

THE CLINICAL AND INVESTIGATIONAL PROFILE OF SCORPION STING AT THE TIME OF ADMISSION AT MGM HOSPITAL, WARANGAL, TELANGANA

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ABSTRACT

INTRODUCTION

Scorpion sting envenomation are real threats in children of tropical and subtropical zones of world including India. It may be life threatening in children, if left untreated. The annual number of scorpion stings exceeds 1.2 million with 2.3 billion population at risk. The incidence of scorpion sting is very high in some parts of India; Warangal is one among them.

METHODS & MATERIALS

This is an Observational Cross-Sectional Study of 115 cases of scorpion sting, admitted to MGM Hospital Warangal, under Kakatiya Medical College from 1st Jan 2014 to December 2014 were included in the study.

RESULTS

In this present study, incidence of scorpion sting was 2.45 %. More than half cases were seen in 1-6 years of age. 63% of scorpion stings are in summer and late winter. 85% of cases were from rural areas. 84% of scorpion stings were indoor, may be due to poor housing condition. Most common symptom was pain, followed by sweating, paraesthesia, vomiting. Most common physical signs noted were cold extremities followed by hypotension, priapism hypertension, tachycardia, and bradycardia. Most common complication observed was peripheral circulatory failure followed by myocarditis, pulmonary oedema, congestive heart failure.

CONCLUSION

One child developed hemiplegia, severity of symptoms, signs, complications and outcome did not depend on the age, sex, site of sting, interval between sting and admission. Presence of, vomiting, tachypnoea, shortness of breath, ECG abnormalities, priapism, creps in the lungs, prolonged CRT, had more chances of progressing to complications like myocarditis, pulmonary oedema. The serum levels of sodium, potassium, blood glucose, total leucocyte count did not have any effect on complications and outcome of the children. Two deaths occurred due to massive pulmonary oedema and myocarditis. Case Fatality rate was 1.7%.

KEYWORDS

Scorpion Sting, Clinical, Investigational.

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INTRODUCTION: There are about 1500 species of scorpions worldwide, of which about 50 are dangerous to man. There are 86 species of scorpion in India, out of which, *Mesobuthus tamulus* and *Palmannaeus swammerdami* are of medical importance. *Mesobuthus tamulus* is the most lethal of all scorpion species and are found abundantly in Western Maharashtra, Andhra Pradesh, Saurashtra, Pondicherry and Tamil Nadu.

When compared to adults, children are at greater risk of developing severe envenomation. They can present with

varied manifestations ranging from severe local pain and skin reactions to neurologic, respiratory, cardiovascular collapse and various autonomic dysfunctions.

If not managed early and appropriately can lead to high mortality and morbidity. We see around 100 cases per year, hence the study of clinical and investigational profile of scorpion sting cases admitted to PICU of scorpion sting is being undertaken in Mahatma Gandhi Memorial Hospital, Warangal.

OBJECTIVES: To know and describe the clinical and investigational profile of scorpion sting at the time of admission.

To analyse the relationship between clinical and investigational features at the time of admission and outcome.

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METHODOLOGY: All the children admitted for scorpion sting in PICU MGM Hospital Warangal formed the material of study, during the period of 1 year from Jan 2014 to December 2014 formed the study group.

Inclusion Criteria:

1. All cases of definite scorpion sting in children up to 13 years of age in which a scorpion was seen in the vicinity either by the patient or the parents, immediately after the sting.
2. Children with history of bite coupled with classic clinical manifestations of scorpion sting were also included in the study.

Exclusion Criteria:

1. Cases of scorpion sting in patients >13 yrs. of age.
2. Unknown bites and cases where the clinical manifestation was not compatible with scorpion sting envenomation were excluded.

Variables Measured:

- Clinical and demographic features of scorpion sting at the time of admission.
- Investigational profile at the time of admission.

