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## Epidemiological Study of Scorpion Sting in City of Poldokhtar, Iran, between 2010 and 2014, Five-Year-Study.

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### ABSTRACT

Due to the wide distribution of the scorpions in various regions of Iran as well as the importance of the arthropods in medicine and biosciences and since the scorpion sting is a major public health problem, especially for people in rural areas and children, this study aimed to investigate the status of scorpion sting in city of Poldokhtar. This is a descriptive analytical cross-sectional study. In order to investigate the scorpion sting cases, data collection was performed according to the questionnaire by referring to Poldokhtar Health Center and examining the existing cases during 2010 through 2014. The obtained data was analyzed using the statistical SPSS Software V.20 and Chi-square test. The results at levels less than 0.05 were considered as significant. Results showed that the total cases of scorpion sting included 810 individuals for the five-year period of the study. The frequency of scorpion sting cases was 414 (51.1%) in males and 396 (48.9%) in females. This study indicated that the highest and lowest number of the scorpion sting cases is related to the 25 to 34-year-old age group with frequency of 209 cases (25.8%) and the 5 to 9-year-old age group with frequency of 34 cases (4.2%), respectively ( $P < 0.05$ ). The number of the scorpion sting cases was indicator of a pattern according to which the highest and lowest incidence rate was in summer with 419 cases (51.7%) and in winter with 17 cases (2.1%), respectively. The highest prevalence rate of scorpion sting with 152 cases (18.8%) was in July. The results showed that among 810 cases of scorpion sting, 195 cases (24.1%) lived in the urban areas and 615 cases (75.9%) in the rural areas ( $P < 0.05$ ). In 76 cases (9.4%) the sting had occurred on the head and body while in 734 (90.6%) cases it had occurred on hands and feet. The recovery rate of the scorpion stung patients in Poldokhtar between 2010 and 2014 was 98.8% and, in this five-year period, 1 case of death had occurred. The high prevalence of scorpion sting in city of Poldokhtar indicates the necessity of conducting prevention programs in order to reduce its incidence. These programs can be started by training the society; moreover, timely treatment, especially for babies and children, is of great importance.

**Keywords:** Scorpion sting, Epidemiology, Poldokhtar, Iran

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## INTRODUCTION

Scorpions belong to the class of arachnids. These animals have poisonous stings. The scorpion sting is one of the major health problems in some countries [1]. Having climate diversity, Iran has provided the conditions for growth of many arthropods. The venomous and poisonous animals such as scorpions which are a part of the environment ecosystem might threaten the health of some people who are exposed to these animals due to their occupational or geographic region of their residence [2, 3].

In southern Iran, the scorpion sting is considered as one of the most important medical and health problems and exposes many people to risk of death, especially the inhabitants of the tropical regions [4]. According to the information provided by the National Committee for Non-communicable Diseases, an annual number of about 50000 cases of scorpion sting are recorded in Iran [5]. The epidemiological studies collected by Razi Vaccine and Serum Research Institute showed that the scorpion sting is the major type of poisoning in Iran [3].

The scorpion sting is the most important type of stings by the arachnid that causes the disease and death of children in many eastern Mediterranean regions, Central and South America, Asia, and North and South Africa (6). Among 2000 scorpion species, 50 species are dangerous to humans [7]. Although there are various scorpion species, most of them cause similar cardiovascular effects [8].

In ancient Iran and in the historical, literary, and religious texts, the evidences on the scorpion sting indicate the history of this issue in Iran [9]. The casualties caused by scorpion sting depend on several factors including specie of the scorpion, age of the stung person, season, geographical region, and scorpion habitat. Among these factors, the specie of the scorpion plays the most important role [3, 10].

The highest diversity of the scorpion species is in the subtropical areas, i.e. the latitudes of 23-38 degrees. Thus, due to the geographical location of Iran between 25-40 degrees north, the diversity and distribution of scorpions is considerable [11].

Lorestan Province is one of the regions where the environmental conditions are suitable for the scorpions due to the weather conditions. This city is located in the southern warm area of the province and has the maximum temperature in the summer as a consequence of the lower latitudes and the hot winds of Khuzestan.

