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A Retrospective Analysis of Scorpion Envenomation Cases Treated in Rozhhalat Emergency Hospital Erbil City in 2018

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Original Article

Summary

Scorpion sting cases are frequently presented to emergency departments. The definite epidemiology and clinical characteristics of these cases in Kurdistan are still vague. To assess demographical data on scorpion envenomation cases, the treatment given and the complications and the outcome of envenomation in Rozhhalat Emergency Hospital, Erbil city of Kurdistan. This is a retrospective cross sectional review conducted in Rozhhalat Emergency Hospital in Erbil, Kurdistan Region of Iraq. The study duration is one year, from 1st of January to 31st of December 2018, on 147 patients with scorpion sting. The diagnosis of scorpion sting is made by the Emergency Physician according to the history of the sting and clinical examination findings. The severity of scorpion envenomation is measured according to clinical findings and complications. Our findings revealed a mean age of patients with scorpion sting in this study is (35.3 years), 45.6% of them are in age group of 18-64 years with female gender predominance. The lower extremity is the prevalent anatomical site and 19.7% of patients presented to the emergency department within one hour after the sting. Generally, the vital signs and examination findings are abnormal in a low proportion of patients with scorpion sting, however, 69.4% of them had local pain. Only one patient is categorized at grade IV of scorpion envenomation. The patients are treated by analgesia, antihistamines, steroids and 31.9% of them are treated with antivenin. All studied patients are alive and only one patient needed admission to intensive care unit. In conclusions: The majority of scorpion sting patients presented to the emergency department in Erbil are mild cases.

Keywords: *Scorpion sting, Envenomation, Emergency, Antivenin.*

1. INTRODUCTION

Scorpion stings are regarded as a common and a dangerous medical emergency presentation, represented with higher incidence and aggressiveness specifically in tropical and subtropical areas all over the world reaching to about one and a half million stings per year 1, 2. Scorpion sting and envenomation are considered as a neglected disease by World Health Organization 3, most commonly in developing countries 4-6. The Buthidae scorpions are a highly prevalent venomous family of scorpions reported in Middle East, specifically the buthacus, leiurus, androctonus and vachoniolus subtypes 3. In Iraq, nineteen subtypes related to five families (Buthidae, Euscorpiidae, Hemiscorpiidae Iuridae and Scorpionidae) are distributed within different geographies of the country. The scorpions in Iraq are mainly Buthidae that includes nine generations and fifteen subtypes 7. The composition of scorpion venoms is made mainly from a complicated mix of low molecular weight proteins which causes prolongation of depolarizing the post-ganglionic nerve ends distributed in human body, causing release of neurotransmitters, triggering the dominance of the systemic effects 6, in addition to causing pulmonary edema through permeation of lung capillaries resulting from toxin effect on mediators of the inflammatory response and cardiac fibers 8. The main symptom of scorpion sting is the local pain which varies in intensity and radiation. Additionally, other local symptoms are reported like numbness, redness, hyperesthesia and oedema 2. The systemic signs and symptoms of scorpion stings are obvious within few hours following the stings, more commonly in the pediatric age group 1. Severity of scorpion envenomation is categorized into four grades, Grade I (local pain and/or paresthesia at the site of envenomation) Grade II (pain and/or paresthesia remote from the site of the sting, in addition to local findings) Grade III (either cranial nerve/autonomic dysfunction or somatic skeletal neuromuscular dysfunction) Grade IV (combined cranial nerve/autonomic dysfunction and somatic nerve dysfunction). Furthermore, the adverse outcomes of scorpion envenomation are pulmonary oedema, shock and organ failure that can lead to death 9. Bad prognosis of scorpion envenomation is frequently reported in children under five years and in patients with delayed management 1. Diagnosis of scorpion stings in emergency departments is based on history and clinical examination. The complementary investigations are needed for moderate to severe cases of envenomation during the first week of the accident especially after taking the scorpion antivenom (SAV) 10, 11. These investigations