Study Design: On admission, a detailed clinical history, including the time of sting, symptomatology, details of treatment received before admission was taken. Further, a description of the scorpion and details about the circumstances leading up to the sting were obtained. All the patients were subjected to a detailed clinical examination at admission and at frequent intervals thereafter, as was necessary in each case. Hourly monitoring of heart rate, respiratory rate, blood pressure, urine output, cardiovascular and respiratory status was done. Routine investigations like complete blood counts, peripheral smear, urine routine, bleeding time, clotting time, blood sugar and serum amylase levels, was done in all the cases. Chest radiograph was done in cases with evidence of myocarditis or pulmonary oedema. Electrocardiography (ECG) and Echocardiography was done in cases with myocarditis and congestive cardiac failure. Computed tomography (CT scan) of the brain was performed in cases with neurological involvement.

Severity of Cases was Graded as follows:

Grade I: Isolated pain.

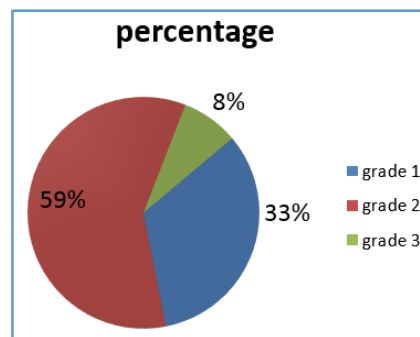
Grade II: (Systemic manifestations) Hypertension, Sweating, Vomiting, Priapism, Fever, Shivering.

Grade III: (Life-threatening manifestations) cardiogenic shock, pulmonary oedema, altered consciousness.

All patients who were symptomatic, received a dose of prazosin (30 µg/kg/dose), at admission. Children with peripheral circulatory failure were treated with prazosin, intravenous fluids, and intravenous diazepam (0.2 mg/kg). Prazosin was repeated every 4 hours, till peripheries became warm and urine output improved. Myocarditis with congestive cardiac failure was treated with oxygen (0.5 – 2 L/min), maintenance IV fluids, prazosin 30 µg/kg/dose

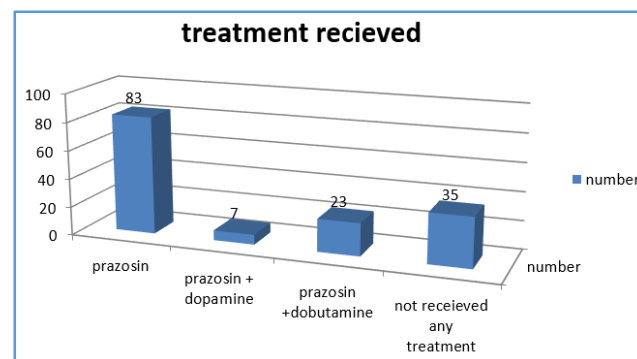
(Nasogastric tube/oral) and Dobutamine infusion (5-15 µg/kg/min). Pulmonary oedema was treated with oxygen, prazosin, dobutamine infusions, furosemide and by mechanical ventilation, when indicated. All the cases were closely monitored for complications and managed accordingly.

RESULTS: Out of 4711 admissions in the study period from 1st Jan 2014 to December 2014, 115 cases were taken up for the study considering inclusion and exclusion criteria.



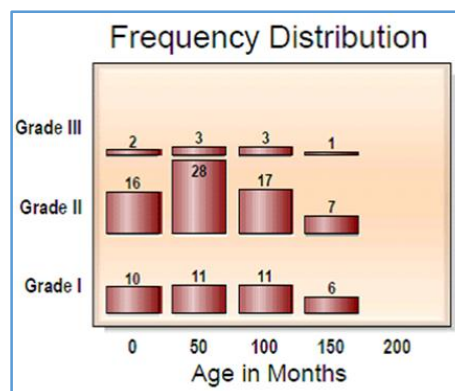
Graph 1: Grades of Severity

In the present study, 59 % of the cases were presented in grade 2, while 33 % grade 1 and 8 % grade 3.



Graph 2: Treatment Received

In this study, 72 % children received prazosin alone while 6% received prazosin + dopamine, 20% received dobutamine + prazosin 27 % children did not receive any treatment they were kept under observation as they did not manifest any symptoms and signs apart from local pain.