The written reports have been provided monthly by the rural and urban health centers, as well as the hospitals for the health network of the city, and it has been specified that Poldokhtar has the highest rate of scorpion sting in the Lorestan province.

The total population of Poldokhtar is about 80000 people; therefore, with regard to the high rate of scorpion sting in this geographical area and lack of a comprehensive study on this issue, it seems that the appropriate solutions for sting prevention, timely treatment, and prevention of mortality are would be achievable through an epidemiological investigation and analysis.

## METHOD

This is a descriptive analytical cross-sectional study conducted in the city of Poldokhtar. Poldokhtar is located in the longitude of 47°42' and latitude of 32°9' in the southern Lorestan province. This city borders Khorramabad to the northeast, Andimeshk to the south, and Koohdasht and Darreh Shahr to the west. With an area of 3615 km<sup>2</sup>, this city comprises about 8% of the total surface area of the province. In order to investigate the scorpion sting cases, we performed data collection according to the questionnaires by referring to the Health Center of Poldokhtar and examining the existing cases between 2010 and 2014. Analysis of the obtained data was performed using SPSS V.20 and Chi-square test. The results were considered significant at the level less than 0.05.

## RESULTS

According to the studies, the incidence rate of scorpion sting cases between 2010 and 2014 in Poldokhtar was 202.5 cases in one hundred thousand people per year. In this study, 810 subjects who had

referred to the health & medical centers and to the Emergency Unit of Imam Khomeini Hospital in Poldokhtar were examined. The highest frequency of scorpion sting, i.e. 414 cases (51.1%), was among males while the frequency of scorpion sting in women was equal to 396 (48.9%). The highest rate of scorpion sting, i.e. 231 cases (28.5%), included 98 males and 133 females in 2013, and the lowest rate of scorpion sting, i.e. 106 cases (13.1%), included 50 males and 56 females in 2012 (Table 1, P <0.05).

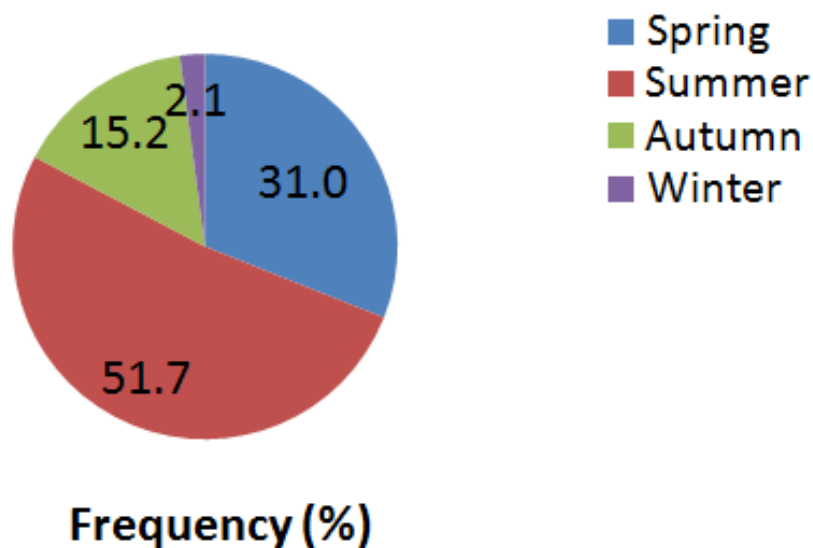
This study showed that the highest number of the scorpion stung patients belonged to the 25 to 34-year-old age group with 209 cases (25.8%) including 122 males and 97 females, and the lowest number belonged to the 5 to 9-year-old age group with 34 cases (4.2%) including 23 males and 11 females (Table 2, P <0.05).

