

First report of death due to *Hemiscorpius acanthocercus* envenomation in Iran: Case reportMehran Shahi¹, Javad Rafinejad², Leyla Az-Khosravi³, Seyed Hamid Moosavy⁴

¹ Ph.D. of Infectious and tropical Diseases, Student, Infectious & Tropical Diseases Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

² Ph.D. of Medical Entomology, Professor, Department of Medical Entomology and Vector Control, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

³ B.Sc., Nursing, Nurse, Department of Internal Emergency, Hormozgan University of Medical Sciences, Bandar Abbas, Iran

⁴ M.D., Gastroenterologist and Hepatologist, Associate Professor, Department of Internal Medicine, Hormozgan University of Medical Science, Bandar Abbas, Iran

Type of article: Case report**Abstract**

Scorpion stings are significant causes of death in the western and southern regions of Iran. To date, reports have indicated that the *H. lepturus* species is the main cause of mortality due to scorpion stings. One of the species that belongs to this genus is *Hemiscorpius acanthocercus* (*H. acanthocercus*). This scorpion's venom is cytotoxic, and it causes pathological changes in the blood and can cause severe damage to the kidneys. The pain of *Hemiscorpius*' sting is mild and asymptomatic in the early hours. Delays in the treatment of these victims can cause hemolysis, hematuria, kidney failure, and even death. In this paper, we report the first known death due to an *H. acanthocercus*' sting in Iran.

Keywords: death, scorpion envenomation, *Hemiscorpius*, Iran**1. Introduction**

Every year, more than one million cases of scorpion stings are reported in the world (1). Most of these cases are reported in Mexico, Tunisia, and Brazil (2). The *Hemiscorpius* genus of scorpions is distributed throughout Asia (Iran, Iraq, Oman, Pakistan, Saudi Arabia, Yemen, and the United Arab Emirates) and Africa (Eritrea, Somalia, and Egypt) (3-7). In Iran, about 40,000 to 50,000 scorpion sting cases are reported annually, resulting in about 19 deaths (8). To date, 1,500 species of scorpions have been identified throughout the world, and about 50 of these species can be dangerous to humans. These 50 species include *Androctonus*, *Buthus*, *Mesobuthus*, *Tityus*, *Leiurus*, and *Hemiscorpius* (9). The *H. lepturus* scorpion is the most venomous scorpion in Iran (10-13). The scorpion's venom contains various toxins, including neurotoxin, cardiotoxin, nephrotoxin, and hemolytic toxin (14). Children and elderly patients are at increased risk of complications from scorpion envenomation (15). It is well known that the potent cytotoxin, venom in *H. lepturus*, causes cutaneous necrosis, necrotic ulcers, psychological problems, ankylosis of the joints, hemoglobinuria, fatal haemolysis, hematuria, renal failure, and even death (9, 11, 12, 16-18). In southern Iran, *Hemiscorpius* is responsible for 95% of deaths (10). This paper presents and discusses the first report of death as a result of *H. acanthocercus* envenomation in a 15-year-old male in southern Iran.

2. Case presentation**2.1. Clinical presentation**

A 15-year-old male resident of a rural area in the Bandar Abbas district in southern Iran was stung by an *H. acanthocercus* scorpion on his right arm (Figure 1), and he was admitted to the hospital 12 hours later due to weakness, fever, chills, and pain at the site of the sting.

Corresponding author:

Dr. Seyed Hamid Moosavy, Shahid Mohamadi Hospital of Hormozgan, University of Medical Science, Bandar Abbas, Iran. Tel: +98.9177635854, Email: Seyedhamidmoosavy@gmail.com

Received: January 09, 2015, Accepted: August 17, 2015, Published: September 16, 2015

iThenticate screening: July 09, 2015, English editing: July 27, 2015, Quality control: August 28, 2015

© 2015 The Authors. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

The patient was conscious at the time of admission, and he was not ill, icteric. On the first day, the clinical signs included fever, lethargy, abdominal pain, chills, active bleeding, and hematuria. The patient's vital signs were BP (115/75 mm Hg), PR 68/min, RR (18/min), and body temperature (39.5 °C); his heart and lung functions were normal. Erythema and local necrosis were observed at the site of the sting. On the second day after admission, the patient's fever increased to 40 °C, and active bleeding and hematuria continued. On the third day, there was no change in the clinical status of the patient.



