

Scorpion Sting in Izeh, Iran: An Epidemiological Study During 2009-2011

Ne'matollah Maghsoodi¹, Babak Vazirianzadeh^{2,*} and Arash Salahshoor¹

¹Health Centre of Izeh, Ahvaz Jundishapur University of Medical Sciences, Izeh, Iran

²Infectious and Tropical Diseases Research Center, Health Research Institute" and "Medical Entomology and Vector Control Department, Public Health Faculty", Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Abstract: *Background:* Izeh is one of the counties of Khuzestan province that its people suffer from scorpion sting. So according to the high prevalence of scorpion sting in this area and the lack of a reduce cases of scorpion stings, timely treatment and prevention of mortality and morbidity resulting from this phenomenon using results of the current epidemiological investigation.

Methods: This cross-sectional and retrospective study has been conducted based on statistics of scorpion sting of Izeh Health Center during 2009-2011. The data including: age, sex, season and month of stings, location of event (urban or rural), location and time of the sting, the stung organ and scorpion species were collected and recorded in the official forms and transformed into the tables and graphs for presentation. The species of scorpions were recognized using Iranian scorpion key.

Results: During 2009 to 2011 a total of 5804 cases of scorpion sting referred to health and medicine centers. Most cases of scorpion sting were females (55.53%). The age range was 15- 24 year olds and the highest incidence rate of scorpion sting was on August. Totally 6 species of scorpions were recognized during the current study and *Androctonus crassicauda* was the most frequent species which caused the scorpion sting. One of the most important results of the present study was to report *Compsobuthus matthiensi* as the 2nd dominant scorpion sting cause and *Mesobuthus eupeus* as the least cause of scorpion sting in the region, in contrast to other parts of Khuzestan which this species has been reported as the most frequent cause of scorpion sting in Khuzestan province.

Conclusions: Since there is a large number of cases with a history of previous scorpion stings, it appears we can reduce the incidence of this occurrence using education of preventing and control ways from this phenomenon to persons referred to treatment in the studied area and repeat those in similar regions with high range of scorpion sting. Furthermore with focus on the educational activities in the warm seasons, when is the peak time of scorpion activity it will be more effective in reducing this phenomenon.

Keywords: Scorpionism prevalence, south west Iran.

INTRODUCTION

Scorpions are arthropods that would have been living from the late Silurian period i.e. approximately 330 million years ago [1-2] and because of the poisonous stings of some species which is lethal to human, are well known from ancient times and have always been a cause of fear, hatred and death to a large group of human throughout the history [2-3].

Scorpion sting is one of the major health problems of developing tropical and sub tropical countries that cause wide effects on human, including from severe local skin reactions to create a nervous, cardiovascular and respiratory problems and sometimes death. This leads to heavy economic costs and psychological-psychiatric injuries to society. The dispersion of the scorpions in tropical and subtropical regions is higher

than the other regions. About 50 species of 1500 known species of Scorpion have the special medical and health importance [4-5].

There are nearly 40000 scorpion sting cases in a year in Iran and the number of recorded deaths are between 14 to 29 people which the most of them have been related to three provinces: Khuzestan, Kohgiluyeh and Bueyerahmad, and Ilam. The scorpion sting cases in the three mentioned provinces, in 2005, were respectively 1563, 1290 and 8260 cases in one hundred thousand people that a total 60% of cases have been related to Khuzestan Province [6].

According to the Disease Management Center's report during the years of the 2001 to 2005 respectively 37666, 38259, 37535, 36806 and 42085 cases of the scorpion sting have happened in the country [6].

