

A CLINICAL SPECTRUM OF SCORPION STING AT VIJAYANAGAR INSTITUTE OF MEDICAL SCIENCES, BELLARYShashidhar G¹, Lokesh S², Aravind Karinagannanavar³**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: Scorpion sting envenomation is a relatively common medical emergency accounting for nearly 9.27% of annual ICU admissions and much more out-patient visits. Symptomatology and severity of envenomation varies greatly. **OBJECTIVES:** 1) To study the clinical manifestations 2) To study the Various electrocardiographic manifestations of scorpion sting. **METHODOLOGY:** This is a prospective study conducted in the department of medicine, VIMS, Bellary, during the period from December 2008- December 2009. All cases with history of scorpion sting were examined thoroughly for various systemic manifestations and were included in the study. Total of 100 cases of scorpion sting envenomation were studied for various clinical manifestations and ECG changes, patients were examined frequently; at admission, 1 hour, 6 hours, 12 hours, 24 hours and 48 hours after the admission and further examination was done where ever needed. **RESULTS:** A total of 100 cases of scorpion envenomation were included in the study, 58 males and 42 females with majority of cases in 11-30 year age group. 95% reached the hospital within 24 hours. 14% of the patients had grade-2, 66% had grade-3 and 20% had grade-4 disease, all grades were common in 11-30 age group. 95% had pain, 40% had tachycardia 32% had profuse sweating; pulmonary oedema was present in 9% of the patients. Excessive salivation was seen in 10% and hypotension in 6%. ECG changes were present in 60%. **CONCLUSION:** Scorpion sting envenomation is a relatively common health problem. Severe cardiopulmonary manifestations like myocarditis, pulmonary oedema and severe hypotension are potentially lethal if proper care is not taken.

KEYWORDS: Scorpion bite, Clinical spectrum, ECG changes.

INTRODUCTION: In the struggle for existence, the fittest survives. Undoubtedly, man has proved himself to be the fittest of all living things. Still his fitness is being continuously tested by the inferior mortals, which include micro-organisms like the bacteria, viruses and other microbes and the macro-elements which include other animal population. Notably among these, are the arthropods and among the arthropods, the scorpions stand out prominently as frequent and notorious offenders. Scorpion sting is a major health problem in tropical and subtropical countries, the fact that many of these areas are under developed, problem is not properly assessed and the consequences are under reported owing to poor medical and statistical facilities.^{1,2} Because of above reasons the true incidence of this common rural, to some extent on occupational hazard is not known.²

There are about 1500 scorpion species worldwide, 50 are dangerous to humans. Almost all of lethal scorpion belongs to Buthide family.³ There are about 86 species of scorpions are found in India.^{1,2} Only three scorpions found in India are poisonous they include:¹

1. Mesobuthus tamulus.
2. Palamneus swammerdami.
3. Heterometrus bengalensis.

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In India they are commonly found in Karnataka (Bellary District, Hassan) Maharashtra (Raigad district), Madurai, Madras, Pondicherry, Madhya Pradesh, Ganjam and West Bengal.⁴ Though there are various species of scorpions, not all are found in all geographic location. Despite of this difference there is no difference in symptomatology following envenomation. Scorpions are not aggressive they do not hunt for prey; they wait for it.

Envenomation due to scorpion sting results in various clinical manifestations they range from mild local pain to diffuse irresistible pain of whole limb and body to systemic manifestation involving almost all system, predominantly cardiovascular and may sometimes lead to death.^{3,5} Most of the manifestations of scorpion envenomation are due to stimulation of autonomic nervous system either directly or indirectly; resulting in various autonomic system disturbances; most important is autonomic storm.^{5,6}

Various treatment modalities are available for scorpion sting, which are broadly classified in to local measures and systemic measures. Locally Xylocaine infiltration, Systemic is O₂ inhalation, insulin glucose infusion atropine, nefedepine, captopril, serotherapy and recently prazosin, which is used almost as pharmacological antidote for scorpion sting.⁷

This study deals with various clinical manifestation of scorpion sting and various electrocardiographic abnormalities due to scorpion envenomation.

OBJECTIVES:

1. To Study the clinical spectrum of scorpion sting.
2. To study the various electrocardiographic manifestations in scorpion sting.

MATERIAL AND METHODS:

Source of Data: All patients presenting with history of scorpion sting to VIMS hospital, Bellary during the period of December 2008 – December 2009.

