A Five Year Epidemiologic Study on Scorpion Stings in Ramhormoz, South-West of Iran

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Abstract.- Scorpionism is a major health problem in Khuzestan, included Ramhormoz, south-west of Iran. This descriptive retrospective survey was conducted to give us basic information about scorpionism in this city during 2006-2010. During 2006-2010, a total of 20902 scorpion-stung patients referred to the Rmhormoz health centers. The frequencies of entomopo-epidemiological and medical parameters were recorded converted to the percentage rank. The results of this study showed that the preventing ways of scorpion stings should be educated among the residents and antivenin of scorpions provided in the health centers of Ramhormoz.

Keywords: Scorpion sting, epidemiology, Ramhormoz, Iran

INTRODUCTION

Scorpionism or being stung by scorpions is a major health problem in the tropics and subtropics including southern half of Iran (Khuzestan, Sistan-and-Baluchestan, Hormozgan and Kerman) with 75% annual mortalities of scorpion sting in Iran; however, the most of mortalities and cases of scorpion stings have occurred in Khuzestan (Azhang and Moghisi, 2006; Pipelzadeh et al., 2007; Jalali et al., 2010; Pourrezai et al., 2010; Zare Mirakabad et al., 2011; Zayerzadeh et al., 2011).

Iranian scorpion fauna consists of 44 named species from 23 genera in 3 families, Buthidae, Scorpionidae and Hemiscorpiidae. Khuzestan has 19 of these species (Farzanpay, 1987; Lourenço, 2001; Navidpour et al., 2008; Lowe, 2010) (Table I).

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 Ramhormoz (Radmanesh, 1990, 1998; Vazirianzadeh et al., 2008).

Table I.- List of scorpion species occurring in Khuzestan Province of Iran (Navidpour et al., 2008).

<table>
<thead>
<tr>
<th>Buthidae</th>
<th>Scorpionidae</th>
<th>Hemiscorpiidae</th>
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<tbody>
<tr>
<td>2. Apistobuthus susanae (Lourenço, 1998)</td>
<td></td>
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<tr>
<td>3. Buthacus macrocentrus (Ehrenberg, 1828)</td>
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<tr>
<td>4. Compsobuthus garyi (Lourenço &amp; Vachon, 2001)</td>
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<td>5. Compsobuthus jakesi (Kovařík, 2003)</td>
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<tr>
<td>6. C. matthiesseni (Birula, 1905)</td>
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<td></td>
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<tr>
<td>7. Hottentotta saulcyi (Simon, 1880)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. H. schach (Birula, 1905)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. H. zagrosensis (Kovařík, 1997)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. H.khozestanus sp. n</td>
<td></td>
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</tr>
<tr>
<td>11. Mesobuthus eupeus philippisi (Pocock, 1889)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Odontobuthus bidentatus (Lourenço et Pézier, 2002)</td>
<td></td>
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<tr>
<td>13. Orthochirus farzanpayi (Vachon &amp; Farzanpay, 1987)</td>
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<tr>
<td>14. O. irani (Kovařík, 2004)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. O. stockweili (Lourenço &amp; Vachon, 1995)</td>
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</tr>
<tr>
<td>16. Razianus zaraduni (Birula, 1903)</td>
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<tr>
<td>17. Vachoniolus iranius sp. n</td>
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</table>

Ramhormoz area is one of the most important foci of scorpion sting problem in the east of Khuzestan from point of medical, epidemiology and
geographic local scorpion distribution according to the reports of local health authority of Khuzestan (Radmanesh, 1990, 1998; Vazirianzadeh and Samie, 2006).

Thus, public health education helps people and authorities to prevent from being stung and remedy scorpionism in these regions. To achieve this objective, information regarding scorpionism is essential and a key factor. Therefore, this survey was conducted to give us basic information about scorpionism in this city.

MATERIALS AND METHODS

Ramhormoz (31° 17' 0" N, 49° 36' 0" E) is an ancient city with the rural and tribe social structure in Khuzestan province in southwestern Iran.

This research was a descriptive retrospective study. The data of the present research has come from files of outpatient or hospitalized persons referring to the health centre and hospital of city of Ramhormoz during 2006-2010.

Scorpion-stung patients who referred to the health centre and hospital of city of Ramhormoz during 2006-2010 filled out a questioner requesting age, gender and residence of victim, stung part of body, color of stinging scorpion, treatment with or without antivenin injection, the way how antivenin applied and death due to the sting. The frequencies of entomo-epidemiological and medical parameters were converted to the percentage rank. The scorpion species were identified using Farzanpay's (1987) key to the Iranian scorpions.

RESULTS

During 2006-2010, a total of 20902 scorpion-stung patients referred to the above-mentioned centers. Statistics of each year is presented in Table II which shows that the incidence of scorpion stings were similar rate during 2006-2010; however, the largest of scorpion stings data were happened in 2006 (22.62% of scorpion stings), and the least were happened in 2010.