Graph 3: Age - Severity of Envenomation

In the present study, there was no correlation between severity of symptoms and age of the Child. (p value=0.630).

Outcome	Male (%)	Female (%)	P value
Grade 3	4(6.4 %)	5(9.6)	0.516
Grade 2	39(61)	29(55%)	
Grade 1	29(46)	18(34.6)	
	63	52	
Sex – Severity of Envenomation			

In the present study, there is no correlation between sex and severity of envenomation. (p value 0.516)

	< 2 hrs.	2-4 hrs.	4-6 hrs.	6-8 hrs.	>8 hrs.		P value
Grade 3	5	3	1			9	0.77
Grade 2	37	17	8	5	1	68	0.516
Grade 1	26	7	4		1	38	0.22
	68	27	13	5	2	115	
Hours after Sting to Admission – Severity							

This table shows children in different grades of severity and time of reporting to the hospital.

5 out of 9 children with grade 3 envenomation were admitted within 2 hours of sting. 26 out of 38 children in grade 1 envenomation, and 37 (54.4) out of 68 children with grade 2 reported to the hospital within 2 hours of the sting (p= 0.22). Severity of envenomation is not dependent on the sting- admission to hospital interval.

	Foot %	Leg %	Hand %	Trunk %	Head %	P value
Grade 3	-	3 (6)	5 (11)	-	1 (16)	0.514
Grade 2	3 (100)	26 (12)	26 (57)	8 (72)	5 (83)	
Grade 1	-	20 (40)	14 (31)	3 (27)	1(16)	
Total	3	49	45	11	6	
Body part Bitten - Severity of Envenomation						

Severity of envenomation does not depend upon site of sting. (P-value 0.514).

Paraesthesia	Absent	Present	P value
Grade 1	31(48)	7(13)	0.00025
Grade 2	30(47)	38(74)	
Grade 3	3(4.7)	6(11)	
	64	51	
Paraesthesia - Severity of Envenomation			

There is statistical significance between severity of envenomation and presence of paraesthesia. Only 7 out of 38 children with grade 1 envenomation signs and 38 out of 68 children with grade 2 envenomation complained of paraesthesia which is statistically significant. (p –0.00025).

	Absent (%)	Present (%)	Probability (%)
Grade 3	3(2.7)	6(85)	0.0000
Grade 2	67(62)	1(15)	
Grade 1	38(35)		
Total	108	7	
Shortness of Breath - Severity of Envenomation			

There is a significant statistical correlation between severity of envenomation and shortness of breath (p value - 0.0000). 85% of children who complained SOB were

suffering from grade 3 and remaining 15% of those who complained of SOB were in grade 2 envenomation, none of the children in grade 1 progressed to SOB.

CREPS	Absent (%)	Present (%)	P value
Grade 3	4(3.5)	5(100)	0.0000
Grade 2	68(62)		
Grade 1	38(35)		
	110	5	
Abnormal Breath Sounds-Severity of Envenomation			

Appearance of crepitations on auscultation was observed in 5 children with grade 3 envenomation, denotes pulmonary oedema. Both the children who died in the present study developed lung crepitations and pink frothy sputum in addition to SOB and tachypnoea.

Sweating	Absent	Present	P value
Grade 3	1	8	0.0000
Grade 2	3	65	
Grade 1	33	5	
Total	37	78	
Sweating - Severity of Envenomation			

There is a significant statistical correlation between severity of envenomation and sweating (P value 0.000).

Cool Peripheries	Present (%)	Absent (%)	P value
Grade 3	8(11)	1(2.3)	0.0000
Grade 2	62(86)	6(14)	
Grade 1	2(2.7)	36(84)	
Total	72	43	

Peripheral Temperature - Severity of Envenomation

There is a significant statistical correlation between severity of envenomation and cool peripheries (P value-0.0000).

Gallop Rhythm	Myocarditis		Total
	Present	Absent	
Present	6	11	17
Absent	2	96	98
Total	8	107	115

Gallop Rhythm - Myocarditis

Sensitivity of gallop rhythm in detecting myocarditis is 75%.