In addition, according to another report the cases of death due to scorpion sting in all regions of Iran have been reported, but about 75% happened in the provinces of Khuzestan, Sistan and Baluchistan,

*Address correspondence to this author at the Infectious and Tropical Diseases Research Center, Health Research Institute" and "Medical Entomology and Vector Control Department, Public Health Faculty", Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; Tel: +986133738282; E-mail: babakvazir@yahoo.co.uk

Kerman, and Hormozgan [7]. However, 82% of the reported deaths due to scorpion sting happened in Khuzestan Province. This means that mortality rate by Khuzestan's scorpions is higher than other provinces [7-8]

The status of the scorpion sting in various regions and countries is different according to the economic and social situation, lifestyle, housing conditions, health services and the quality of each geographical region [9-10].

With regard to the different type of climate and weather in Iran, considering the fauna of scorpions in Iran is very rich [11]. Iran is among the countries where a lot of species of scorpion especially a variety of dangerous has been reported [1, 11-12].

Iranian scorpion fauna consists of 44 named species from 23 genera in 3 families, Buthidae, Scorpionidae and Hemiscorpiidae. Khuzestan has 19 of these species [1,13-20].

Khuzestan province is well-known for its scorpions and scorpionism among the Iranian provinces but there is little knowledge about the subject in some areas such as Izeh [21-23].

Izeh (31° 50' 3" N, 49° 52' 2" E) is one of the counties of Khuzestan province that its people suffer from scorpion sting. The annual average rainfall is 725mm and the warmest and coldest months are 45.5°C and 1.15°C are in August and February, respectively. So according to the high prevalence of scorpion sting in this area and the lack of a related comprehensive study carried out in the field, it seems that we can achieve solutions to reduce cases of scorpion stings, timely treatment and prevention of mortality and morbidity resulting from this phenomenon using results of the current epidemiological investigation.

METHODS

This cross-sectional and retrospective study has been conducted based on statistics of scorpion sting of Izeh Health Center during 2009-2011. Scorpions were delivered by the stung people and were identified in Entomology Unit of Izeh Health Centre using Iranian key of scorpions.¹ We recognized the scorpions by showing our collections to the victims when they did not bring the scorpions as a model. The data including: age, sex, season and month of stings, location of event (urban or rural), location and time of the sting, the

stung organ and scorpion species were collected and recorded in the official forms. Obtained data were presented descriptively in the form of tables and graphs using SPSS version 18.

RESULTS

From the beginning of April 2009 until March 2011 a total of 5804 cases of stung people by a scorpion who referred to the City Health Center of Izeh have been recorded that 1903 (32.78%), 1835 (31.61%), and 2066 (35.60%) cases were related to 2009 and 2010, and 2011, respectively.

A total of 53.55% of the victims were female and 47.44% of them were male. The most frequent of scorpion stung people were in the range of 15-24 year old. The frequencies of other ages of scorpion stung people have been shown in Table 1.

Table 1: Frequency Distribution of Scorpion Sting by Age in the County of Izeh (2009-2011)

Age	Number	Percentage
0-4	338	5.82
5-9	371	6.40
10-14	501	8.63
15-24	1372	23.63
25-34	1246	21.47
35-55	781	13.46
45-54	567	9.76
55-64	367	6.32
> 65	261	4.50
Total	5804	100

A total of 84.30% of scorpion stings (4893 cases) and 15.7% (911 cases) happened respectively in the limbs, head and trunk area. Out of 5804 cases, 760 cases of scorpion stung people were with a history of stings.

A total of 2372 (40.87%) scorpion stings were done by *Androctonus crassicauda* as the most frequent data followed by *Compsobuthus matthiensi* (1159-19.97%), *Hemiscorpius lepturus* (1044-17.99%), *Hottentotta saulcyi* (551-9.49%), *H.schach* (322-5.55%), *Mesobuthus eupeus* (241-4.15%) and *Scorpio maurus* (115-1.98%). The original pictures of the scorpions are presented in Figure 1A-G.