include blood-work, urine tests, electrocardiogram, chest X-ray, echocardiography and computed brain tomography 12. The treatment of severe scorpion envenomation is generally composed of symptomatic treatment, support of vital signs and specific treatment such as SAV 13. In spite of the fact that more than 85-90% of the scorpion envenomation is mild which needs no specific treatment 14. The mechanism of SAV action is based on neutralization of the circulating scorpion toxins and absorbing these toxins at the injection site before entering circulation, in order to reduce or stop releasing of mediators before systemic effect 12. In recent studies, many authors have reported better outcomes with the helpful effect of SAV combined with prazosin within four hours after the sting 15-17. Other authors reported the efficacy of this combination in improving the neurological complications in children stung by scorpions 18. The SAV is prescribed commonly in moderate and severe cases, and in children under five years of age 19. Geographically, Iraq is considered a subtropical region which is located between Arabian deserts and the humid Arabian Gulf characterized by a continental climate, hot at summer and cold at winter. These geographical and climate variations in Iraq have led to diversity of scorpion families and subtypes in different regions 20. In Kurdistan Region, scorpion sting is regarded as a main health risk that is accompanied with a high morbidity and mortality during summer, in addition to a great burden on the healthcare system and especially on the emergency departments 21. For that, this study aimed to assess demographical data on scorpion envenomation cases, the treatment given and the complications and the outcome of envenomation in Rozhhalat Emergency Hospital, Erbil, Kurdistan.

2. PATIENTS and METHODS

This study is a retrospective cross sectional review conducted in Rozhalat Emergency Hospital in Erbil, Kurdistan Region of Iraq. The study duration is one year, from 1st of January to 31st of December, 2018. The study population is all the patients with scorpion sting presented to Rozhalat Emergency Hospital during the study duration. The inclusion criteria are patients with scorpion sting history aged 12 years or older presented or referred to Rozhhalat Emergency Hospital. Exclusion criteria are patients with unconfirmed animal responsible for sting, missing data and unregistered patients. The ethical considerations are

implemented according to Helsinki Declaration regarding ethical approval of Health authorities; an ethical approval is obtained from the Ethical Committee of Kurdistan Board for Medical Specialties. A convenient sample of 147 patients with scorpion sting is selected after eligibility to inclusion and exclusion criteria. The data are collected by the researcher from saved records of scorpion stung patients in Rozhalat Emergency Hospital and fulfilled in a prepared questionnaire. The questionnaire is designed by the researchers. The questionnaire includes the following information: sociodemographic characteristics of scorpion stung patients (age, gender and residence) scorpion sting characteristics of patients (time of sting, anatomical sting sites and admission time after scorpion sting), vital signs of patients (blood pressure, pulse rate, respiratory rate, SPO2 and Glasgow Coma Scale), systemic examination findings of scorpion sting patients (chest, cardiovascular, neurological and abdominal examinations findings), local examination findings of patients (local signs and symptoms and grades of envenomation) and treatment with outcome of patients. The diagnosis of scorpion sting is made by the Emergency Physician according to the history of the sting and clinical examination findings. The data collected are analyzed statistically by Statistical Package of Social Sciences Software version 22. The data are organized in suitable tables.

3. RESULTS

This study includes 147 patients with scorpion sting with mean age of (35.3 years) and range of 0-69 years; 10.9% of patients are in the age group of 0-12 years, 27.2% of them are in age group of 13-17 years, 45.6% of them are in the age group of 18-64 years and 16.3% of them are in age group of 65 years and above. Females with scorpion stings are more than males with female to male ratio of 1.2:1. The residence of patients is inside Erbil city for 49% of them and outside Erbil city for 51% of them. (Table 1). Timings of the Scorpion stings are at day time for 42.2% of patients, night time for 46.9% of patients and unknown for 10.9% of patients. The anatomical sites of Scorpion stings are mainly in the lower extremity (57.1%) and in the upper extremity (32%), followed by body (4.8%) and unknown (6.1%). The time from sting occurrence to presentation to hospital are distributed as followings; 0-1 hour (19.7%), 1-2 hours (25.2%), 2-3 hours (19.7%), 3-4 hours (19%), more than 4 hours (10.2%) and unknown (6.1%). (Table 2). The blood pressure of Scorpion