Specificity of gallop rhythm in detecting myocarditis is 98.71%.

PPV -35.29%.

NPV -97.95%.

ECG changes	Myocarditis		Total
	Present	Absent	
Present	8	18	26
Absent	0	88	88
Total	8	106	114

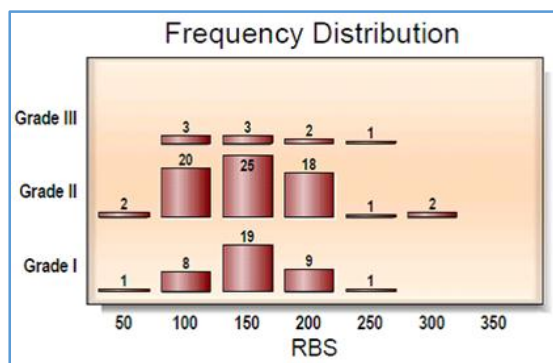
ECG changes vs. Myocarditis

Sensitivity of ECG in detecting myocarditis – 100%.

Specificity of ECG in detecting myocarditis – 83%.

PPV -30.76%.

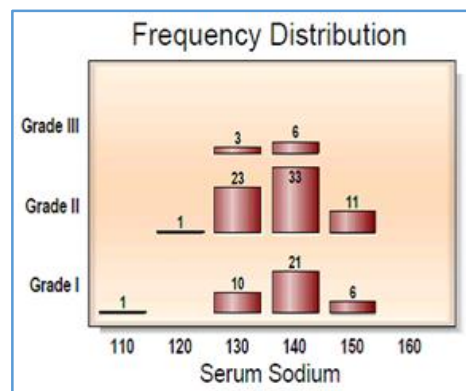
NPV -100%.



Random Blood Sugar – Severity of Envenomation

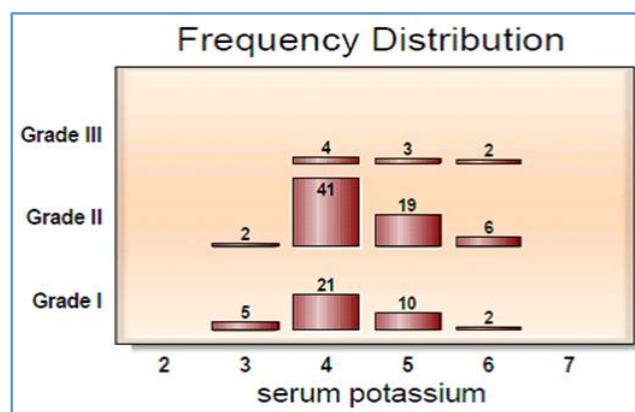
P value - P VALUE- 0.130

There is a no statistical correlation between outcome and RBS levels at the time of admission (P VALUE- 0.130).



Serum Sodium Levels – Severity of Envenomation

There is no statistical correlation between outcome and serum sodium levels measured at the time of admission (p value 0.501).



Serum Potassium – Severity of Envenomation

There is no statistical correlation between outcome and serum sodium levels measured at the time of admission (p value 0.130).

In our study, total leucocyte count in the children of scorpion sting at the time of admission was in the range of 3800-11,500 with mean of around 6644±1748. The mean RBS value in the children of scorpion sting at the time of admission was in the range of 58-320 with mean of 147±46.8. The mean serum sodium level in the children of scorpion sting at the time of admission was in the range of 112-154 with mean of 138.4±7. The mean serum potassium level in the children of scorpion sting at the time of admission was in the range of 2.9-6.2 with mean of 4.36±0.72.

Complications:

Complications	Number of Cases	%
PCF	68	59
Myocarditis	8	7
Pulmonary oedema	5	4.3
Hemiplegia	1	0.86
CHF	5	2.6
	115	100

In this study, Peripheral circulatory failure (59 %) is the most common complication observed followed by myocarditis (7%), pulmonary oedema (4.3%), congestive heart failure (2.6%). One child developed hemiplegia (1%). Of the 115 children admitted to PICU for scorpion sting, 2 children died of myocarditis with pulmonary oedema (1.7 %) one child developed hemiplegia.

