

A Study on Clinical Spectrum of Scorpion Sting in A Teaching Hospital in Bengaluru Region

Tejaswi CN¹, Kanavi Roopa Shekharappa², Lakshmikantha BM³, Smileevivian⁴, G Venkatesh⁵

Author's Affiliation:

¹Associate Professor, Department of General Medicine, ²Associate Professor, Department of Physiology, BGS Global Institute of Medical Sciences, Bangalore, Karnataka 560060, India. ³Professor, Department of Anatomy, DM Wayanad Institute of Medical Sciences, Wayanad, Kerala 673577, India. ⁴Professor, Department of Physiology, JJM Medical College, Davangere, Karnataka 577004, India. ⁵Professor and Head, Department of Physiology, Chamarajnar Institute of Medical Sciences, Chamarajnar, Karnataka 571313, India.

Corresponding Author:

Kanavi Roopa Shekharappa, Associate Professor, Department of Physiology, BGS Global Institute of Medical Sciences, Bangalore, Karnataka 560060, India.

E-mail: roopa.tejaswi@gmail.com

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Abstract

Context and Aim: In Bengaluru region the Scorpion sting is not common among rural and urban population. The exact incidence of Scorpion sting bite was unreported among the people living in Bengaluru region. So, the aim of present study was to find the incidence, clinical features, complications and outcomes of Scorpion sting bite among Bengaluru region. **Settings and Design:** This observational prospective study was conducted in BGS Global Institute of Medical Sciences in Bengaluru region from Jan 2017 to Dec 2017. Patient between the age of 3 and 66 with history of scorpion sting bite were included in the study. **Methods and Material:** There were 25 patients (0.56%) with scorpion sting bite during the study period. Among which 16 (0.36%) of them were treated as outpatient basis and 9 (0.2%) scorpion sting bite patients were treated as inpatient. There clinical features, treatment, management of complication and follow up was done during their admission. **Statistical analysis used:** The data collected was put in the Excel sheet. The incidence of Scorpion sting bite was calculated and the other parameters were analyzed and depicted in percentages. **Results:** The incidence of Scorpion sting bite was 0.56% among patients who attended Emergency Department. As per this study Scorpions sting bite are more common in May to November months which is the rainy season in this area. Presentation with pain and paresthesia is common, they also had tachycardia and tachypnea as major signs. 11% of patient had myocarditis among which 1 case (4%) died with pulmonary edema. **Conclusions:** Scorpion sting bite is an occasional occupational health hazard affecting the farmers leaving in villages of Bengaluru region during rainy seasons.

Keywords: Bengaluru Region; Complication; Incidence; Scorpion sting; Treatment.

Key messages: Incidence of Scorpion sting bite was 0.56% among patients who attended Emergency Department in a tertiary care center in Bengaluru. The most common Clinical features were pain and paresthesia. Tachycardia and Tachypnea being the most common sign. Among this majority recovered but 11% cases had myocarditis and 4% died due to pulmonary edema.

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Introduction

The annual number of scorpion sting exceeds 1.2 million with 2.3 billion population at risk.¹ In Emergency medicine, scorpion sting bite is one of the acute life-threatening condition among villagers.² In India, Saudi Arabia and South Africa the case fatality rate varies between 3–22%.³⁻⁷ *Mesobuthus tamulus* and *Palameus swammerdami* are important among 86 species of scorpion in India.⁸ The clinical effects of Scorpion sting bite varies between various subspecies in different places. The Indian red scorpion sting bite is known to cause cardiovascular effects predominately.⁹ The true incidence of envenomation's is unreported in Indian case scenarios in Bengaluru. So, the aim of present study is to find the incidence of scorpion sting bite along with its clinical manifestation, management and outcomes of the scorpion sting bite among patient coming to Tertiary care and teaching hospital in Bengaluru region.