Figure 1. Dorsal view of a female *Hemiscorpius acanthocercus* scorpion from Hormozgan Province in southern Iran: Original picture taken by M. Shahi (Scale, mm).

2.2. Laboratory findings

Table 1 provides the results of the patient's laboratory tests. On the second day, his data showed increases in PTT (56 sec), WBC ($24 \times 10^3/\mu\text{l}$), Urea (86 mg/dl), Creatinine (2.1 mg/dl), SGOT (240 U/L), SGPT (180 U/L), Total and Direct Bilirubin (9 and 2 mg/dl, respectively), and there were decreases in his RBC ($2.83 \times 10^6/\mu\text{l}$), HGB (8.8 g/dl), and PLT ($20 \times 10^3/\mu\text{l}$).

2.3. Treatment and outcome

The patient received scorpion anti-venum and intravenous hydrocortisone and clemastine. The patient also received 400 mg of ciprofloxacin twice a day and 600 mg of clindamycin three times a day for treatment of cellulitis. Also, intravenous paracetamol was used to control the patient's fever, and he received fresh frozen plasma (FFP), platelets, and cryoprecipitate for correction of coagulation factors. In spite of these treatments, the patients died due to his impaired coagulation status and hemodynamic status.

Table 1. Biochemistry and Complete Blood Count test results

Test (Units)	Results	
	Day1	Day 3
Urea (mg/dl)	44	164
BUN (mg/dl)	20	76
Creatinine (mg/dl)	1	4.2
LDH (U/L)	611	6538
Sodium (mEq/L)	139	149
Potassium (mEq/L)	4.3	5.6
PTT (Sec)	33	41
PT (Sec)	14.5	20
WBC ($\times 10^3/\mu\text{l}$)	7.6	24.9
RBC ($\times 10^6/\mu\text{l}$)	3.82	2.94
HGB (g/dl)	11.2	8.4
HCT (%)	34	26.1
MCV (fL)	89	88
MCH (pg)	29	28
MCHC (g/dl)	32	32
PLT ($\times 10^3/\mu\text{l}$)	38	150
RDW-SV (%)	17	22

3. Discussion

H. lepturus envenomation has resulted in a significant number of mortalities in Iran (19, 20). The *Hemiscorpius* scorpion's sting does not cause immediate or severe pain (1, 19), so most people who are stung do not get medical care. The delay in seeking medical care may be due to the fact that there are few early symptoms associated with *H. lepturus* envenomation, and those that do occur are mild (18). The patient did not seek medical care until 12 days after envenomation, and by that time he had developed severe complications. The severe symptoms of envenomation caused by *H. lepturus* venom in children are attributable to their low body mass and their limited physiological reserves (19). Very severe renal complications have been observed in children who had not sought medical care (21). In Rahmani & Jalali's study, all patients who died also had been stung by *H. lepturus* scorpions and sought medical care days later (18), as was the case for the patient in our study. *H. lepturus* venom causes various symptoms, such as macular erythema, necrosis, ulcers, fever, and others (22). The clinical symptoms caused by *H. acanthocercus* envenomation were similar to those of *H. lepturus*. Therefore, this scorpion poses a significant risk for victims, especially children. Studies have shown that *Hemiscorpius* venom is highly cytotoxic and can cause cutaneous necrosis, severe hemolysis, hematuria, renal failure, and death (18, 23), and our observations in the case in question were similar to the findings of those studies.