A total of 2693 cases (46.40%) and 3111 cases (53.60%) of scorpion stung people were living in the

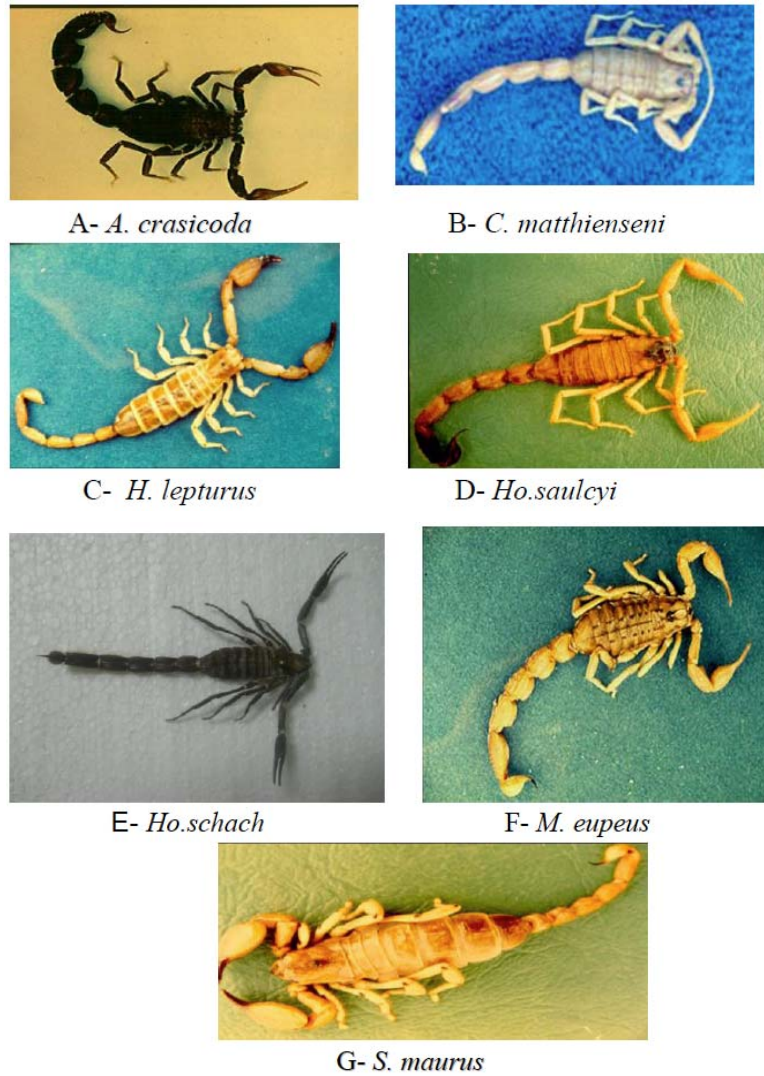


Figure 1: Collected of Scorpion sting in the county of Izeh (2009-2011). The pictures all are original of correspondent address collection.