The Primary objectives of this study was to find the incidence of scorpion sting bite among patient coming to tertiary care teaching hospital in Bengaluru region. Then the secondary objective is to study the clinical feature along with management and outcomes in scorpion sting bite affected patient coming to tertiary care teaching hospital in Bengaluru region.

Materials and Methods

Patients who presented themselves at the BGS Global Institute of Medical Sciences and teaching hospital, Bengaluru, with history of scorpion sting, during the period of 01 January 2017 to 31 December 2017, formed the material of this study. There were twenty five patients in this study and 16 (64%) of them were treated as out-patients and 9 (36%) patients were admitted to the hospital. The age of the patients ranged from 3 to 66 years in this study. The patients who were treated as out-patients were observed up to 24 hours and reviewed whenever necessary. The admitted patients were followed up regularly during the hospital stay. The complications observed after scorpion sting in this study.

The following complications due to scorpion sting bite were noted:

1. General - Autonomic storm
2. Cardiovascular - Peripheral circulatory failure

- Myocarditics
- Left ventricular failure with or without pulmonary edema.

3. Neurological

- Convulsions
- Hemiplegia
- Paraplegia

Diagnosis of complications due to Scorpion sting bite was based upon the following criteria:

1. Autonomic storm – Profuse sweating
– Rigors and chills
– Excessive salivation
– Dilated pupils
– Cold extremities
– Vomiting / diarrhea
2. Peripheral circulatory failure
– Cold, clammy extremities with peripheral cyanosis
– Thready pulse
– Systolic blood pressure less than 90 mm Hg.
3. Myocarditis: – Arrhythmias
– Transient murmurs
– Protodiastolic gallop
– Acute cardiomegaly
– ECG changes: nonspecific changes like ST depression or elevation and T wave inversion, atrial, junctional or ventricular arrhythmias or any type of conduction defect.
4. Left ventricular failure
– Overt pulmonary edema
– Tachycardia
– Orthopnea
– Bilateral basal crepitation's
– Third and/or fourth heart sounds

- 5. Convulsions – Narrow pulse pressure
– In the absence of history of epilepsy or other risk factors
- 6. Hemiplegia – In the absence of previous history of transient ischemic attacks or other contributing factors
- 7. Paraplegia – By excluding other causes of paraplegia

Patients who had no systemic complications, at the time of presentation, were given the following treatment:

1. Local infiltration of 1-3 ml of 2% lignocaine. The same was repeated in cases of recurrence of pain.
2. Injection chlorpheniramine maleate 2 ml. Intramuscularly was given to all patients.
3. Oral analgesics like tablet ibuprofen 400 mg three times daily for 1-2 days, whenever necessary.

The patients with complications were given supportive and symptomatic treatment as follows:-

1. Peripheral circulatory failure:

Intravenous fluids, oxygen, Injection dexamethasone 4 mg 8th hourly, prazosin 30 microgram/kg/ dose orally and Dopamine Infusion at a rate of 5-10 mg dose being adjusted according to the needs of individual Cases.

2. Cardiac failure with myocarditis with or without pulmonary edema
– Injection furosemide 40 mg 1V, twice daily
– Oxygen inhalation
– Injection dexamethasone 4 mg 1V/1M 6th hourly.

3. Neurological complications:

In cases of convulsions and hemiplegia cerebral anti-edema measures like hypertonic Dextrose (25%) 200 ml intravenously, twice daily, injection mannitol 20%. 100 ml 1V drip 8th hourly, nutrition, care of bladder, bowel and skin and other nursing care was and provided.

Statistical Analysis: The data collected was entered in excel sheet and incidence of scorpion sting was calculated. The other analyzed results was represented as percentages.

Results

Total number of scorpion sting cases 25 formed 0.6% of total medical admissions (4486) during the study period. Among which 16 (64%) of them were treated as outpatient basis and 9 (36%) scorpion sting bite patients were treated as inpatient (Table 1).