sting patients is commonly normal for age (84.4%), hypertensive (12.2%) and hypotensive (3.4%). The pulse rate is normal for age in most of Scorpion sting patients, while tachycardia is observed in 6.1% of patients and bradycardia is observed in 1.4% of patients. The respiratory rate of Scorpion sting patients is mostly normal, however, only one patient has hypercapnia. The SPO2 is normal in 83.7% of Scorpion sting patients and unknown in 16.3% of them. Glasgow Coma Scale reveals normal scale in 99.3% of Scorpion sting patients and 9-14 scale in only one patient. (Table 3). The systemic examination of Scorpion sting patients shows that 93.2% of them has normal chest examination, while unknown in 6.8% of them, 92.5% of them have normal cardiovascular system examination, while unknown in 7.5% of them. Only one patient has abnormal neurological examination while 99.3% of patients have normal neurological examination. Also the abdominal examination is normal in 92.5% of Scorpion sting patients, while unknown in 7.5% of them. (Table 4). Local signs and symptoms are unknown in 20.4% of Scorpion sting patients, however, 69.4% of patients have local pain and 10.2% of patients have hyperemia. Most of the patients (99.3%) are classified as Grade I of envenomation except one who is classified as Grade IV. (Table 5). The common treatments of Scorpion sting patients is Analgesia (100%), Antihistamines (97.9%) and Steroids (89.1%); followed by, Antivenin (31.9%), Tetanus IG (Immunoglobulin) (3.4%), local anesthetic (1.4%) and Benzodiazepines and Barbiturates (0.7%). The outcome of Scorpion sting patients after treatment is recovery for most of them (99.3%) and only one patient admitted to intensive care unit with no reported death. (Table 6)

Table 1: Socio-demographic characteristics of Scorpion stings patients.

Variable	No. of patients	%
Age		
0-12 years	16	10.9
13-17 years	40	27.2
18-64 years	67	45.6
≥65 years	24	16.3
Gender		
Male	66	44.9
Female	81	55.1
Residence		
Inside Erbil city	72	49.0
Outside Erbil city	75	51.0
Total	**147**	**100.0**

Table 2: Scorpion stings characteristics of patients.

Variable	No. of patients	%
Time of sting		
Day	62	42.2
Night	69	46.9
Unknown	16	10.9
Anatomical Sting Site		
Lower Extremity	84	57.1
Upper Extremity	47	32.0
Body	7	4.8
Unknown	9	6.1
Admission time after sting (hour)		
0-1 hour	29	19.7
1-2 hours	37	25.2
2-3 hours	29	19.7
3-4 hours	28	19.0
>4 hours	15	10.2
Unknown	9	6.1
Total	**152**	**100.0**

Table 3: Vital signs of Scorpion sting patients.

Variable	No. of patients	%
Blood Pressure (BP)		
Normal for age	124	84.4
Hypertensive	18	12.2
Hypotensive	5	3.4
Pulse Rate (PR)		
Normal for age	136	92.5
Tachycardic	9	6.1
Bradycardic	2	1.4
Respiratory Rate (RR)		
Normal for age	146	99.3
Hypercapnic	1	0.7
SPO_2		
Normal	123	83.7
Unknown	24	16.3
Glasgow Coma Scale		
Normal (15/15)	146	99.3
9-14	1	0.7
Total	**147**	**100.0**

Table 4: Systemic examination findings of Scorpion sting patients.

Variable	No. of patients	%
Chest examination		
Normal	137	93.2
Unknown	10	6.8
Cardiovascular system examination		
Normal	136	92.5
Unknown	11	7.5
Neurological examination		
Normal	146	99.3
Abnormal	1	0.7
Abdominal examination		
Normal	136	92.5
Unknown	11	7.5
Total	**147**	**100.0**

Table 5: Local examination findings and grading of Scorpion sting patients.

Variable	No. of patients	%
Local Signs and Symptoms		
Local pain	102	69.4
Hyperemia	15	10.2
Unknown	30	20.4
Grade of Envenomation		
Grade I	146	99.3
Grade IV	1	0.7
Total	**147**	**100.0**

Table 6: Treatment and outcomes of Scorpion sting patients.

Variable	No. of patients	%
Treatment		
Analgesia	147	100.0
Antihistamines	146	97.9
Steroids	131	89.1
Antivenin	47	31.9
Tetanus IG	5	3.4
Local Anesthetic	2	1.4
Benzodiazepines and Barbiturates	1	0.7
Outcome		
Recovery	146	99.3
ICU (Intensive Care Unit)	1	0.7
Death	0	-
Total	**147**	**100.0**