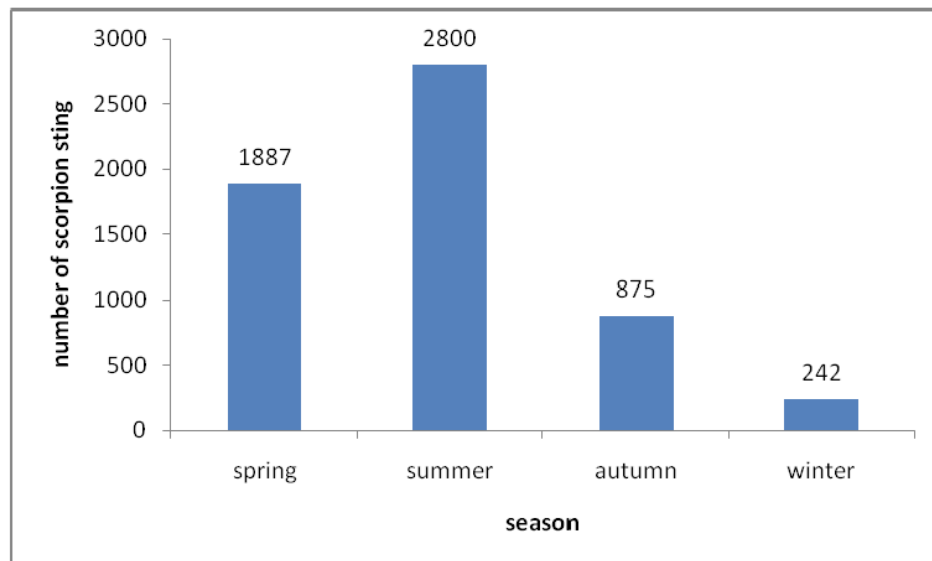


Figure 2: Distribution of cases of Scorpion sting by season in the county of Izeh (2009-2011).

city and villages, respectively. The highest scorpion stings (3871 cases) were happened in the night. In this study the most frequent of scorpion stings were happened in the summer (2800 cases), and the maximum cases (1006 cases) were related to the August (Figure 2).

DISCUSSION

The status of the Scorpion sting in various countries and regions is different according to the economic and social situation, lifestyle, housing conditions, health service quality and the species of each geographical region [8].

The results of our study showed a difference between frequency of males (47.8%) and females (52.2%) among the patients who were referred to the health centers of Izeh with scorpion stings. It means the females were at greater risk of scorpion stings than males in this area. This rate is accordance with the results of Vazirianzadeh *et al.* (2008) [23] for Khuzestan and Pour rezaee *et al.* (2010) [24] for Ramshir (in the south east of Khuzestan). Our results are not in accordance with the results in Saudi Arabia [25-26] and Ramhormoz (in the east of Khuzestan) who reported that scorpion stings were greater in the males than in the females [27]. However, our results is not consistent with the results of in Kashan (central of Iran); that they reported that the percentages the epidemiology of scorpion sting is related to the sex of the victims. It varies according to the year and location of different studies [28]. However, it may take cultural factors like different activities among females and males [27-28].

The current study expressed that summer with 48.24% of cases was the most scorpion-sting season. This result is in accordance with the results of several studies in different countries [25-26, 29-32]. However, it is not consistent with the results of a similar study in Lordegan in the south west of Iran with different climate [31]. The surveys in Ramhormoz area during 2006-2010 explained that there was a consistency regarding the dominance of scorpion stings in the summers [33]. Data collected in the Lordegan study indicated that the highest incidence of scorpion sting cases in 2006 took place in spring (49.72%) [34].

These differences were presumably due to the variation of geographical, climatologic and species distributions. These authors have reported that 49.7–93.4% of scorpion sting cases occurred in summer.

There are two reasons behind this fact: 1) scorpions are ectothermal animals; therefore, their activities increase with the increase of the environmental temperature. 2) It is assumed that the warmer seasons are the time of reproduction for scorpions [35-36]. The important point is that the scorpions stings happen entire a year.

The findings of this study showed that the most cases of the stings were related to two species of *Androctonus crassicauda* and the *Compsobuthus matthiesseni* of and two least scorpion sting causes to species of *Mesobuthus eupeus* and *Scorpio maurus*. Being *C. matthiesseni* as the second most frequent cause of scorpion stings in the region and so *M. eupeus* as the the second least frequent cause of scorpion stings in the region are in contrast to other areas in Khuzestan Province. The other researchers have indicated that *M. eupeus* scorpion was as the most frequent or the second one cause of scorpion stings in the different parts of Khuzestan [23,30,37].

Mozaffari *et al.* (2013) [38] have reported different results to our current study from points of frequency and composition of their collected species in Ilam. During their study seven scorpion species were found: *Hottentotta (Buthotus) saulcyi* (28.95%), *A. crassicauda* (25.44%), *Scorpio maurus* (18.42%), *M. eupeus* (10.09%), *H. lepturus* (8.33%), *C. matthiesseni* (5.70%) and *Odontobuthus doriae* (3.70%). They have concluded that the scorpion community in Ilam isn't stable. This indicates that different composition of scorpion species in the different area should be a role.