Table 1: Showing the Total Incidence of Scorpion Sting

S. No	Particulars	Number of cases
1.	Total number of admissions to the Hospital, during the study period	11,803
2.	Total number of medical admissions	4,486 (38%)
3.	Number of scorpion sting cases	25 (0.6%)

Maximum number of patients were noted in the 21-30 age group.

Males accounted for 58% of total scorpion sting cases while females were 42%.

In this study 95% of the patients were stung over the extremities, lower limbs being more involved than upper limbs.

Maximum number of cases in this study was during the period between May and November accounting for 64% of cases.

Local pain 24 cases (96%) and paresthesia 20 cases (80%) were the commonest symptoms in this study (Table 2).

Table 2: Showing the Incidence of Symptoms in Scorpion Sting Cases

S. No.	Symptoms	No of cases with percentage
1.	Local pain	24 (96%)
2.	Local paresthesia	20 (80%)

S. No.	Symptoms	No of cases with percentage
3.	Profuse sweating	8 (32%)
4.	Chills and Rigors	8 (32%)
5.	Breathlessness	3 (12%)
6.	Excessive salivation	3 (12%)
7.	Vomiting	3 (12%)
8.	Local swelling	1 (4%)
9.	Convulsions	1 (4%)
10.	Weakness of one half of body	1 (4%)
11.	Weakness both lower limbs	1 (4%)

Tachycardia 9 (36%) and tachypnea 9 (36%) were the most common signs in this study. Excessive

perspiration and cold extremities (both are 8 (32%)) were also common (Table 3).

Table 3: Showing the Analysis of Signs

S. No.	Clinical signs	No of cases with percentages
1.	Tachypnea	9 (36%)
2.	Tachycardia	9 (36%)
3.	Excessive perspiration	8 (32%)
4.	Cold extremities	8 (32%)
5.	Mydriasis	5 (20%)
6.	Protodiastolic gallop	2 (7%)
7.	Pulmonary edema	2 (7%)
8.	Transient hypertension	2 (7%)
9.	Cyanosis	2 (7%)
10.	Transient murmurs	2 (7%)
11.	Hypotension	2 (7%)
12.	Bradycardia	1 (4%)
13.	Hemiparesis	1 (4%)

In this study 10 cases (40%) of the ECGs were abnormal and of these 10 cases had clinically detachable cardiac complications (Table 4).

Sinus tachycardia was the commonest electrocardiographic abnormality detected in this study (Table 5). Of the 10 (40%) abnormal ECGs 4 (40%) reverted to normal within 24 hours. One patient died.

In the present study 25 patients with scorpion sting, 23 (92%) patients recovered completely, 1 died in the hospital and the 1 case with hemiplegia was referred to NIMHANS, Bangalore as no improvement was noticed even after 8 days of treatment.

Complications of Scorpion Sting Bite

1. *Autonomic storm:* It is characterized by profuse sweating with rigors and chills was the most frequent complication in this study 8 (32%). Mydriasis was observed in 5 (20%). Tachypnea was observed in 9 (36%) of this group.
2. *Cardiac complications:* Myocarditis 2 (7%) and / or pulmonary oedema was the most frequent cardiac complication in this study. Transient hypertension was observed in 2 (7%) of the cases. These patients recovered completely within 24 hours and no further complications were observed.

Table 4: Showing the Electrocardiographic changes

S. No.	EKG changes	No. of cases with percentages
1.	Normal ECG	15 (60%)
2.	Abnormal ECG	10 (40%)
	Total	25 (100%)

Table 5: Showing Different Types of Abnormal ECG Changes Among Scorpion Sting Cases

S. No.	Abnormal Changes (ECG)	Number of cases with percentages
	Sinus tachycardia	9 (90%)
	ST depression	4 (40%)
	T wave inversion	4 (40%)
	Tall T waves	2 (20%)
	Sinus bradycardia	1 (10%)
	ST elevation	1 (10%)
	Junctional rhythm	1 (10%)

3. *Neurological complications:* There were two cases with neurological complication in this study. One case was admitted with convulsions, and one with hemiparesis was observed for the first time in scorpion sting.