**Table 1: The abundance of scorpion stings according to gender in Poldokhtar County, Iran (2010-2014)**

Gender	Years					Total
	2010 No. (%)	2011 No. (%)	2012 No. (%)	2013 No. (%)	2014 No. (%)	
Male	58 (14.0)	85 (20.5)	50 (12.1)	98 (23.7)	123 (29.7)	414 (51.1)
Female	60 (15.2)	60 (15.2)	56 (14.1)	133 (33.6)	87 (22.0)	396 (48.9)
Total	118 (14.6)	145 (17.9)	106 (13.1)	231 (28.5)	210(25.9)	810 (100)

**Table 2: Frequency of scorpion sting by gender and age groups in Poldokhtar County, Iran (2010-2014)**

Age group	Male No. (%)	Female No. (%)	Total No. (%)
0-4	23 (56.4)	17 (43.6)	40 (4.9)
5-9	23 (67.6)	11 (32.4)	34 (4.2)
10-14	19 (50.0)	19 (50.0)	38 (4.7)
15-24	74 (49.3)	76 (50.7)	150 (18.5)
25-34	112 (53.6)	97 (46.4)	209 (25.8)
35-44	74 (48.7)	78 (51.3)	152 (18.8)
45-54	40 (49.4)	41 (50.6)	81 (10.0)
55-64	31 (50.0)	31 (50.0)	62 (7.7)
>64	18 (40.9)	26 (59.1)	44 (5.4)
Total	414 (51.1)	396 (48.9)	810 (100)



**Figure 1: Distribution of scorpion sting cases by season in Poldokhtar County, Iran (2010-2014)**

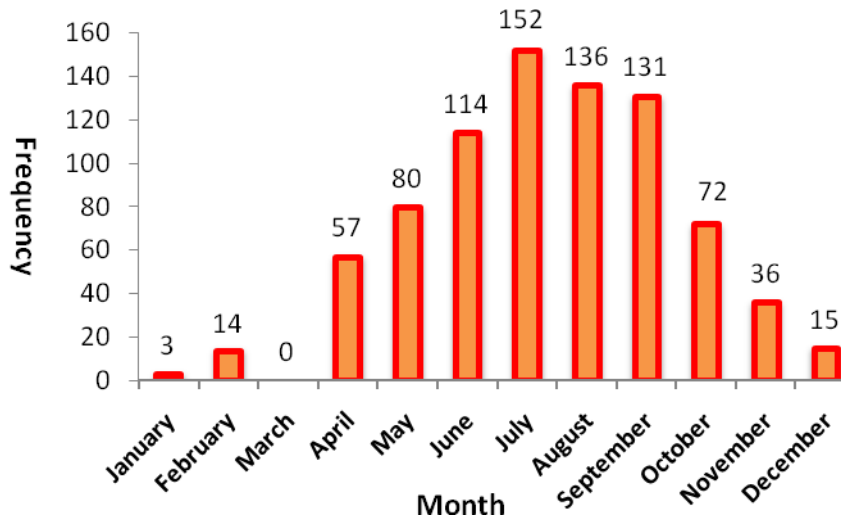


Figure 2: Distribution of scorpion sting cases by month in Poldokhtar County, Iran (2010-2014)

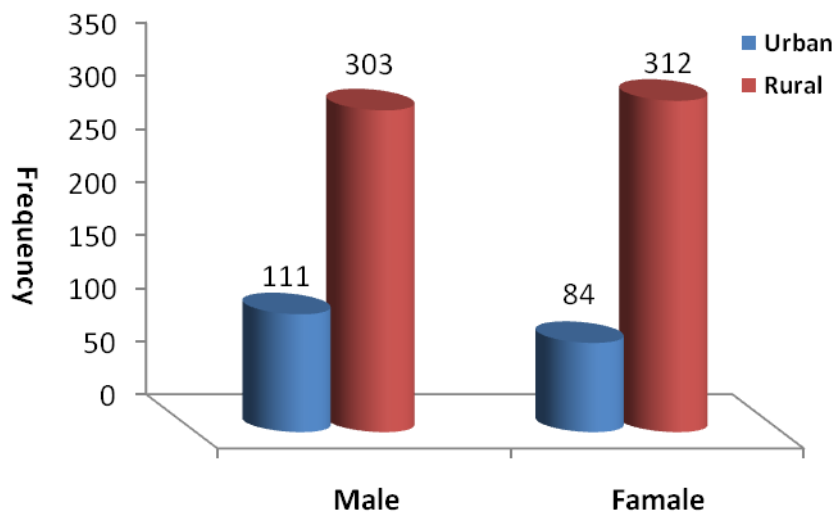


Figure 3: Distribution of scorpion sting cases by gender and residence in Poldokhtar County, Iran (2010-2014)

The number of the scorpion sting cases indicated a pattern according to which the higher incidence rate was in the summer with 419 cases (51.7%) including 198 males and 221 females and the lower rate was in the winter with 17 cases (2.1%) including 12 males and 5 females. The frequency of scorpion sting was 251 cases in the spring (31%) including 136 males and 115 females and 123 cases in the autumn (15.2%) including 68 males and 55 females (Figure 1,  $P < 0.05$ ). The highest incident rate of scorpion sting was 152 cases (18.8%) including 72 males and 80 females in July (Figure 2).