Androctonus crassicauda is one of the most venomous species in the Middle East and North Africa. They are found throughout the semi-arid and arid regions with a moderate toward big sized and brown-black and black scorpions, attaining lengths of 10 cm. This species are distributed geographically through Iran (Figure 1A). It is reported 28.7% of all cases of scorpion stings in Khuzestan province were caused by *A. crassicauda* and it is different from our results (40.87%) which were locally [39].

Compsobuthus matthiesseni (Buthidae) is a light yellow scorpion in color and immaculate (free of spots) except for black pigment around median and lateral eyes and also half of IV and V metasomal segments with 4–5 cm in long (Figure 1B). Its habitats are the warm and moist places which ornamented with the cracks of stones and trees. Farzanpay reported that envenoming by this scorpion leads to hematuria. This

scorpion is widely distributed in Khuzestan. Dehghani and colleagues showed that *C. matthiesseni* was responsible for 20.6% of all cases of scorpion stings in Khuzestan province, therefore, this is a consistency between our results (19.97%) and Dehghani *et al.* results [40].

Hemiscorpius lepturus (Hemiscorpiidae) (Figure 1C) is known as Gadim scorpion (locality name in Khuzestan province). The whole body of this scorpion is yellowish and only its hands (end of pedipalp segment) are dark brown. This species has a sexual dimorphism say the length of male (6-6.5 cm) is longer than female (5-5.5cm). It is the most dangerous species in Iran (Radmanesh, 1990a), where it is responsible for 67% of scorpion sting fatalities in Iran. The results of the current study showed that it is included 16.99 % of scorpion stings in Izeh area, N E of Khuzestan [40].

Mesobuthus eupeus (Buthidae), also known as the marked yellow scorpion, is yellow to orange with dark longitudinal spots on the abdomen and 5–6 cm length (Figure 1D). This species is considered as one of the most common species throughout Iran. It lives in different areas and because is a Synanthropy or anthropophilous (close relationship with man) able to take shelter under stones, rocks, and litter or hide under the bark of trees. Sting by *M. eupeus* causes moderate to severe pain at the sting site for a few hours before appearance of any systemic sign of envenoming [40].

Hottentotta saulcyi (Buthidae), also known as black tail scorpion in Iran, measures 12–13 cm in length. It's color is yellow to yellowish green or brown, except black anterior part of carapace, chelicers, telson and fifth metasomal segment. Ventral carinae on third and fourth metasomal segments may also be black (Figure 1E). Dehghani showed that 3.35% of all cases of scorpion stings were caused by *H. saulcyi* in Khuzestan province [40].

Hottentotta schach at 13 cm is the largest scorpion species in Iran (Figure 1F). Since all parts of its body such as pedipalps, dorsal surface of mesosoma, legs, lateral and ventral surfaces of metasomal segments, and vesicle densely are covered by hair, it is known as the hairy black scorpion. It normally is found in Khuzestan and Fars provinces of Iran. Although Dehghani *et al.* showed that 0.25% of all cases of scorpion stings were caused by *H. schach* in Khuzestan province but there were not enough medical

records available to elucidate the clinical signs of envenoming by this scorpion [40].

Scorpio maurus of Scorpionidae family is a burrowing species in Iran. Its appearance is similar to *H. lepturus* without sexual dimorphism and end of its pedipalp leads to very oval and wide hand. It is distinguishable from by a definite sting (Figure 1G). Only 0.4% of scorpion stings are due to this species [23]. There is no evidence of its medical importance in Iran [40].

It is clear that 6 of 7 reported species in Izeh area are definite medical important and except to *H. lepturus* and *S. maurus* which are belonged to Hemiscorpiidae and Scorpionidae families, respectively, the other reported scorpion species in the present study belonged to Buthidae family [21-24].