DISCUSSION: Scorpion sting is an acute life threatening, time-limiting medical emergency of villages. Numerous envenomation go unreported and the true incidence is not known.¹ Antivenom against the toxins of Indian scorpions is not available for clinical use. Moreover, children reach hospital late already exhibiting cardiac manifestations. It is not clear from published reports whether antivenom is effective in prevention or abolition of cardiovascular manifestations. It would be practical to neutralise the effects of an overstimulated autonomic nervous system through prazosin than attempting to neutralise toxin already bound to receptors on sodium channel¹. Dominant clinical effects vary from species to species and from one geographical location to another.² Case fatality rates vary widely among different regions from 3–22% and over the years, with improvement in management protocols, there has been a dramatic reduction in mortality.¹ We studied 115 cases of scorpion sting, admitted to Mahatma Gandhi Memorial Hospital, Warangal from 1st Jan 2014 to December 2014 and our observations are discussed below.

The proportion of cases in the <12 months, 13 – 36 months, 37 – 72 months, 73 – 108 months 108-156 months are 9.5%, 29.5%, 21.7%, 19.1% and 28.7% respectively. Mahadevan S² in 1981, reported a series of 100 cases of children with scorpion sting and reported a similar age distribution. Children aged between 6-12 years are more exploratory and tend to wander outside homes in the darkness and hence are more susceptible to stings.² Studies in the past have also shown that most of the admissions for scorpion sting, in paediatric departments are in children between 1 – 10 years of age.³

In the present study, there was no significant difference between sex distributions, males and females are equally effected. In contrast, in the study conducted by Bosnak M et al (2009),⁴ male preponderance was noted with male to female ratio of 1.8.

In our study, 50% of the cases were in the months of January to May i.e. late winter and summer. Similar results were noted in the study of Bhattacharya et al⁵ and Shahbazzadeh p et al (2009)⁶ in two different studies, the incidence of scorpion sting were much more frequent in summer season.

In the present study, 85% cases were from rural areas. Scorpion sting is mainly a rural emergency, similar observations were seen in the study conducted by Bosnak M et al⁴ (2009) with the majority of scorpion sting cases were from rural areas is 71.1%. Thus, children from rural areas are at highest risk for accidental contact with scorpions.¹

In this study, proportion of scorpion stings, sustained indoor (84 %) was greater than outdoors. Similar

observations were observed by Otero R et al (2004)⁷ where 70% of the stings were inside the house.

In the present study, majority of stings were sustained on the extremities with leg 43% and hand 39%. Similar results were observed Otero R et al (2004)⁷ with most stings on hand 28% and feet 27%. Bosnak M et al (2004)⁴ also observed similar results with majority of stings on foot and leg. Prasad R et al (2011)⁸ also reported majority of the sting on extremities (97 %).

Most common symptom is pain seen in 79% followed by sweating 67.8%, paraesthesia 44.5%, vomiting 19%, local swelling (2.6%). Similar observations are seen by Diaz p et al⁹ (2005) and Shahbazzadeh et al 2003 in two separate studies with most common symptom being local pain (99 %), followed by paraesthesia 75% in the study by Bosnak M et al⁴ (2009), sweating is the most common presenting symptom (91 %). The reported incidence of local swelling has been relatively rare in Indian literature.^{1,10} Four children presented with altered sensorium out of which three developed complications like pulmonary oedema and myocarditis. One developed right hemiplegia, one child presented with seizure. Central nervous system manifestations are infrequently encountered in India. The incidence of CNS manifestations reported in India vary from 3% to 7%.^{10,11,3}