Method of collection of Data: All patients with history of scorpion sting were subjected to thorough clinical examination to assess various systemic manifestations. For purpose of the study, cases were allocated in to four groups according to severity of envenomation they include grade-1 to grade-4:

- **Grade-1:** local pain and paresthesia without any systemic manifestations. These patients were observed for 24 hours.
- **Grade-2:** Patients with pain and paresthesia distant from the site of sting with or without tachycardia or with mild hypertension without other cardiovascular or respiratory signs.
- **Grade-3:** Those with peripheral collapse, cardiovascular manifestations, respiratory manifestations or mild neurological symptoms were included.
- **Grade-4:** Those patients with central nervous system signs and multi system involvement.

Patients with grade-1 disease were discharged after symptomatic therapy. Patients with grade-3 and grade-4 envenomation were admitted in ICCU ward and those with grade-2 envenomation were admitted in medical emergency department. All cases were asked detailed history and subjected to thorough clinical examination. All the patients were subjected to necessary investigations.

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Demographic features like age, sex, time since sting to the arrival to the hospital and clinical parameters like pain at the site of sting, swelling, paresthesia, profuse sweating, excessive salivation and hypotension and ECG changes were studied. All patients were received tetanus toxoid depending on immunization status. All patients with local pain were treated with 2% Xylocaine local infiltration and repeated if necessary. Tab-Prazosin, except those with hypotension. I.V fluids, diuretics, O₂ inhalation and inotropic supports were given whenever required. Patients were followed up at regular intervals, at 1 hr, 6 hrs, 12 hrs, 24 hrs, and 48 hrs and if necessary till the patients were discharged from the hospital.

Inclusion Criteria: All patients with history of scorpion sting and Patients aged 11 years and above.

Exclusion criteria:

1. Patients with pre-existing congenital heart diseases, Ischaemic heart diseases, Valvular heart diseases.
2. Pregnant women
3. Patients with Diabetes and CKD.

RESULTS: Results of the study which involved 100 patients of scorpion sting envenomation are as follows:

Number of cases of scorpion sting during the study period was 100. Out of which 63 were out patient cases and remaining 37 were in-patients. Patients admitted with systemic manifestations account for 9.27% of total ICU admissions.

Age	Male	Female	Total
11-20	14	12	26
21-30	20	14	34
31-40	17	6	23
41-50	3	5	8
51-60	3	2	5
61-70	1	3	4
Total	58	42	100

Table 1: Showing age and sex distribution of scorpion sting cases

Maximum incidence of scorpion sting was seen in the age group of 11 to 30 years, accounting for 60% of the patients. Mean age for all patients is 30.28 years, Mean age for males is 30.34 years, Mean age for females 30.1 years, Majority of cases were male (58) 58%, Sex ratio for males and females is 1.38:1.

Time since sting	No. of cases
<6 hrs	55
6-24 hrs	40
> 24 hrs	5

Table 2: Showing time since sting to arrival to Hospital

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About 55% of patients reached hospital within 6 hours, another 40% within 24 hours. Only 5 patients reached hospital after 24 hours.

Age group	Severity of envenomation			Total
	Grade-2	Grade-3	Grade-4	
11-20	4	14	8	26
21-30	8	22	4	34
31-40	-	17	6	23
41-50	-	8	-	8
51-60	-	3	2	5
61-70	2	2	-	4
Total	14	66	20	100

Table 3: Showing relation between Age and Severity of envenomation

All grades of envenomation were common in the age group of 11 to 30 years.

60 patients belong to this age group. (66) Patient's had grade 3 disease, about (20) of patients had grade 4 disease and only (14) of the patients had grade 2 envenomation.

Severity	Male	Female	Total
Grade 2	2	4	6
Grade 3	44	30	74
Grade 4	12	8	20
Total	58	42	100

Table 4: Showing relation between sex and severity of the disease

About (44) Of the males and (30) of the females had grade 3 envenomation, accounting for total of 74%. About 12% of the males and 8% of the females belonged to grade-4 envenomation. Remaining 6% had grade-2 envenomation.

Clinical features in scorpion Envenomation:

Pain: was present in 53 males and 42 females, overall 95%.

Paresthesia: 38 males and 40 female patients had paresthesia, accounting for 78% in both the sex.

Profuse sweating: 32 patients had profuse sweating, 12 from males and 20 from females.

Excessive salivation: 8 males and 2 females had excessive salivation.