Data collected in this study revealed that the highest incidence of scorpion sting cases were taken place in summer (43.63%) followed by spring (39.46%), fall (12.57%) and in the winter as the lowest incidence (4.34%) in Ramhormoz region. The most frequent of scorpion sting cases belonged to the month of June (17.94% of scorpion stings) and the lowest to the January with 0.69% (Table III).

Table II.- Percentage and number of scorpion-stung and fatality in Ramhormoz during 2006-2010.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Percent</th>
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<tr>
<td>2006</td>
<td>4730</td>
<td>22.62</td>
</tr>
<tr>
<td>2007</td>
<td>3867</td>
<td>18.5</td>
</tr>
<tr>
<td>2008</td>
<td>4246</td>
<td>20.3</td>
</tr>
<tr>
<td>2009</td>
<td>4055</td>
<td>19.4</td>
</tr>
<tr>
<td>2010</td>
<td>4004</td>
<td>19.1</td>
</tr>
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</table>

Generally, most victims of scorpion-stung people were in rural area (11762: 56.3%) than in urban area (9140: 43.7%). Table IV shows that the greatest rate of scorpion stings victims belonged to the 15-24 year old persons (20.60%) followed by 25-34 year old persons (19.22%) and the lowest rate of scorpion stings were reported among the older than 65 year old patients (6.22%).

Totally, the number and percent of stung women and men of scorpion-stung patients were 10912 (52.2%) and 9990 (47.8%), respectively.

Legs, as the lower parts of the body were targeted by scorpion stings more than the other parts (39%) followed by hands with 36% and head and trunk with 25%.

Out of 20,902 scorpion sting cases, 20,895 cases (99.97%) recovered, however deaths (0.03%) were recorded during the present study. Totally, 3.8% of victims recovered using convenience treatments without scorpion antivenin serum. However, the rest treated by scorpion antivenin serum including intra-venin (7.70%) and intra-muscular (92.30%) injections and convenience treatments. The interval hours after stings and injections were recorded as: survival was 70.3 % after 0-6 h, 14.8% after 6-12 h and 10.9% after more than 12 h. All deaths (seven cases; six were children with 1.5-14 year old and one was a 75 year old person) occurred when scorpion antivenin serum was injected 0-6 h after stung. In other cases all
victims recovered No case of anaphylaxis shock was reported after injection of scorpion antivenin serum. During the study, a total of 20,100 vials of scorpion antivenin serum were applied.

Scorpion-stung patients reported 11,031 (52.7%) yellow scorpions and 4,117 (19.7%) black scorpions. The rest did not recognize the color of the scorpions.

The scorpions brought to the medical centers by the patients or their relatives were identified as Androctonus crassicauda (Scorpionida: Buthidae), Hemiscorpius lepturus (Scorpionida: Hemiscorpioiidae), and Mesobuthus eupeus (Scorpionida: Buthidae), Compsobuthus sp. (Scorpionida: Buthidae) and Scorpio maurus (Scorpionida: Scorpionidae).

**DISCUSSION**

The results of our study showed that there was a difference between frequency of males (47.8%) and females (52.2%) among the patients who were referred to the health centers of Ramhormoz 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) for Khuzestan. Our results are not in accordance with the results in Saudi Arabia (Al-Sadoon and Jarrar, 2003; Jarrar and Al-Rowaily, 2008) who reported that scorpion stings were greater in the males than in the females. The epidemiology of scorpion sting is related to the sex of the victim. It varies according to the year and
location of different studies. However, it may take cultural factors like different activities among females and males.

In this study 56.3% of scorpion sting cases occurred in the rural area of Ramhormoz. Pourrezai et al. (2010) and Vazirianzadeh et al. (2008) have likewise reported that scorpion stings occur most frequently in rural areas of Ramshir County of Khuzestan province and Lordegan County of Chahar-Mahal-and-Bakhtiari Province in southwestern of Iran. Our results, however, do not agree with the results of Vazirianzadeh et al. (2008) and Pipelzadeh et al. (2007) of entire Khuzestan Province, southwest of Iran, who reported 60% of scorpion stings in the urban area.

The greatest rate of scorpion stings occurred among the 15-24 year old people. This agrees with the findings in Kashan, central of Iran (Dehghani et al., 2010), Ahvaz, south west of Iran (Emam et al., 2008) and north-west of Khuzestan (Ghaderi et al., 2006).

