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SCORPION ENVENOMATION IN BAGH-E MALEK, IRAN –A 5 YEAR STUDY

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ABSTRACT

Scorpionism is a major health problem in many tropical countries including Iran. The aim of this study was to describe the epidemiological and demographic information among whom stung by scorpions in Bagh-E Malek, Iran. In this retrospective cross-sectional study the information were gathered through evaluation of the records of stung patients referring to Shahid Tabatabai hospital of Bagh-E Malek April 2008 to April 2012. A total of 132 cases stung by scorpion were recorded including 3115 males (43%) and 4121 females (57%).Approximately 42.1 percent of the sting cases occurred in the summer followed by spring with 35.9% of stings. About 59.8% of stings happened in people by the age of 15-44 years old. Most of the stings happened in exposed extremities (78.5%) with most of it in upper limbs (41.8%). The scorpions' species were unknown but 60.4% of them were yellow, 34.0% black and 5.6% were "other colors". Since the highest rate of scorpionism cases were reported in rural areas (74.2%), it is suggested that the main focus should be considered for education of rural people, especially women who play a major role in the family. Additionally, evaluation of residential houses and surrounding environment and giving information on method of cleaning up the environment from the equipment and the factors from which scorpion may use as shelter, can also be effective in reducing the incidence of Scorpionism.

Keywords: Scorpion sting; Epidemiology; Bagh-E Malek; Iran

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INTRODUCTION

Scorpions (Arthropods: Arachnida)are amedically important arthropod which has beendistributed around the world, but usually they are abundant in the warm and dry weather conditions(1). So far, about 1,500 species of scorpions have been reported from all over the world of which only 30 species are medically important (2-5).According to the scientific reports, about 51 species of scorpions have been reported from Iran that belong to four families (Buthidae, Scorpionidae, Hemiscorpiidae, and Diplocentridae) and areclassified in 14 genera.These Scorpionscause 40,000 to 50,000Scorpionisms each yearand approximately 19 deaths happen in Iran which is the highest reported in the Middle East (6-9). The main Scorpionisms in Iran are caused by 3 scorpions including *Mesobuthus eupeus* (CL Koch, 1839), *Androctonus crassicauda* (Olivier, 1807), and *Hemiscorpius lepturus* (Peters, 1861), and the scorpions of*Hottentota saulcyi* (Simon, 1880), *Odontobuthus doriae* (Thorell, 1876), *Mesobuthus caucasicaus* (Nordmann, 1840) and *Apistobuthus pterygosercus* (Finnegan, 1932) are in the next ranks (2, 10).

In a retrospective study by Rahman et al.which was conducted in 2015on 1922 cases of scorpionism in Ahvaz (Khuzestan), it was determined that 56.86% of the reported people were female and the rest were male while from this population 31.94% were stungby *Hemiscorpius lepturus* and others were stung by other scorpions(1). In a retrospective study conducted by Kasiri et al (2015) in Fars,also 58.6% of stung people were women that were the highest rate (2).

Most of scorpionism and the caused death have been reported inKhuzestan province in southwestern Iran (1563 per 100000 people)and the cities of Masjed Soleiman, Rāmhormoz, izeh, Susa, and Bagh-E malek were respectively ranked as first to fifth in this field(11). Since in the studied city of this research a greater percentage of the population were living in rural areas and also due to the mountainous terrain and climate of the city, dangerous scorpions *Hemiscorpius lepturus*is certainly present in this region, therefore, it seemed thatdemographic and epidemiological data of stung people in this area is neededto carry out targeted and preventive measures. For this reason, the present study was conducted to assess these characteristics in 7236stungpeople in this city over a period of 5 years.

MATERIALS AND METHODS:

The present study is a retrospective cross-sectional study,which was conducted during a 5-year period from April 2008 to March 2012 and through evaluation of the records of scorpionism patients referring to Shahid Tabatabai hospital of Bagh-E Malek. In terms of

geographical location,Bagh-E Malek city (31 ° 31 '23 "N, 49 ° 53' 10" E) is located in the East Khuzestan province (Figure A), with altitude above sea as 917m and the population of 20844 people according to the 2006 census. The required data for the research was collected using a questionnaire which is completed for each patient in the hospital.The questionnaire consisted of demographic information, gender, geographic location of residence,the interval between the stingand serum receiving, serum injection method (intramuscular or intravenous) and the situation of injured person after serum injection.All data was analyzed using SPSS software and results less than0.05 ($P<0.05$) was considered as significant.