Nausea/ Vomiting: were present in 6 males and 4 females.

Breathlessness: 11 patients had breathlessness. 8 from males and 3 from female.

Tachycardia: Was present in 40 patients.

Bradycardia: Only 4 had bradycardia.

Tachypnoea: Was present in 38 patients, 20 males and 18 females.

Hypertension: 8 patients had hypertension.

Hypotension: Was present in 6 patients.

Cold peripheries: 16 males and 16 females had cold peripheries, accounting for 32% of patients.

Mydriasis: Present in 19 patients.

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Pulmonary edema was present in 9 patients. LVS3 was noted in 9 patients, common among male patients involving 7 of the patients. Cardiac murmur was audible in 7 patients, which was of 2-3/6 grade apical systolic murmur.

Sinus tachycardia	40
Bradycardia	4
ST changes	20
T-wave changes	35
Bundle branch block	2
First degree block	4

Table 5: Showing various ECG changes in patients with scorpion sting

Our study shows majority of the patients had sinus tachycardia and least was bundle branch block.

11-20	20
21-30	24
31-40	10
41-50	4
51-60	-
61-70	2
Total	

Table 6: Showing age wise distribution of abnormal ECGs

Our study revealed that more abnormal ECGs were found in age group between 21-30 years.

ECG changes	Male	Female	Total
Sinus tachycardia	26	14	40
Bradycardia	3	1	4
ST changes	14	6	20
T-wave changes	20	15	35
Bundle branch block	0	2	2
First degree block	1	3	4

Table 7: Showing sex wise distribution of abnormal ECGs

ECG changes	Grade 2	Grade 3	Grade 4
Sinus tachycardia	2	30	8
Bradycardia	-	2	2
ST changes	-	10	10
T-wave changes	1	19	15
Bundle branch block	0	1	1
First degree block	-	2	2

Table 8: Showing relation between severity of Envenomation and ECG changes

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Our study showed that ECG changes were more common with Grade 4 severity of envenomation.

In this study, 3 patients died despite management in the hospital. The fatal cases are briefly described:

1. **Case no 34:** An 18 year old boy presented to the hospital with a history of scorpion sting after about 20 hours of sting. He presented with complains of breathlessness and palpitations which started about 12 hours after sting. On enquiry he admitted that he had local pain initially and later had severe sweating, vomiting and cold extremities. On examination patient was cyanosed, his blood pressure was 70 mm hg systolic and he had tachycardia, third heart sound and left parasternal systolic murmur He had basal crepitations also suggesting pulmonary oedema. ECG showed sinus tachycardia with non-specific ST-T changes suggesting myocarditis. He was treated but succumbed to his illness on the third day of his admission.
2. **Case no 70:** This patient was again a 18 year old male and presented to the hospital with complains of chest pain, breathlessness and palpitation. He also had history suggestive of autonomic storm. Examination showed cyanosis, tachycardia, hypotension, tachypnoea, gallop rhythm and features of pulmonary oedema. ECG showed sinus tachycardia with ST depression and T wave inversion He died after 6 hours of admission.
3. **Case no 96:** This patient was a 16 year old male presented to the hospital with history suggestive of autonomic storm followed by breathlessness. He was in shock (BP 60 mm hg systolic), cyanosed and had tachypnoea and tachycardia. Cardiac auscultation revealed third heart sound and a systolic murmur in the left parasternal region and had bilateral basal crepitations. ECG changes were nonspecific with sinus tachycardia and ST depression in all the leads. He also died after 8 hours of admission.

All the deaths were due to myocarditis with acute left ventricular failure and pulmonary edema.

DISCUSSION: 100 patients were prospective studied during the period of 12 months from December 2008 to December 2009. Scorpion sting envenomation is relatively common medical emergency in this hospital accounting for nearly 400 emergency department visits. In the present study period of 12 months 100 cases of scorpion sting envenomation were included in the study. Overall 927 cases admitted to ICCU annually during the study period. 9.27% of them are due to scorpion sting. This is a very significant number.

Age and sex distribution of cases of scorpion Sting: As we are not having access to patients aged less than 10 years; because children's hospital is situated some distance away from VIMS institution, we excluded these patients. Age of the patients in this study ranged from 11 years to 70 years, with mean age of envenomation was 30.28 years.