The results of this study showed that the most frequent cases of scorpion sting have occurred at the ages of 15-24 which is the active age of the population. Therefore, if the scorpion sting cause death or long term hospitalization of people in this age group, can cause the loss of useful life of the working group of the society and this is a considerable losses to the community's economy. This agrees with the findings in Kashan, central of Iran [28], Ahvaz, south west of Iran [39] and north-west of Khuzestzn [12].

However, results of the current study explained that scorpionism in Izeh is a rural phenomenon but there is not a role, because in another area like Ahvaz, capital of Khuzestan, is an urban situation. Presumably, this is due to the different texture of buildings between rural and urban areas in Izeh. The structure materials of buildings in rural areas of Izeh are from stones and are not modern material. However, Izeh area is near to Bghmalek. The latter is assumed as one breeding place of scorpions in Khuzestan. Bghmalek area is a professional job place for hunters of scorpions.

Furthermore the results of the study showed that a total 760 of 5804 Scorpion sting cases were with a history of scorpion stings. We can extract two conclusions of this fact: firstly the scorpion stings in this area are an endemic health problem and the second which has come from the high frequency of scorpion stings in the limbs which easily are exposed by scorpion stings.

CONCLUSION

Results of the current study indicated that the scorpion sting demographic data in Izeh is different

from some areas and more and less similar to some other areas. Therefore, it is concluded that scorpionism is a relative phenomenon and is not a steady event and is different from one area to other areas. This fact has been reflected in the composition of scorpion stings species in Izeh which was expressed in the scorpion stings by *C. matthiesseni* as the second rank of high frequency of it and *M. eupeus* as one of the least of it.

Also, because there are a lot of people with the history of previous stings, training ways of prevention and decreasing the scorpion stings to the Izeh residences can be an effective role in reducing the incidence of this occurrence in the future.

ACKNOWLEDGEMENTS

The present article is as a result of cooperation of personnel working in the emergency department of the Shohada Hospital in Izeh County, personnel Entomology units from Izeh Health Center and all personnel health units, urban and rural health centers and especially social workers in health house in this county. Therefore, we thank these persons for their sincere contribution.