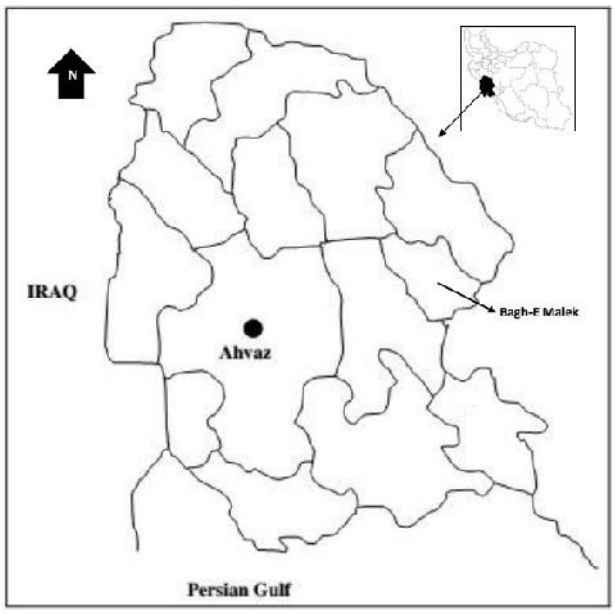

Fig.1. Geographical location of the study site in Khuzestan province of Iran

RESULTS

The results of this study are reported based on 7236 stung peopole(57% female and 43% male) referring to Shahid Tabatabayi Hospital between the years from 2008 till 2012 in Baghmalek city.

Figure2 shows that statistics of scorpionism in 2008 and 2012 years is almost the same; however, the largest number of scorpionism has occurred in 2012 (23% of bitten people) and the lowest in 2011 (4.17% ofstung people).Time dispersion ofscorpionism in the area clearly shows that the number of bites is subject to seasonal changes so that the greatest number of stung people in the summer (42.1%), especially in August (15.5%) and then in June (15.3%) and July (15%) and the lowest number have been observedin winter (4%) and in January and March each with 2.1% (Table1).

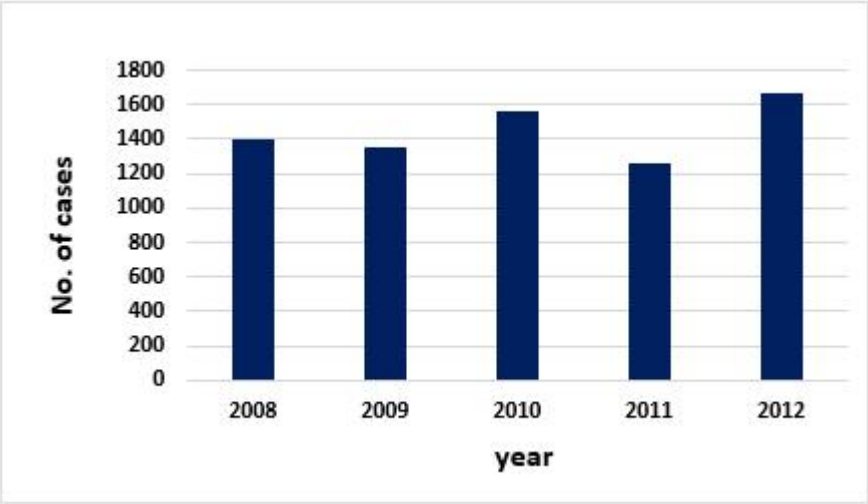

Fig.2. Annual trend of patients with scorpion stings in Bagh-E Malek during 2008 to 2012

Table1. Seasonal frequency of stings in patients with scorpion stings in Bagh-E Malek during 2008 to 2012

season	No.	%	Month	No.	%
Spring	2599	35.9	**April**	537	7.4
			May	952	13.2
			June	1110	15.3
Summer	3045	42.1	**July**	1083	15.0
			August	1115	15.4
			September	847	11.7
Autumn	1301	18.0	**October**	723	10.0
			November	472	6.5
			December	106	1.5
winter	291	4.0	**January**	84	1.2
			February	119	1.6
			March	88	1.2

Table 2 shows that most stungpeople are in the age group of15-44 years (59.8%), 1724 patients in the age group of15- 24 years, 1588 people in the age group of25- 34 years, and 1020 patients in the age group of 34-44 years).

Table 2. The epidemiological variables in patients with scorpion stings in Bagh-E Malek during 2008 to 2012

variable	Number of patients (n:7236)	%
Sex		
Female	4121	57
Male	3115	43
Age group (years)		
0-14	1418	19.6
15-44	4332	59.8
>45	1486	20.6
Site of sting		
Upper extremity	3027	41.8
Lower extremity	2657	36.7
Head and trunk	1552	21.4
Type of scorpions		
Yellow	4370	60.4
Black	2458	34.0
Others	408	5.6
Geographical distribution		
Urban	1865	25.8
Rural	5371	74.2

The results showed that most stung people lived in rural areas(74.2%). Analysis of the collected information demonstrated that 24.4% of women and 27.6% of men are urban residents while 75.6% of women and 72.4% of men are rural residents and this difference was statistically significant (P=0.002). Additionally, there was a statistically significant difference between the residence locations (P=0.000) so that most people had a history of being stung in the rural areas.

