muddy walls as a suitable shelter for scorpions (Prepared by H. Kassiri)

Fig. 3: Active nest of Iranian burrowing scorpion like *Scorpio maurus* and *Odontobuthus doriae* (Prepared by H. Kassiri)

Fig. 4: Distribution of the potendial risk regions by scorpion sting evenoming in Iran (Prepared by R. Dehghani)

Despite of there have been many works of scorpion stings inseveral regions of the Iran, this was the first research of this type in Masjed Soleyman County. The aim of this research was to explainthe epidemiology of stings among humans stung by scorpions in the southwestern county of Iran, Masjed Soleyman. The study was conducted during the years of 2006 and 2007.

MATERIALS AND METHODS

Masjed Soleiman (31°56'11'N 49°18'14'E, altitude ca. 372 m asl) is a historical county, in northeastern Khuzestan Province, southwestern Iran which is located among the Zagros mountains. The average annual temperature in winter is 6 degree centigrade and in summer is 45°C. The first modern oil wells of the Middle East were discovered and drilled in this area. It is mostly populated by the Bakhtiari people. At the 2006, its population was 206121, in 51530 families.

This is a cross-sectional applied-descriptive study which was done in Masjed Soleiman County. All the patients which were referred to Masjed Soleyman health services centers were inquired,

examined, cured and finally followed. Subsequently, a researcher-made questionnaire including epidemiologicand demographic data (such as, sex, age, residency, site of sting, month, season and body color of scorpion) were completed for the scorpion stings. All parameters were gathered and recorded by a physician in a questionnaire. Then, these information were analyzed in SPSS software by using descriptive statistics.

RESULTS

Table 1-7 present epidemiological aspects of cases stung by scorpions in Masjed Soleyman. Information were collected from 11169 sting cases registered over period the two years of study. The incidence rates were calculated 24.2 and 29.2 per 1000 population in 2006 and 2007, respectively while the average incidence rate was 26.7 per 1000 inhabitants. Additionally, 5055 and 6114 cases were found in the years of 2006 and 2007, respectively. Stings were distributed nip-and-tuck equally between genders, the male-to-female ratio was 1.2:1. Among the 11169 studied patients, 6078 men (54.4%) and 5091 women (45.6%) were registered (Table 1). There was an unequal distribution of cases between urban and rural areas. Most cases occurred in urban areas (79.6%, n = 8896) (Table 2). Moreover, when the scorpion color was observed, the yellow scorpion was simply distinguished by the most of cases (50.8%) (Table 3). Furthermore, most patients

Table 1: Distribution of scorpion sting cases by sex in Masjed Soleyman County, SW Iran (during 2006-2007)

	Year					
	2006		2007		Total	
Sex	No.	%	No.	%	No.	%
Male	2769	54.8	3309	54.1	6078	54.4
Female	2286	45.2	2805	45.9	5091	45.6
Total	5055	100.0	6114	100.0	11169	100.0

Table 2: Distribution of scorpion sting cases by sting place in Masjed Soleyman County, SW Iran (during 2006-2007)

	Year					
	2006		2007		Total	
Sting place	No.	%	No.	%	No.	%
Town	4536	89.7	4360	71.3	8896	79.6
Village	519	10.3	1754	28.7	2273	20.4
Total	5055	100.0	6114	100.0	11169	100.0

Table 3: Distribution of scorpion sting cases by scorpion body color in Masjed Soleyman County, SW Iran (during 2006-2007)

	Year					
	2006		2007		Total	
Scorpion color	No.	%	No.	%	No.	%
Black	428	8.5	747	12.3	1175	10.5
Yellow	2784	55.1	2894	47.5	5678	50.8
Others	1843	36.4	2473	40.2	4316	38.7
Total	5055	100.0	6114	100.0	11169	100.0

happened within the summer and spring periods (70.6%) (Table 4), predominantly from April to July, with a peak in May (14.4%) and June (13.2%) (Table 5). Table 6 shows several characteristics of the studied stings which maximum commonly affected extremities (76.3%). The highest sting prevalence, 32 and 26.8%, afflicted individuals between 25-44 and 15-24 years, respectively (Table 7).

Table 4: Distribution of scorpion sting cases by season in Masjed Soleyman County, SW Iran (during 2006-2007)

	Year					
	2006		2007		Total	
Season	No.	%	No.	%	No.	%
Spring	1686	33.4	2426	39.7	4112	36.8
Summer	1727	34.2	2044	33.4	3771	33.8
Autumn	1210	23.9	1239	20.3	2449	21.9
Winter	432	8.5	405	6.6	837	7.5
Total	5055	100.0	6114	100.0	11169	100.0

Table 5: Distribution of scorpion sting cases by month in Masjed Soleymn County, SW Iran (during 2006-2007)

	Year					
	2006		2007		Total	
Month	No.	%	No.	%	No.	%
April	489	9.7	547	8.9	1036	9.3
May	562	11.1	1042	17.0	1604	14.4
June	635	12.6	837	13.7	1472	13.2
July	510	10.1	600	9.8	1110	9.9
August	643	12.7	721	11.8	1364	12.2
September	574	11.3	723	11.8	1297	11.6
October	659	13.0	693	11.3	1352	12.1
November	436	8.6	377	6.1	813	7.3
December	115	2.3	169	2.7	284	2.5
January	60	1.2	65	1.1	125	1.1
February	120	2.4	93	1.5	213	1.9
March	252	5.0	247	4.0	499	4.5
Total	5055	100.0	6114	100.0	11169	100.0