Table 1 shows laboratory findings that indicate the changes in a patient's hematology and biochemistry parameters as the result of being stung by an *H. acanthocercus* scorpion. ed. These data were in good agreement with the findings of other similar studies in Iran (10, 16, 18, 24-26). The most severe hemoglobinuria, i.e., + 4, that has been observed in people stung by *H. lepturus* scorpions was reported in Mohseni's study (27). Other studies have shown a rapid reduction in the level of HCT with acute hemolysis among patients who were referred to hospital emergency departments (16, 28). In addition, Emam's report indicated that the measurement of hematologic parameters, such as PTT, Hb, RBC, and PLT, was important because they are important indicators in patients who have been stung by *H. lepturus* scorpions (29). In contrast to the above results, the results of Mohseni's study indicated that the PTT and PT factors were not important indices in cases involving scorpion stings (27). Dehghani showed that the venom from the *H. lepturus* scorpion causes an increase in WBC count (30). The results of hematology tests and urine analyses in this case were similar to the above results. The results of this report showed that, when people are stung by *Hemiscorpius* scorpions, their laboratory test results change, including the results associated with hematology, biochemistry, and urine analysis. Therefore these tests can be useful in the early detection and treatment of victims. Anti-venom therapy is an available method for treating scorpion envenomation in Iran. The specific anti-venin made by the Razi Vaccine and Serum Research Institute is a polyvalent antivenom (5-ml ampoule) against six species of scorpions, i.e., *H. lepturus*, *Androctonus crassicauda*, *Mesobuthus eupeus*, *Odonthobothus doriae*, *Hottentotta saulcyi* and *Hottentotta zagrozensis* (31). In Iran, the current treatment of patients who have been stung by *H.*

lepturus is the intravenous (IV) or intramuscular (IM) injection of anti-venom (12). The specific polyvalent anti-venom injection as early as possible after the sting is fundamentally important with respect to the effectiveness of the anti-venom (19). In severe cases following envenomation, death can occur as a result of delaying the administration of the anti-venom, especially in children and elderly patients (32).

4. Conclusions

The venom of *H. acanthocercus* such as *H. lepturus* venom represents serious clinical Symptom such as hemoglobinuria, proteinuria, hematuria, hemolysis of blood cells and increased creatinine excretion. Therefore the venom of *H. acanthocercus* had severe effects on the blood and kidneys. These toxic effects may be fatal for children. Urine analysis, hematology and biochemistry data are the most important factors in the follow-up of scorpion victims. This report showed that the anemia and hemoglobinuria in patients who stung by Hemiscorpius scorpions should be considered. Finally, the results of this report indicate that *H. acanthocercus* is one of the most dangerous scorpions in south of Iran. Further studies are recommended due to lack of sufficient information on the toxicology of these scorpions done.

Acknowledgments:

This case is part of a thesis prepared at the Infectious Disease Research Center, Hormozgan University of Medical Sciences, and it was approved and financed by the Research Council. The authors are grateful to Mrs. Bahmani and Mr. Ghasemi in the Department of Medical Records at Shahid Mohamadi Hospital, Hormozgan University of Medical Sciences, for their assistance.

Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

References

- 1) Isbister GK, Bawaskar HS. Scorpion Envenomation. *New Engl J Med*. 2014; 371(5): 457-63. doi: 10.1056/NEJMra1401108. PMID: 25075837.
- 2) Kassiri H, Feizhaddad M, Abdehpanah M. Morbidity, surveillance and epidemiology of scorpion sting, cutaneous leishmaniasis and pediculosis capitis in Bandar-mahshahr County, Southwestern Iran. *Journal of Acute Disease*. 2014; 3(3):194-200. doi: 10.1016/S2221-6189(14)60043-3.
- 3) Lourenco WR. The scorpions families and their geographical distribution. *Journal of Venomous Animal and Toxins including Tropical Diseases*. 2001; 7 (1): 3-23. doi: 10.1590/s0104-793020011000100002.
- 4) Soleglad ME, Fet V, Kovařík F. The systematic position of the scorpion genera *Heteroscorpion* Birula, 1903 and *Urodacus* Peters, 1861 (Scorpiones: Scorpionoidea). *Euscorpium*. 2005; 20: 1-38.
- 5) Monod L, Lourenco WR. Hemiscorpiidae (Scorpiones) from Iran, with descriptions of two new species and notes on biogeography and phylogenetic relationships. *Revue Suisse de Zoologie*. 2005; 112(4): 869-941.
- 6) Lourenco WR. The genus *Hemiscorpius* Peters, 1861 (Scorpiones: Hemiscorpiidae) in East Africa, and description of a new species from Somalia. *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg*. 2011; 15 (185):275-85.
- 7) Lourenco WR. More about the African species of *Hemiscorpius* Peters, 1861 (scorpions: hemiscorpiidae), and description of new species from Egypt. *Boletín de la Sociedad Entomológica Aragonesa*. 2011; 49:23-6.
- 8) Kassiri H, Kassiri A, Kassiri E, Safarpor S, Lotfi M. A Hospital-base Study on Scorpionism in Khorram-Shahr County Southwestern Iran. *Asian Journal of Epidemiology*. 2014; 7(2):28-35. doi: 10.3923/aje.2014.28.35.
- 9) Vazirianzadeh B, Hossienzadeh M, Moravvej S, Vazirianzadeh M, Mosavi S. An epidemiological study on scorpion stings in Lordegan County, south-west of Iran. *Archives de L'Institut Razi*. 2013; 68(1):71-6.
- 10) Manouchehrifar M, Khosravi Sh, Khavanin A, Derakhshandeh N. Report of 267 Cases of Scorpion Bite Referring to an Emergency Department during One Year. *Emergency*. 2013; 1(1):24-6.
- 11) Radmanesh M. Cutaneous manifestation of the *Hemiscorpius lepturus* sting: a clinical study. *Int J Dermatol*. 1998; 37(7):500-7. doi: 10.1046/j.1365-4362.1998.00386.x. PMID: 9679690