Treatment and Follow Up of Scorpion Sting Bite Cases

Specific antivenom was not given to any of the patients in this study as specific anti-venom was not available in Bengaluru. All patients were treated symptomatically as described earlier. Recovery within 8 days, without any residual complications was seen in 95% of the cases. One patient with paraplegia needed 15 days for full recovery. All these 24 patients were a symptomatic at follow-up. One patient with hemiparesis did not improve even after 8 days of hospital management and was referred to NIMHANS, Bangalore for further evaluation and management. He did not turn up for follow up. One patient with myocarditis died during this study period.

Details of Cases Died Due to Scorpion Sting Bite

In this study, one patient died despite management in the hospital. The fatal case is briefly described.

Case 1: An 18-year-old boy. He presented with complaints of breathlessness and palpitation which started about 12 hours after sting. 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 crepitation's also suggesting pulmonary edema. ECG showed sinus tachycardia with non-specific ST-T changes suggesting myocarditis. He was treated with steroids, dopamine infusion, oxygen inhalation and other supportive measures.

Discussion

Scorpion is an arthropod which is primarily nocturnal leaving in the crevices of dwellings

during the daytime only emerge at night for hunting insects, lizards, etc. Scorpions are active in summer and hibernate in winter. Scorpion sting bite may be total, partial or non-existent as it can control its ejaculation. Those Scorpionidac which can inflict fatal stings in humans belong to families Buthus and scorpoidae which are commonly reported in Bellary region of Karnataka.¹¹

The data on Scorpion sting bite cases among Asian population is scarce. In India the incidence of Scorpion sting bite was 0.6%. According to the present study the incidence of Scorpion sting bite was 0.6% in Tertiary care center of Bengaluru region. When compared to other regions of India, the incidence was same as rest of the places in India. The probable reason for this is that this region does provide the perfect environment for habitat of Scorpions.¹⁰

In the present study the incidence of scorpion sting was more during the months of May to November. This corresponds to the rainy season in this part of the country. This is in contrast to other parts of the country and the world, where stings are common in summer months. The exact reasons for this are unclear.

The most affected age group was of 21–30 males were more than females and lower extremities more when compared to upper extremities.

The toxicity and clinical picture of scorpion sting bite depends on species differences, venom dose/weight relationship, time lapse, season of bite determine the toxicity and clinical picture.¹⁰ In the present study the most common symptom was local pain in 95% of cases and paresthesia in 78% of cases. Other symptoms breathlessness, vomiting, local swelling and convulsions. The most common signs are tachypnea is 9 (36%), tachycardia is 9 (36%), excessive perspiration and cold extremities 8 (32%), other signs include hypertension, hypotension, bradycardia, murmurs, pulmonary edema, rarely hemiparesis and paraparesis. The symptoms seen in the present study was similar to other studies like Arpit Bansal *et al.* in North Uttar Pradesh,

India where 92.38% of patient presented with pain, 20.95% tachycardia and 12.85% with sweating. All these symptoms indicated the autonomic storm during presentation to hospital as majority of cases approached the hospital after 6–12 hours of the scorpion sting bite.¹² The scientific basis of these symptoms is that the scorpion venoms are species-specific complex mixtures of short neurotoxic proteins (31–64 amino acid sequence).¹³ This venom contains numerous free amino acids, appreciable quantities of serotonin, hyaluronidase and various enzymes that act similar to trypsinogen. Voltage dependent ion channels are altered by the venom. The toxin acts by opening sodium gated channels at the presynaptic nerve terminals and by inhibiting calcium dependent potassium channels. An Autonomic storm is thus initiated.⁹ The unopposed effects of the alpha receptor stimulation are thought to result in autonomic disturbances and this is also the rationale for treatment with the alpha blocker prazosin.¹⁴