Table 6: Distribution of scorpion sting cases by sting site in Masjed Soleyman County, SW Iran (during 2006-2007)

	Year					
	2006		2007		Total	
Sting site	No.	%	No.	%	No.	%
Foot	2006	39.7	2381	39.0	4387	39.3
Hand	1823	36.1	2313	37.8	4136	37.0
Head and trunk	1226	24.2	1420	23.2	2646	23.7
Total	5055	100.0	6114	100.0	11169	100.0

Table 7: Distribution of scorpion sting cases by age group in Masjed Soleyman County, SW Iran (during 2006-2007)

	Year					
	2006		2007		Total	
Age group	No.	%	No.	%	No.	%
0-4	411	8.1	443	7.2	854	7.6
5-9	332	6.5	378	6.1	710	6.4
10-14	416	8.4	549	8.9	965	8.6
15-24	1388	27.5	1611	26.5	2999	26.8
25-44	1647	32.5	1920	31.5	3567	32.0
>44	861	17.0	1213	19.8	2074	18.6
Total	5055	100.0	6114	100.0	11169	100.0

DISCUSSION

Scorpion accidents are the most significant cause of venomous arthropods envenomation and are liable for pediatric mortality and important morbidity in numerous portions of Central and Latin America, Asia, Middle East in addition in northern and southern Africa (Abourazzak *et al*., 2009). Besides, scorpion sting is a main common health problem, chiefly in children, in Khuzestan Province, southwestern of Iran (Mirdehghan and Motlagh, 2001; Shahbazzadeh *et al*., 2009). It has been reported that at least 42,500 scorpion stingsand approximately 19.5 deaths take place each year (Dehghani and Fathi, 2012). In Iran, there are at least seven species of scorpions responsible for hard envenoming and *Hemiscorpius lepturus* (Hemiscorpionidae) is the most medically important scorpion (Zarei *et al*., 2009; Rafizadeh *et al*., 2013) and others belong to the Buthidae family. Scorpion envenomation is specified by different signs such as sweating, pain, hypertension and fever. The venom of Buthidae has neurotoxic complications and *H. lepturus* with dermal reaction and hemolytic effect (hematuria, in most severe cases) (Mirdehghan and Motlagh, 2001; Shahbazzadeh *et al*., 2009; Radmanesh, 1998).

In this study, the total number of scorpion stings reported in Masjed Soleyman county over the two year period was 11169. Different studies have shown varied age distribution for scorpion stings. In the current study, the most cases saw in the age groups 25-44 and 15-24 years old. This is because these age groups are more active in the area. Adiguzel *et al*. (2007) in Turkey' study reported that there were more stings among children 9-15 years old (54.1%). He attributed this great incidence of cases among children to their inquisitive nature and risk-taking behavior. Osnaya-Romero *et al*. (2001) in Mexico's research observed that infants 1-3 years old were more frequently affected than other age groups. Kassiri *et al*. (2013) in his study showed that the age group of 15-24 years old had the most frequency of stung cases (27.85%), in Baghmalek county, southwestern Iran. In another research, Kassiri *et al*. (2012b) reported that the majority of victims were between 15-24 years old (37.8%).

In the present study, lower and upper limbs were more frequently injured than other body parts that is not very various from those reported by other researchers (Kassiri *et al*., 2012a, b, 2013; Vazirianzadeh *et al*., 2013; Abourazzak *et al*., 2009; Al-Sadoon and Jarrar, 2003; Gordillo *et al*., 2000). These results can be because of the reality that exposed extremities are often used in greatest works. Furthermore, stings may happen in the neck and head due to motions make scorpions draw back; when the person is asleep. Our study showed that men had more contact with scorpions than women (54.4 vs. 45.6%). Although, there was no notice able disparity in cases

between the two genders. Several investigators mentioned the same findings to more activity indicated by males, accordingly male cases prevailed over female victims (Kassiri *et al*., 2012a; Vazirianzadeh *et al*., 2013; Rafizadeh *et al*., 2013; Al-Sadoon and Jarrar, 2003; Pardal *et al*., 2003) while other authors reported that women assigned for the most of cases (Kassiri *et al*., 2012b, 2013; Forrester and Stanley, 2004). Our survey also showed that the most of victims happen in the months of May and June. Similar other studies, the current study indicates that the injury frequency enhances in the hot months around the world (Kassiri *et al*., 2012a, b, 2013; Shahbazzadeh *et al*., 2009; Rafizadeh *et al*., 2013; Al-Sadoon and Jarrar, 2003; Ozkan and Kat, 2005). In this study, frequencies of most common scorpions that had stung the patients were 50.8 and 10.5%, for yellow and black scorpions. This finding is in accordance with the findings of other works, that indicated more frequent yellow scorpions contacts in comparison to black ones (Kassiri *et al*., 2012b, 2013; Rafizadeh *et al*., 2013).

CONCLUSION

According to our findings, scorpion stings are considered a public health challenge in Masjed Soleyman county. Hence, it is required to recommend educational programs for personal protection, until impede conceivable hurts from these animals, especially for the 15-24 and 25-44 age groups that settle in urban regions. Also the towns people should use appropriate beds to sleep in the outdoors or indoors.

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