There is no difference in mean age for male and female patients. In this study most (60) of the patients belonged to the age group of 11-30 years, accounting for total of 60% of patients. This may be due to the fact that the scorpion envenomation is purely an accidental phenomenon, associated with increased human activity which is common during this age group.

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Majority (58%) of the patients in this study were males, this may be again because of increased outdoor activities especially during morning and evening hours.

Time of the day during Sting: Majority (48%) of the patients had sting during early morning hours i.e., 6 am to 12noon. Another 38% had sting between 6 pm to 10 pm. 10 patients had sting between 12 noon to 6 pm and only 4 patients had sting between 10pm to 6am. All 4 of them occurred at home, while in bed and all were multiple sting. This indicates that most of the scorpion stings (86%) occurred between 6am to 12 noon and 6pm to 10pm, indicating the maximum activity of people during these hours; scorpions are also more active during these hours. This is in accordance with previous studies.³

Time since sting to arrival to Hospital: 95 patients in this study presented to emergency department within 24 hours (95%), of them 55 patients presented within first 6 hours and 40 patients in next 18 hours. Only 5 patients presented after 24 hours of sting, and of these 5 patients only 2 patients had grade-4 envenomation. 3 of 9 patients who had pulmonary edema and 6 of 20 patients who had grade-4 disease were presented after 6 hours of sting. But there was no statistical correlation between the time lag in attending to emergency department and severity of envenomation. In contrary to the present study previous studies by Bawaskar. H.S, and S. Mahadevan reported that delay in hospital presentation was associated with severe manifestation, which is not noted in present study.^{2,7,8}

This is because the milder case presented to hospital only when there was no relief of symptoms but most of the moderate to severe envenomation presented relatively early because of early development of annoying symptoms. Present study did not show statistically significant association between time delays in hospital presentation to severity of envenomation, this is in contrast to the previous studies. This difference may be due to increased health awareness and awareness regarding the dangers of the disease. On personal enquiry with the patients and their relatives, it was learnt that they have seen and heard of serious cases of scorpion sting envenomation hence they didn't take chance and tried to arrive to the hospital as early as possible. On enquiry, it is learnt that majority of patients who presented after 6 hours of sting are from rural areas and reason for delay in them being:

1. Initial use of various local remedies, attending the hospital only if the symptoms did not subside or if in case the condition worsens.
2. Lack of adequate transportation facilities. However the number is very small to conclude, further large scale studies are required.

Site of scorpion sting Bite: In the present study, 95% of the patients were stung on extremities and only 5% got it on other parts of the body. The common situation in which a person is stung by a scorpion is either when he walks into a poorly lit room or when he stretches the hands in dark corners to pick up some objects. Of the 5 patients who received stings elsewhere, 2 were on the back, 1 on the chest, 1 on the shoulder and the other was on the buttock. All these patients were stung while sleeping outside their houses in the night. People in Bellary prefer to sleep outside the houses because of the hot climate in summers.

CLINICAL FEATURES:

Pain: Pain was present in 95 (95%) patients, which was the most common presentation.^{2,7,8}

The other 5 patients who did not complain of pain were admitted with features of myocarditis and pulmonary edema and admitted on direct questioning that they had pain at the local site after the sting. The pain varied in severity from person to person but generally within a matter of minutes the local burning pain spread proximally. The description of spread of pain to the proximal sites is strongly suggestive of the lymphatic dissemination of the scorpion venom. The persistence of the pain with or without radiation also varied greatly. In some of these patients, pain lasted only for a few minutes in yet others, it lasted for several hours, even after treatment. Some patients required repeated local infiltration with lignocaine.

Pain as a symptom of scorpion sting is so characteristic that, in patients complaining of pain with history of bite or sting by unidentified or unseen creatures, scorpion sting must be strongly suspected and they must be observed for possible appearance of complication of scorpion sting.

It is noted from the study that those with severe pain at presentation had relatively milder systemic manifestation and majority of patients with severe envenomation had mild pain, this finding is in accordance with the findings of Bawaskar and S. Mahadevan.⁸

Paraesthesia: Paraesthesia was present in 78 (78%) patients in this study, which persisted for 8 hours to two days. Paraesthesia could be because of local inflammatory response or due to local effects of scorpion venom.