- 12) Amir Jalali A, Pipelzadeh MH, Sayedian R, Rowan EG. A review of epidemiological, clinical and in vitro physiological studies of envenomation by the scorpion *Hemiscorpius lepturus* (Hemiscorpiidae) in Iran. *Toxicon*. 2010; 55(2-3):173-9. doi: 10.1016/j.toxicon.2009.09.012. PMID: 19799924.
- 13) Dehghani R, Djadid N, Shahbazzadeh D, Bigdelli S. Introducing *Compsobuthus matthiesseni* (Birula, 1905) scorpion as one of the major stinging scorpions in Khuzestan, Iran. *Toxicon*. 2009; 54(3):272-5. doi: 10.1016/j.toxicon.2009.04.011. PMID: 19393258.
- 14) Saini T, Gupta S, Kumhar M. Scorpion Bite causing Acute Severe Myocarditis: A Rare Complication. *Indian J Clin Pract*. 2012; 23(3):166-8.
- 15) Dittrich K, Ahmad R, Ahmad QA. Cardiac arrest following scorpion envenomation. *Ann Saudi Med*. 2002; 22(1-2):87-90. PMID:17259777
- 16) Pipelzadeh M, 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(7): 984-92. doi: 10.1016/j.toxicon.2007.07.018. PMID: 17854855.
- 17) Lowe G. Two new *Hemiscorpius* Peters, 1861 (Scorpiones: Hemiscorpiidae) from Northern Oman. *Euscorpius*. 2010; 91:1-24.
- 18) Rahmani A, Jalali A. Symptom patterns in adult patients stung by scorpions with emphasis on coagulopathy and hemoglobinuria. *Journal of Venomous Animals and Toxins including Tropical Diseases*. 2012; 18(4):427-31. doi: 10.1590/S1678-91992012000400011.
- 19) Zare Mirakabadi A. *Hemiscorpius lepturus* envenomation: Manifestations and management with specific antivenom. *Archives de L'Institut Razi*. 2013; 68(2): 91-9.
- 20) Paknahad A, Pouraskar M, Ghasemi Pour A. A review of scorpion stings in Iran. *J Curr Res Sci*. 2014; 2(6):887-90.
- 21) Afzali N, Pezeshki N. Surveying of kidney acute dysfunction following *Hemiscorpius lepturus* sting in children. *J Med Sci Ahvaz Jundishapur Univ Med Sci*. 1998; 25:42-8.
- 22) Valaei E, Alemzadeh Ansari M. Hemolytic uremic syndrom following *Hemiscorpius lepturus* (Scorpion) sting. *Indian J Nephrol*. 2010; 18(4):166-8. doi: 10.4103/0971-4065.45293. PMID: 20142930, PMCID: PMC2813541.
- 23) Souza DG, Tanaka K, Algemiro W, Dezena RA, Borges MM. Hemorrhagic stroke following scorpion sting. A case report. *Revista Chilena de Neurocirugía*. 2013; 39:69 - 70.
- 24) Pourkhalili K, Kim E, Mashayekhy NR, Kamyab M, Hoseiny MM, Evazy R, et al. Cardiotoxic and Arrhythmogenic Effects of *Hemiscorpius lepturus* Scorpion Venom in Rats. *Iranian Journal of Arthropod-Borne Diseases*, 2015; 9(2): 215-225.
- 25) Radmanesh M. Clinical study of *Hemiscorpius lepturus* in Iran. *J Trop Med Hyg*. 1990; 93(5):327-32. PMID: 2231841.
- 26) Srairi-Abid N, Shahbazzadeh D, Chatti I, Malayah_Bellalouna S, Mejdoub H, Borchani L. Hemitoxin, the first potassium channel toxin from the venom of the Iranian scorpion *Hemiscorpius lepturus*. *FEBS J*. 2008; 275(18): 4641-4650. doi: 10.1111/j.1742-4658.2008.06607.x. PMID: 18699777.
- 27) Mohseni A, Vazirianzadeh B, Hossienzadeh M, Salehcheh M, Moradi A, Moravvej S. The roles of some scorpions, *Hemiscorpius lepturus* and *Androctonus crassicauda*, in a scorpionism focus in Ramhormoz. *Southwestern Iran. J Insect Sci*. 2013; 13(89):1-12. doi: 10.1673/031.013.8901. PMID: 24219757. PMCID: PMC38355033.
- 28) Emam SJ, Khosravi AD, Alemohammad A. Evaluation of Hematological and Urine Parameters in *Hemiscorpius lepturus* (Gadim) Victims Referred to Razi Hospital, Ahvaz, Iran. *Journal of Medical Sciences*. 2008; 8(3): 893(306-309). doi: 10.3923/jms.2008.306.309
- 29) Emam S, Malihi R, Jafari Mosavi S, Vazirianzadeh B, Visi I. Evaluation of hematological and urine parameters in *Hemiscorpius lepturus* (Gadim) victims referred to health centre of Hendijan, sw Iran, 2008. *Jundishapur Journal of Health Sciences*. 2011; 3(1):12-18.
- 30) Dehghani R, Khamechian T, Vazirianzadeh B, Moravvej S. Toxic effects of scorpion, *hemiscorpius lepturus* (hemiscorpiidae) venom on mice. *J. Anim. Plant Sci*. 2012; 22(3):593-6.
- 31) Kassiri H, Kassiri A, Shariffar M, Shojaee S, Lotfi M, Kasiri E. Scorpion envenomation study in Behbahan County, Southwest Iran. *Journal of Coastal Life Medicine*. 2014; 2(5):416-20. doi: 10.12980/JCLM.2.201414J24.
- 32) Amir Jalali A, Rahim F. Epidemiological Review of Scorpion Envenomation in Iran. *Iran J Pharm Res*. 2014; 13(3):743-56. PMID: 25276176, PMCID: PMC4177636.