The results showed that among 810 scorpion stung cases, 195 cases (24.1%), including 111 males and 84 females, lived in the urban areas and 615 cases (75.9%), including 303 males and 312 females, lived in the rural areas (Figure 3,  $P < 0.05$ ).

The scorpion sting in 76 cases (9.4%), including 38 males and 38 females, was on head and body, and in 734 cases (90.6%), including 376 males and 358 females, was on hands and feet ( $P < 0.05$ ).

The rate of recovery of the scorpion stung patients in Poldokhtar between 2010 and 2014 was 98.8%, and one case led to death in this five-year period.

## DISCUSSION

Many of the arthropods have always played important role in diseases transmission to humans and are significant in terms of health [12, 13]. Poldokhtar, due to climatic conditions, has the highest rate of scorpion sting in Lorestan province. The previous studies have shown that the epidemiological features of scorpion sting vary from one country to another [14].

Results of the present study showed that the total number of the scorpion sting cases is 810 for the five-year period of the study. The highest frequency of scorpion sting is males. Many of the studies also show that the frequency of scorpion sting in males is higher than that in females. Nazari et al., in a study in Hamadan, showed that men with 62.5% are the most frequent gender afflicted by scorpion sting [3]. Rafizadeh et al. showed that the scorpion sting in men was 51.8% (15). Dehghani et al., in a study in Kashan in central Iran, also showed that the most of the scorpion stung patients (53.04%) were male [16]. However, some of the reports also indicated that the scorpion sting in women is higher than that in men [17, 18].

In this study, the most prevalent age group of the scorpion stung patients was the 25 to 34-year-old age group, which is in agreement with Nazari et al. as well as Nazari and Hajizadeh [3, 19]. Talebian and Doroudgar investigated the epidemiological indices of scorpion sting in Kashan. According to their report, the highest number of the scorpion sting cases was in the 0 to 9-year-old age group (36.5%) and the lowest number was in the above 70-year-old age group (3.8%) [20]. Atamo et al. reported the highest frequency of scorpion sting in lower ages, so that 50% of the scorpion sting cases was in the 6-15 years o age [21]. Osnaya et al. also reported the highest frequency of the scorpion sting cases in the childhood years and in the young boys [22].

This research showed that the highest frequency of scorpion sting was in summer and in July, August, and September and the lowest was in winter. Other studies also showed that most of the scorpion sting cases were in the warm seasons of the year, especially in summer [20, 23]. Nejati et al. showed that many of the scorpion sting cases were in the warm months from May to September with a peak in July [24].

This study demonstrated that the organs such as hands and feet were more exposed to the scorpion stings, which is in agreement with Nazari et al. [3].

In the present study, regarding the residence, the population of the rural areas was more exposed to the risk of scorpion sting, which is similar to the findings of many researchers [16, 19]. Lack of appropriate coverage of the legs and barefoot walking especially at night, unawareness of the scorpion sting risks and its symptoms, lack of appropriate construction materials, and the old buildings provide a suitable place for the scorpions to live. Sleeping on the ground, not using a bed, and putting the bed and clothes on the ground, that the scorpion uses as a shelter, can be the effective factors in the increase of the scorpion sting cases in the villages.

## CONCLUSION

In order to reduce the scorpion sting rate and its consequences, the people's awareness and knowledge of the scorpion sting should be improved and the anti-scorpion serum should be constantly available to the health centers. Further, it is necessary to control and reduce the high-risk behaviors such as not wearing shoes, picking up the stones, and playing with colonies of scorpions, which increase the scorpion sting especially among the children. The articles on this topic can be published using the teaching aids such as posters and brochures and provided for the people in schools and public places. The mass media such as radio and television can also be used for further public awareness in this regard.

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