Most of sting site in body were in the arms (41.8%) and the lowest number were the head and trunk (21.4%).

According to Table3,51.8% of examined people had received serum for treatment and none of them showed the shock caused by serum. The applied anti-Venom was injected intramuscularly for 86.09%and the rest intravenously; the results of analysis revealed that there was statistically significant difference between the percentage of females (54.1%) and men (48.7%) who received serum (p=0.000). Additionally there was a significant difference between men and women in terms of the interval between getting stung and serum receiving(P=0.000) so that 41.1% of men and 44.7% of women have received serum within 0-6 hours after being stung.

Table 3: The frequency of different variables regarding to antiserum reception in patients with scorpion stings in Bagh-E Malek during 2008 to 2012

	No.	%
Antivenom receipt	3748	51.8
Antivenom previous receipt	87	1.2
Antivenom allergy	0	0
Elapsed time between sting and reciening antivenom (h)		
<6	3122	83.3
6-12	53	1.4
>12	573	15.3
Route of injection		
IV	525	14
IM	3223	86

During the 5-year study,from 7236 stungpeople99.96% of people improved and only 3 deaths (0.04%) were reportedwhich all were women in the age groups including under 15 years old (one death), 15- 44 years (one person), and greater than 44 years (one death); and from deceased persons, onewas urban resident and two others were rural residents.Studying the relationship between gender of stung people and color of Scorpions,it was found that 60.4% of patients (60.8%of women and 59.8% of men) had been stung by yellow scorpions;33.97% of patients (33% of women and 3.35% of men) by black scorpions and the rest of them had been stungby ‘’other scorpions’’ while the difference was statistically significant (P=0.013).

DISCUSSION

Given that approximately 1230000 scorpionism and 3250 leading death have been occurredall over the world and with the knowledge that treatment of scorpionism is complexespecially in terms of the use of anti-venom and required systemic treatments, therefore,scorpionism is one of the major public health problems(1, 2, 6, 12).

In the present study most stungpeople by scorpions were female (57% vs. 43% men).There are a lot of studies about scorpionism that have similar results (1, 11, 13-15).However, in this regard, a number of studied can be found that have achieved different results with the results of the present research and reported that most of the stung people by scorpions were men (6, 16-20).

In the present study, most people were in the age group of15-44 years which suggests that most of the stung people were young people and work force of the community, while similar studies confirmedour findings that represent thatthe active force of our communities are at risk(6, 13, 16-19, 21).

The study of Shahbazzadeh et al 2009(11) shows that 90% of reportshave been presented in summer (from April to October).In this study it was observed that stings occur throughout the year but the majority of scorpionismoccur in the summer (42%).This study and many other studies confirm these results that the majority of stings are in June, July and August(6, 13-16, 18, 22)but there are also studies that report more numbers of stings in the rainy seasons especially May (7, 20, 21).

The results of this study demonstrated that the majority ofstung subjects were rural residents (74.2%).Vezirian Zadeh et al., 2013(17) and Karami et al. 2013(13)confirmed these results in their study; however, the reported results in studies of Kasiri et al. 2014(6)and Requzigel et al 2014(19) revealed more reports in urban areas.

The collected data showed that most stings occurred in the upper limbs,here we can find studies with similar results(6, 11, 14, 20) but there are studies that their results contradict the mentioned result and reported that most stings were in the lower limbs and organs(16, 17).

The method of administration of applied Venom for treatment of stung people by scorpions was mostly intramuscularly (86.09%), Karami et al. 2013 (13)and Vezirian Zadeh et al 2013(17)also found similar results but in the study of Kasiriet al. 2014(6) the major anti-venom administration method has been reported as IV method.

Although the studied subjects could not identify the genus and species of attacker scorpions; however evaluations revealed that the majority of people were stung by yellow scorpions.These results are consistent with results of other studies conducted in Iran in which

major attacker were reported as yellow scorpions(1, 11, 13) but in two studies conducted in Turkey(15) and Saudi Arabia(18) the attacker scorpions were reported as Black Scorpions; this difference may be due to different scorpions of every region.

In general, and based on the results obtained from this study, programs could be planned to educate people at risk to avoid happening the stings.Due to the frequency of stings in the rural than urban areas, the main focus should be considered for education of rural people, especially women who play a major role in the family. Additionally, evaluation of residential houses and surrounding environment and giving information on method of cleaning up the environment from the equipment and the factors from which scorpion may use as shelter, can also be effective in reducing the incidence of Scorpionism.

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Conflict of interest:

The authors have no conflict of interest to disclose.

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