In the present study, most common physical signs noted were cold extremities (63%), followed by hypotension 33%, priapism (22%), hypertension 18.26%, tachycardia seen in 13%, bradycardia seen in 11%, tachypnoea seen in 7.8% in the study by Bosnak M et al (2009).⁴ Similar observations were noted with most common finding at presentation is cold peripheries (95%) followed by tachycardia, bradycardia. A study by Bucaretti et al (1995)¹² observed similar results with tachycardia in 14%, tachypnoea 8%, hypertension 7%, hypotension 5% of cases. Incidence of hypertension in scorpion stings in Indian studies varies from 12.6% to 29% and hypertension is seen usually within 4-8 hours after the sting.¹⁰ Hypotension can occur within 1-2 hours after sting due to fluid loss and also within 4-48 hours, due to left ventricular dysfunction¹ Bradycardia is an early finding in 'Autonomic storm', due to cholinergic overactivity and has been reported in 8–15% of cases.^{10,11} Priapism is seen in 24 males out of which 4 (16%) developed myocarditis. Prasad R et al (2011)⁸ in his study noted similar incidence of priapism with 31%. Bawaskar et al in his study noted priapism in 10% of cases and observed it to be one of the important cardiac premonitory signs.¹³

Most common electrolyte abnormality seen is hyponatraemia 11% followed by hyperkalaemia 8.7%, hypernatraemia 6%, hypokalaemia 5.2%. Hyponatraemia and hypokalaemia has been noted due to diaphoresis, vomiting and diarrhoea.¹⁴ Total leucocyte count in the children of scorpion sting at the time of admission was in the range of 3800-11,500 with mean of around 6644 ±1748. The mean RBS value in the children of scorpion sting at the time of admission was in the range of 58-320 with mean of 147 ± 46.8. The mean serum sodium level in the children of scorpion sting at the time of admission was in the range of

112-154 with mean of 138.4 ± 7 . The mean serum potassium level in the children of scorpion sting at the time of admission was in the range of 2.9-6.2 with mean of 4.36 ± 0.72 . Similar results were observed in study by Osnaya-Romero N et al (2007).¹⁵

The mean serum level of sodium was 146.4 mEq/L, standard deviation (SD) 5.58; potassium 3.86 mEq/L, SD 0.53. They found 30.4% hypernatraemia, 12% hypokalaemia.

In our study, the severity of symptoms, signs, complications and outcome did not depend on the age, sex, site of sting bite, interval between sting bite and admission. Similar results were observed by Dudin AA et al¹⁶ they concluded that severity of signs and symptoms, outcome and complications did not depend on age, sex, weight, interval between scorpion sting and admission, was most likely dependent upon the susceptibility of the individual and or the dose of venom injected by the scorpion. Presence of, vomiting, tachypnoea, shortness of breath, ECG abnormalities, priapism, creps in the lungs, prolonged CRT, had more chances of progressing to complications like myocarditis, pulmonary oedema. Similar results were observed in the study conducted by Prasad R et al (2011).⁸ In their study, patients who had tachypnoea, myocarditis, priapism had significantly higher mortality. The mean value of sodium, potassium, blood glucose, total leucocyte count did not have any effect on complications and outcome on the children.

Out of 115 children admitted to PICU in Mahatma Gandhi Memorial Hospital, 2 children died (1.7 %). Both had myocarditis with cardiogenic shock, massive pulmonary oedema. The mortality due to scorpion sting has dramatically declined over the years from up to 68% to less than 1%.^{1,10,11} Improved management practices and early administration of prazosin are the important factors responsible for the decline.¹⁷ Deaths due to scorpion sting occur mainly due to massive pulmonary oedema, CCF with cardiogenic shock or recurrent seizures^{10,11,18}

CONCLUSION: Case fatality rate was 1.7%. Scorpion stings are a significant public health problem in many underdeveloped, tropical and subtropical countries including India. Cardiovascular complications are most common and life threatening. However, anticipation and close monitoring for other uncommon complications is critical for effective management. Early and effective prazosin therapy, good supportive care, close monitoring and management of complications can limit the resulting morbidity and mortality significantly. Public awareness regarding measures for prevention of sting and physician readiness to combat this common emergency can go a long way in preventing the devastating effects of this condition.

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