4. DISCUSSION

Scorpion sting is a common presentation to emergency departments globally 22. Despite this fact, the epidemiology of scorpion sting all over the world is not fully clear, especially in Arabic countries as scarce studies discussing this lethal emergency 2. It is known that scorpions are distributed in all areas of the world except in the Antarctic, they are widely distributed in tropical and subtropical regions and less commonly seen in low temperature areas 23. Present study shows that 147 patients with scorpion sting presented to Rozhhalat Emergency Hospital, the mean age is (35.3 years); 45.6% of them are in the adulthood age group. This finding is close to results of Kachel study in Kurdistan which reports that 59% of patients presented with scorpion sting in Zakho city hospitals are at age group of 15-49 years 20. Current study results regarding age is also close to results of Mashidfar et al 24 cross sectional study in Iran which found that 45% of scorpion stung cases were at age group of 20-39 years. In Turkey, a retrospective study carried out by Yilmaz et al 25 on 123 patients with scorpion stings presented to the emergency showed that 61% of patients were at age group of 19-49 years. The incidence of scorpion stings is more prevalent among adults, however, the severity of symptoms and mortality rate is higher among children due to lower body weight in addition to other risk factors 26. In current study, 55.1% of patients with scorpion sting are females and female to male ratio is 1.2:1. This finding is similar to results of Shahsavarinia et al 27 study in Iran which revealed that 52.3% of scorpion stung cases were females. It is evident that scorpion sting affects the offspring in the pregnant and lactating women 28. The present study reports that 51% of cases with scorpion stings are residents outside Erbil city. Elyamani et al 29 study in Morocco documented that prevalent scorpion sting patients are rural residents.

Current study shows that scorpion stings occurr at night time predominantly and are targeting the lower extremities. Konca et al 30 reported that 66.2% of scorpion sting cases in Turkey were affecting lower extremities, but more prevalent at day time. Higher stings at night time in our study can be due to differences in population demographics, lifestyle and behavior. Only 19.7% of patients with scorpion stings in this study presented to the emergency department within one hour from sting, while 10.2% of them presented within more than four hours. This finding is inconsistent with results of Abd El-Aziz et al 31 study

in Egypt which recorded that 92.7% of scorpion sting patients presented to the emergency within one hour. This inconsistency can be attributed to a lesser awareness of the population for scorpion stings and the long distance from the hospital for patients living outside Erbil.

In present study, hypertension is observed among 12.2% of patients with scorpion sting and hypotension is shown among 3.4% of them, while bradycardia is recorded in two patients. These findings is similar to results of Tan and Mong study in Singapore 32 which documented low proportion of scorpion sting cases with abnormal vital signs. The Glasgow Coma Scale is below normal in one patient only, that also has abnormal neurological examination. Many literatures revealed rare abnormal neurological complications of scorpion stings 31, 33. Our study revealed that 69.4% of patients had local pain and 10.2% of patients had hyperemia. This finding is consistent with results of many studies like the Hussen and Ahmed study in Kurdistan 21, Abourazzak et al 34 study in Morocco and Yadav et al 35 study in India which all state that local pain is the most common presentation of scorpion sting followed by hyperemia. In general, the majority of studied scorpion sting cases in this study are at Grade I Envenomation, only one patient is reported to be a Grade IV Envenomation. Similarly, a previous analysis review study in Saudi Arabia on 1449 scorpion sting patients showed that 92.3% of them were at Grade I Envenomation severity, while the others were at grades II and III of severity 36. The severity of scorpion envenomation is dependent on patient characteristics like age, scorpion characteristics like family, subtype and toxin dose in addition to the time between actual sting occurrence and reaching the hospital.

The present study reveals that common treatment of scorpion sting used are analgesia, antihistamines, steroids and antivenin, etc. The antivenin is used for 31.9% of patients in this study. Although the antivenin is not recommended for scorpion sting cases with grade I, 37 it is given to some younger and older patients, and also given according to their clinical status or late presentation to the emergency department. Current study shows that only one patient is referred to intensive care unit with no reported death. These findings are in agreement with Kachel study in Kurdistan 20, Jarrar and Al-Rowaily study in Saudi Arabia 36 and Alkahlout et al 38 study in Qatar which didn’t report any death among the patients with scorpion sting in their study.

5. CONCLUSIONS

Majority of scorpion sting patients that present to Rozhhalat Emergency Hospital are mild cases. Most of the patients have local signs with normal examination findings. Current study recommends careful examination of patients with scorpion sting, taking grading of envenomation into consideration for measuring the severity and when prescribing treatment. 46 of the 47 patients that received antivenin are classified as Grade I, this could be the factor that prevented worse outcome and more severe grading, and helped in early discharge.

Ethical Clearance: Ethical clearance and approval of the study are ascertained by the authors. All ethical issues and data collection were in accordance with the World Medical Association Declaration of Helsinki 2013 for ethical principles for medical research involving human subjects, informed consent obtained from all patients. Data and privacy of patients were kept confidentially.

Conflict of interest: Authors declared none

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