In the present study hypotension was seen in one patient. The patient had presented later than the average reporting time of 8 hours. This is explained by facts that early hyperdynamic phase of increased BP and LV contraction is followed by a hypokinetic phase in which hypotension and Impaired LV function occurs.^{15–18} Central nervous system manifestation was encountered in only 1% of individuals. These neurological symptoms are infrequent but they resulted in high mortality. Convulsions was seen in 4% in the present study when compared to 2–13% from India, Israel and south Africa.¹¹

In the present study, commonest ECG abnormality seen was sinus tachycardia. ST-segment depression and T-wave inversion were observed in 4 (40%) of cases. ST-T changes are non-specific changes associated with tachycardia. Tall T waves were noticed in 2 (20%) of cases. Tall T waves in scorpion sting may be due to hyperkalemia (Bawasker H.S. 1998). Sinus bradycardia occurs in the initial phase of autonomic storm. Later it is followed by sinus tachycardia. Transient ST-elevation was observed in 1(10%) of cases. These two patients had clinical features of myocarditis which was confirmed by 2D echocardiogram and troponin elevation. ST-elevation reverted to normal when the patients recovered from myocarditis.

Junctional rhythm was observed in one patient with myocarditis, one week after admission. ECG taken at the time of admission showed ST-depression with coving and deeply inverted T waves in the anterior chest leads, mimicking

subendocardial infarction. Junctional rhythm persisted for one week. T wave inversion persisted for three months in this case. These changes may be due to myocarditis and associated coronary artery spasm or thrombosis.

As per the study conducted by Bawaskar H.S in 1998 the myocarditis after scorpion sting may be due to the effect of excessive catecholamine's on the myocardium or due to direct cardio toxicity of scorpion venom.⁹

In this study, all patients with myocarditis and neurologic complications had autonomic storm. Autonomic storm in scorpion sting is due to massive release of catecholamine's from the adrenals.⁹

In study conducted by Reddy *et al.* the complications due to Scorpion sting bite was common in stings by Mesobuthus species than Palamneus species. So, clinical effects and toxicity of scorpion venom varies considerably from species to species. Cardiovascular effects are particularly prominent following sting by Mesobuthus species. In the present study we had 11% cases with myocarditis. It manifested with a clinical picture of pulmonary edema. A more objective study needs to be done regarding identifying the species.¹⁰ Deaths due to scorpion sting occurs mainly due to massive pulmonary edema, congestive cardiac failure or recurrent seizures.^{19–21}

Improved management practices and early administration of Prazosin are important for the decline in the mortality due scorpion sting bite.¹⁰ The relative higher incidence of mortality in the present study is due to the delayed referral and failure to seek medical care early. Specific anti venom of scorpion is also not available even though it is mentioned as treatment in guidelines. But early referrals do help to promote treatment and saving the life by early recognition and management of autonomic storm.

Conclusion

Scorpion sting bite constitute a significant public health problem in many underdeveloped, tropical and subtropical countries like India. The incidence of scorpion sting bite is 25 (0.6%) in tertiary care center in Bengaluru. Most of the cases presented with Local pain 24 (96%) and Local paresthesia 20 (80%) with tachycardia and tachypnea as the commonest sign which constituted 9 (36%). The cardiovascular complications 10 cases (40%) in scorpion sting bite are most common and life-threatening when there are delay in referral to tertiary care centers.

Prazocin has revolutionized the management of Scorpion sting envenomation. Early and effective prazocin therapy, good supportive care, close monitoring and management of complications can limit the resulting morbidity and mortality significantly. The role of scorpion antivenom and its cost-effectiveness still remains controversial. Public awareness regarding prevention of scorpion sting bite will be helpful for people living in Bengaluru and other parts of the country.

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