REFERENCES

- [1] Chomaili B, Moghisi A, Zare-Mirakabadi A. Guide line in treatment of Scorpion bite, editor. Tehran: Ministry of Health Publication Center 2008 [In Persian].
- [2] Farzanpay R. Scorpion knowledge. Iran Academic Press, Tehran 1987.
- [3] Guidline in the Management of Venomous Animals Bite and Sting, Ministry of Health and Kerman University of Medical Sciences 2006. [In Persian].
- [4] Prophylaxis of snake and scorpion bite in Islamic republic of Iran. 2005-2006 Ministry of Health Education CfcdMoHaM 2006 [In Persian].
- [5] Ahmadzadeh A, Ahmadzadeh A. Scorpion Sting Syndrome and Acute Kidney Injury in Southwestern Iran. *Sci Med J* 2010; 9(4): 413-425.
- [6] Azhang N, Moghasi A. Investigation of report of snake and scorpion stings in 2001-2005 (5-year statistics). Tehran: management Center of fighting with disease 2006; pp. 1-29.
- [7] Hossininasab A, Alidoosti K, Torabinejad MH. An epidemiologic study on scorpion sting and its effective factors in south of Kerman province, Iran. *Journal of Medical Council of Islamic Republic of IRAN* 2009; 27(3): 295-30. [In Persian].
- [8] Labbaf Qassemi R. Status of scorpion sting in Iran and ways for preventing it. *Journal of Social Workers, the Second Number* 2008; 10(2): 32-35.
- [9] Keegan HL. Scorpions of Medical importance. University Press of Mississippi 1980; 1: 1-140.
- [10] Polis GA. Seasonal patterns and age specific variation in the surface activity of a population of desert scorpion in relation to environmental factors. *J Anim Ecol* 1998; 49: 118.
- [11] Dehghani R. Thermoherapy in the treatment of *Hemiscorpionus Lepturus*, thesis in PhD, Health college, Tehran University of Medical Sciences 1382; p. 180 (Persian).
- [12] Ghaderi H, Shariati Z, Qodosi A, Ziaee M. Scorpion sting cases in the North-Western Khuzestan Province from May 2002 to January 2003. *Hayat J Faculty of Nursing and Midwifery* 2006; 12(2): 73-78. [In Persian].
- [13] Dehghani R, Dinparast Jadid N, Shahbazzadeh D, Bigdeli Sh. Reviews of the Scorpion sting and its factors at Khuzestan province in 2003. *J Faiz* 2008; 12(3): 68-74.
- [14] Dehghani R. Scorpions and Scorpion sting (Biology, Ecology and control of them). Esfahan: Publications of Kashan University Medical Sciences; Esfahan Beautiful Arts 2006; p. 160 [In Persian].
- [15] Lourenço WR. The scorpion's families and their geographical distribution. *J Venom Anim Toxins Include Trop Dis* 2001; 7: 3-23.
- [16] Navidpour S, Kovařík F, Sologlad ME, Fet V. Scorpions of Iran Arachnida, Scorpiones). Part I. Khoozestan Province. *Euscorpius* 2008a; 65: 1-41.
- [17] Navidpour S, Kovařík F, Sologlad ME, Fet V. Scorpions of Iran Arachnida, Scorpiones). Part I. Khoozestan Province. *Euscorpius* 2008b; 67: 1-33.
- [18] Navidpour S, Kovařík F, Sologlad ME, Fet V. Scorpions of Iran (Arachnida, Scorpiones). Part I. Khoozestan Province. *Euscorpius* 2008c; 69: 1-29.
- [19] Lowe G. Two new *Hemiscorpius* Peters, 1861 (Scorpiones: Hemiscorpiidae) from Northern Oman. *Euscorpius* 2010; 91: 1-24.
- [20] Fet V. Scorpions of Iran (Arachnida, Scorpiones). Part I. Khoozestan Province. *Euscorpius* 2008; 65: 1-41.
- [21] Radmanesh M. Clinical study of *Hemiscorpius lepturus* in Iran. *Am J Trop Med Hyg* 1990; 93: 327-332.
- [22] Radmanesh M. Cutaneous manifestations of *Hemiscorpius lepturus* sting: a clinical study. *Int J Dermatol* 1998; 37: 500-507.
<http://dx.doi.org/10.1046/j.1365-4362.1998.00386.x>
- [23] Vazirianzadeh B, Hajhosseini R, Amiri B, Bagheri S. Epidemiological study of scorpionism in the hospitals of Ahvaz, SW Iran. *J. Hlth. Sci., Ahvaz Joundi Shapour University of Medical Sciences* 2008; 2: 17-25.
- [24] Pourrezai S, Hossieni A, Vazirianzadeh B, Gardani HA. Study on some epidemiologic parameters among scorpion stung people who referred to Ramshir Health Centre, SW Iran, 2007-2009. 7th National and 2nd Regional Congress of Parasitology and Parasitic Diseases in Iran, Tehran 2010; p. 481.
- [25] Al-Sadoon MK, Jarrar BM. Epidemiological study of scorpion stings in Saudi Arabia between 1993 and 1997. *J Venom Anim Toxins Include Trop Dis* 2003; 9: 54-64.
- [26] Jarrar BM, Al-Rowaily MA. Epidemiological aspects of scorpion stings in Al-Jouf Province, Saudi Arabia. *Annl Saudi Med* 2008; 28: 183-187.
- [27] Mohseni A, Vazirianzadeh B, Salehchah M, Moradi A, Moravvej SA. The roles of the scorpions, *Hemiscorpius lepturus* and *Androctonus crassicauda* in a scorpionism focus in Ramhormoz, southwestern Iran. *J Insect Sci* 2013; 13: 89.
<http://dx.doi.org/10.1673/031.013.8901>
- [28] Dehghani R, Vazirianzadeh B, Rahimi Nasrabadi M, Moravvej SA. Study of scorpionism in Kashan in central of Iran. *Pakistan J Med Sci* 2010; 26: 955-958.
- [29] Chitnis PA, Maraghi S, Vazirianzadeh B. Epidemiological and laboratory study on scorpion stings in Khuzestan province. *J Guilan Univ Med Sci* 1993 2: 5-12.
- [30] Vazirianzadeh B, Samie M. Epidemiological study of scorpionism in the Khozestan. 2nd Congress of Medical Entomology, Tehran 2006; pp. 24-26.
- [31] Ozkan O, Adigüzel S, Cesaretli Y, Orman M, Karaer ZK. *Androctonus crassicauda* (Olivier 1807) scorpionism in the