Data collected in the current study revealed that the highest incidence of scorpion sting cases during 2006-2010 occurred in summer (43.63%) in the Ramhormoz region. This is in accordance with the studies in south-west of Iran (Chitnis et al., 1993; Vazirianzadeh and Samie, 2006), Saudi Arabia (Al-Sadoon and Jarrar, 2003; Jarrar and Al-Rowaili, 2008) and in Turkey (Ozkan and Kat, 2005; Ozkan et al., 2006). They have reported that 49.7% - 93.4% of scorpion sting cases occurred in summer. However, it is not consistent with the results of a similar study in Lordegan in the south west of Iran with different climate. The surveys in the Ramhormoz area during 2006-2010 explained that there was a consistency regarding the dominance of scorpion stings in the summers. Data collected in the Lordegan study revealed that the highest incidence of scorpion sting cases in 2006 took place in spring (49.72%) however, the surveys in Lordegan area during 2002-2006 explained that there was not a consistency regarding the dominance of scorpion stings in the summer or spring. This consistency was due to the summer during years of 2002 and 2005 and due to the spring during 2003, 2004 and 2006 (Vazirianzadeh et al., 2008). These differences were presumably due to the variation of geographical, climatologic and species distributions. The important point is that the scorpions stung every year with a similar rate (18.5-22.62%) during entire period of 2006-2010 (Table II).

The species of scorpions collected at the health centre of Ramhormoz were similar to the one reported in other parts of Khuzestan, southwest of Iran (Radmanesh, 1990, 1998; Vazirianzadeh and Samie, 2006; Navidpour, 2008; Vazirianzadeh et al., 2008). However, the H. lepturus reported from Ramhormoz is as one of the most dangerous species of scorpion in the world. H. lepturus is well known for having a potent cytotoxic venom that causes cutaneous necrosis, deep and necrotic ulcers, psychological problems, ankylosis of the joints, and severe systemic pathology leading to death, severe and fatal haemolysis, secondary renal failure and fatal failure of the kidney (Radmanesh, 1998; Pipelzadeh et al., 2007; Lowe, 2010; Jalali et al., 2010). H. lepturus is only scorpion with related cutaneous findings in Iran (Radmanesh, 1990). Presence of Compsobuthus sp. in Ramhormoz is another important scorpion in this area, because this species cause similar medical problems in human (Farzanpay, 1987; Dehghani et al., 2009).

A total of 96.2% scorpion stung persons received antivenin of scorpions. This antivenin made in Razi Research Vaccine and Serum Institute, Iran is a 5 ml polyvalent ampoule against 6 species including H. lepturus, A. crassicauda, Mesobuthus eupeus, Odonthobothus doriae, Hottentotta saulcyi and Hottentotta zagrozensis.

In this study seven cases terminated to death that had received the antivenin between 0-6 hours after injecting and no death was recorded in the current study regarding the rest of patients including non-receiver and receiver of antivenin. However, species and ages of scorpions and age, weight and health situation of the patients are essential factors regarding fatality, but it is presumed the reason of seven deaths antivenin was due to H. lepturus. Age of victims is another factor in mortality of victims after scorpion sting during this study. Except one of the victims who was 75 years old, the rest were children with the range of 1.5-14 year old. It means that envenomation of scorpion sting is more dangerous among the younger and elder victims (Mahaba, 1997; Radmanesh, 1998; Pipelzadeh et
Our results are in accordance with the results of Gajre and Dammas (1999) who concluded that in the effectiveness of using the earliest species-specific antivenin reduces mortality and morbidity due to scorpion stings. In spite of worldwide debates on serotherapy of the scorpion envenoming syndrome serotherapy is considered as the only specific treatment of scorpion stings in Saudi Arabia. Hamed (2003) has suggested intravascular administration of antivenin instead of intramuscular injection of antivenin because scorpion venin are absorbed and distributed more rapid than the immunoglobulins. It is in contrast to our results which show that antivenom administered in 96.2% of scorpion sting people including 92.30% intramuscular application and 7.70% intra-venin application, with 0.030% mortality and no anaphylaxis shock in Ramhormoz hospitalized people. Vazirianzadeh et al. (2013) (in press what is the year ?) has reported that 91.53% of stung people were treated using same anti venom in Lordegan area in Iran with no death or shock after serotherapy intra-muscular application. Vazirianzadeh et al. (2012) has recorded one death among 57 hospitalized children due to scorpion sting, 73.68% of which received antiserum injection in a hospital in Ahvaz, capital of Khuzestan.

All the above mentioned cases of Iran are in agreement with the study of El-Amin et al. (1994) who reported that the reduction in mortality was attributed to the use of antivenom and improved the management of children in Saudi Arabia. Belghith et al. (1999) have, however, shown that systematic administration of scorpion antivenin irrespective of clinical severity did not alter the clinical course of scorpion sting.

CONCLUSIONS

According to the results of the current study it is concluded that the scorpion stings in Ramhormoz county is epidemiologically similar to the other parts of Khuzestan, south-west of Iran with reference to age, sex, site of stings, scorpion species and season frequency. It is concluded that residents of Ramhormoz County should be educated since the scorpion stings ranged between 18.5 and 22.62%

during 2006-2010.

Epidemiologically, it is suggested injecting antivenin in the victims will reduce mortality after scorpion stings. All hospitals and other health centers must be well educated and equipped with antivenin vials to be able to extend proper services to scorpion-stung people.

Conflict of interest statement

We declare that we have no conflict of interest.

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