Autonomic Manifestations: Majority of signs and symptoms of scorpion sting envenomation are due to dysautonomia. Most common sign was tachycardia which was present in (40%) patients. Persistence of this sign even after 6 Hrs was seen in only 16% of the patients and all of them had other signs of sympathetic over activity. In 8 patients in whom it persisted for more than 24 Hrs, all had pulmonary edema and of them 6 had hypotension also. Tachycardia is a non-specific sign of cardiac involvement. In most of the cases, it could be due to anxiety and it is possible that the tachycardia was an expression of sympathetic over activity because it was associated with persistent symptoms of sympathetic over activity in 16 cases even after 6 Hrs.

Persistence of the sign beyond 24 hours could be due to myocarditis and pulmonary edema with or without cardiac failure. Next common autonomic manifestation is profuse sweating, lasted for 8 to 10 hours, which was noted in 32% of the patients, correlates with previous reports. All patients with pulmonary oedema had profuse sweating except 2 patients. Pulmonary oedema was noted in 9 (9%) patients, which was slightly less than that observed in mahadevan and Almost equal to Das.S series.^{1,2} Hypertension was noted in 8 (8%) patients, majority had moderate hypertension, only 5 patients had severe hypertension (180/100 mm of Hg and above). 5 patients became normotensive within 6 hours, 2 patients in next 24 hours, only 1 patients remained hypertensive after 24 hours. All the patients were treated with prazosin irrespective of the blood pressure levels.²

Most common parasympathetic manifestation is excessive salivation noted in 10 patients; more than half of the patients had pulmonary oedema and LVS3. Next common is nausea and vomiting seen in 10% of the patients.

Bradycardia was noted in 4% of the patients, the pulse rate was less than 60/min. Rajarajeshwari observed 3% while other studies Mahadevan 9%,⁹ Poon king 18%¹⁰ and Das 6.25%.¹

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In all these studies, bradycardia was noticed during the early part of autonomic storm in the course of which bradycardia was replaced by tachycardia. Same was noticed in the present study also. The low incidence in this study could be due to late arrival of the patients to the hospital.

Hypotension: was noted in 6% of the patients which was much less compared to previous series, this may be because of the age composition of the study population. 5 of 6 patients with hypotension had pulmonary oedema. Two patients presented with severe hypotension died, one patient who initially presented with hypertension developed hypotension after 6 hours and succumbed to death.

Mydriasis: It is one of the signs of sympathetic over activity. It was observed in 19% of cases in this study. Incidence of mydriasis as a sign of autonomic storm was less common compared to sweating and cold extremities.

Other cardio-respiratory Manifestations: Cold peripheries seen in 32 (32%) patients, which is less compared to Raja Rajeswari et al (68%) and S. Das et al (93.75%).¹ This discrepancy may be because of inclusion of mainly pediatric population in their study group.^{1,11} 9 (9%) patients had LVS3 among them 8 patients had pulmonary oedema and 4 had breathlessness also. 7 patients had grade 2-3/6 systolic murmur at the apex, two of them died and in remaining patients murmur disappeared after variable period.

Electrocardiographic Changes: 60 patients had ECG changes. One of the common manifestations is T-wave changes, seen in 35 (35%) patients. Other manifestations include ST changes in 20(20%). First degree heart block in 4 (4%), Bundle branch block in 2 (2%) patients. However sinus tachycardia was the commonest abnormality seen in 40 patients.

CONCLUSIONS: This is prospective observation study done over a period of one year from December 2008 to December 2009. Our study included 100 patients of scorpion sting. Scorpion sting envenomation was a relatively common medical emergency, accounting for 9.27% of ICU admissions.

Patients of age group 11-30 years were commonly involved (60%) in this accidental environmental and occupational hazard. Male population is predominantly affected in our study, with male to female ratio of 1.38:1. Majority of the patients had grade-3 envenomation accounting for 66% Of the total studied population. Grade-4 disease accounted for 20% of the total cases. 95% of the patients reached hospital with in first 24 hours after sting.

Most common clinical presentation was pain; present in 95% of the cases. Profuse sweating was the commonest symptom of the sympathetic nervous system seen in 32% of patients and most common sign was tachycardia (40%). Most common parasympathetic symptom was excessive salivation (10%) and sign was hypotension. Pulmonary edema was the most serious manifestation seen in 9 (9%) patients, requiring critical monitoring.

Most common ECG change in the study was T -wave changes other than sinus tachycardia. Patients in the study were treated with Prazosin; most of the patients responded well with rapid improvement in the clinical signs. There were three deaths in the study group accounting to 3% of the cases, all of them had severe hypotension, and pulmonary edema and LVS3 gallop.

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