- Sanliurfa Province of Turkey. *Türkiye Parazitolojisi Dergisi* 2006; 30: 239-245.
- [32] Ozkan O, Kat I. *Mesobuthus eupeus* scorpionism in Sanliurfa region of Turkey. *J Venom Anim Toxins Includ Trop Dis* 2005; 11: 479-484.
- [33] Karami K, Vazirianzadeh B, Mashhadi E, Hossienzadeh M, Moravve JS. A Five Year Epidemiologic Study on Scorpion Stings in Ramhormoz, South-West of Iran. *Pak J Zool* 2013; 45: 469-474.
- [34] Vazirianzadeh B, Hossienzadeh M, Moravvej SA, Vazirianzadeh M, Mosavi SA. An epidemiological study on scorpion stings in Lordegan. *Arch Razi Inst* 2013b; 68: 73-78.
- [35] Molaee SM, Angali Ahmadi K, Vazirianzadeh B, Moravvej SA. A Climatological Study of Scorpion Sting Incidence From 2007 to 2011 in the Dezful Area of Southwestern Iran, Using a Time Series Model. *J Insect Sci* 2013; 14(1): 151. <http://dx.doi.org/10.1093/jisesa/ieu013>
- [36] Cala-Riquelme F, Colombo M. Ecology of the scorpion, *Microtityus jaumei* in Sierra de Canasta, Cuba. *J Insect Sci* 2010; 11: article 86.
- [37] Pipelzadeh MH, Jalali A, Taraz M, Pourabbas R, Zaremirakabadi A. An epidemiological and a clinical study on scorpionism by the Iranian scorpion *Hemiscorpius lepturus*. *Toxicon* 2007; 50: 984-992. <http://dx.doi.org/10.1016/j.toxicon.2007.07.018>
- [38] Mozaffari E, Sedaghat MM, Dehkordi AS, Akbarzadeh K. Biodiversity and species composition of scorpions (Arachnida, Scorpiones) in Ilam County. *Iran J Applied Sci Res* 2013; 9: 5412-5418.
- [39] Emam SJ, Khosravi AD, Alemohammad A. Evaluation of hematological and urine parameters in *Hemiscorpius lepturus* (Gadim) victims referred to Razi Hospital, Ahwaz, Iran. *J Med Sci* 2008; 8: 306-309. <http://dx.doi.org/10.3923/jms.2008.306.309>
- [40] Dehghani R, Fathi B. Scorpion sting in Iran: a review. *Toxicon* 2012; 60(5): 919-33. <http://dx.doi.org/10.1016/j.toxicon.2012.06.002>

Received on 27-05-2015

Accepted on 05-06-2015

Published on 01-07-2015

<http://dx.doi.org/10.6000/1927-5129.2015.11.57>© 2015 Maghsoodi *et al.*; Licensee Lifescience Global.

This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.