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Original Research Article

Study of Clinical Profile of Scorpion Sting in Children at Tertiary Care Center

Pooja Prashant Deshmukh[1], Nilofer Bhori[2], Shakira Savaskar[3]

[1]Senior Resident, Department of Paediatrics, Dr.Vaishampayan Memorial Government Medical College, Solapur, Maharashtra

[2]Associate Professor, Department of Paediatrics, Dr. VaishampayanMemorial Government Medical College, Solapur, Maharashtra

[3]HOD and Professor, Department of Paediatrics, Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra

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Corresponding author: Dr. Pooja Prashant Deshmukh
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Abstract

Background: In several parts of the globe, scorpion stings are common emergency activities. The estimated annual global incidence, based on national health data, is about 1.5 million envenomings involving 2600 deaths. The incidence of scorpion stings, however, is under-researched, while mortality in most countries appears to have decreased because of adequate management.

Material and Methods: This Prospective, observational study conducted in Dr. Vaishampayan Memorial Government medical college, Solapur, Maharashtra from July 2018 - August 2020 on 60 patients of scorpion stings in study period whose guardian would voluntarily agreeto sign informed consent form after coming to tertiary care centre.

Results: Out of total cases admitted and cases with scorpion, sting came out to as 0.025% in study period. Maximum number of children were between age group 9-11 years. Out of total 60 patients, number of males were 44 i.e. 73.33%. Scorpion sting happened mostly on night-time i.e. 46 (76.67%). Mainly scorpion sting found in this study to be happened in monsoon i.e. 32 (53.33%) followed by summer i.e. 30.00% respectively.Based on ECG changes in patients with Scorpion sting, in 26 patients ECG was normal (43.33%), 30 patients had tachycardia (50%), 04 patients had bradycardia (6.66%), 03 patients had Tall T waves (5%). Out of all patients, shock was most common complication and PICU stay maximum up to 3 days were 19 cases i.e. 31.67% and no PICU stay in 36 cases i.e. 60.00%. Based on outcome, out of 60 patients, 59 patients recovered and 1 patient expired (01.67%).

Conclusion: Time intervened between sting and admission is probably a key factor for better outcome. There is now professional confidence for successful management of scorpion sting in India. Scorpion sting envenomation is a common medical emergency among children. Judicious use of inotropes like Dobutamine for management of shock and alpha-receptor blocker Prazosin has been found to be very useful and beneficial in decreasing morbidity and mortality of scorpion sting cases.

Keywords: Scorpion sting, ECG changes, Tachycardia, PICU

Introduction

In several parts of the globe, scorpion stings are common emergency activities. The estimated annual global incidence, based on national health data, is about 1.5 million envenomings involving 2600 deaths. While the frequency of scorpion stings in adults is higher, the magnitude of envenoming in children is substantially higher, where the case-fatality rate is up to 10 times higher than in adults [1-6]. The incidence of scorpion stings, however, is under-researched, while mortality in most countries appears to have decreased because of adequate management1-5. Indeed, victims of scorpion stings go to the hospital more readilyand efficiently, where adequate treatment can be obtained. This is a result of the greater attention given by the health authorities to poisoning5. South and Central America, Southern United States; countries of the Arabian Peninsula, Northern Africa and part of the Indian sub-continent are endemic for scorpions. In Asia, epidemiological data on scorpion stings is scarce. India is the most affected, with a reported incidence of 0.6% [7]. There are more than 1500 species of scorpions; about 100 species are found in India [8]. Among these scorpion species in India, Mesobuthus tumulus - the “red scorpions” are more prevalent and Black scorpion Palmaneus Gravimanus are common. Red scorpions are found abundantly in western Maharashtra, northern Karnataka, Andhra Pradesh, Saurashtra and Tamilnadu [9].

The venom of red scorpion is more likely to cause myocardial dysfunction and life-threatening complications such as respiratory, neurological and cardiovascular compromise and their bites are common in rural India. Black scorpion sting causes severe pain with mild swelling, sweating, local fasciculation, spasm of underneath muscle at the sting site and transient cardiac involvement [10].

The scorpion venom is a water-soluble antigenic complex, which is a composite mixture of neurotoxin, cardiotoxin, nephrotoxin, hamolysins, phosphodiesterase, phospholipases, hyaluronidases, histamine, and other chemicals. The primary target of scorpion venom is voltage dependent ion channels. The cardiovascular toxic effect of the venom causing toxic myocarditis is by the reduction of Na, K ATPase, and adrenergic myocarditis is by releasing adrenaline and nor adrenaline from neurons, ganglia, and adrenals, thereby increasing myocardial oxygen demand by direct inotropic and chronotropic effect on already compromised myocardial blood supply [11].

The anatomical part of the scorpion that delivers the sting is called a "telson. Scorpions are arthropods – a relative of insects, spiders and crustaceans. The average scorpion is about 3 inches (7.6 centimetres) long, but different species can be smaller or larger. Scorpions have eight legs and a pair of crab-like pinchers. They sting rather than bite, using the stinger in their tails [12].

Due to the lack of adequate emergency medical facilities, morbidity and mortality rate of scorpion envenomation is still high in rural areas. Hence, study was planned in Tertiary care hospital of eastern Maharashtra regarding the understanding clinical effects of the venom and has important implications in designing appropriate therapeutic interventions.

Aim and objectives: To study incidence of scorpion sting in tertiary care centre, to determine age, mode of presentation, seasonal variation, clinical profile and outcomein scorpion sting.

Material and methods: This Prospective, observational study conducted in Dr. Vaishampayan Memorial Government medical college, Solapur, Maharashtra from July 2018 - August 2020 on 60 patients of scorpion stings in study period whose guardian would voluntarily agree to

sign informed consent form after coming to tertiary care centre.

Inclusion Criteria: All children less than 14 years of age diagnosed with scorpion sting and patients with history of unknown bite with clinical feature suggestive of scorpion sting. **Exclusion Criteria:** Age more than 14 years and patient with history of unknown bite with clinical feature not suggestive of scorpion sting.

Data collection techniques and tools: After study parameters, social demographic parameters like age, gender, place of residence, time of bite, location where bite has occurred and site of bite. Clinical parameters included heart rate, respiratory rate, blood pressure, oxygen saturation, sensorium, priapism, salivation, vomiting, sweating, cold extremities and pupil size. Laboratory parameters considered were blood sugar, chest x-ray, ECG, echocardiography etc. Complications like autonomic storm, shock, myocarditis, encephalopathy or intra-cranial bleed, need for assisted ventilation, need for inotropes, hospital-acquired infection; nosocomial sepsis and death were recorded.

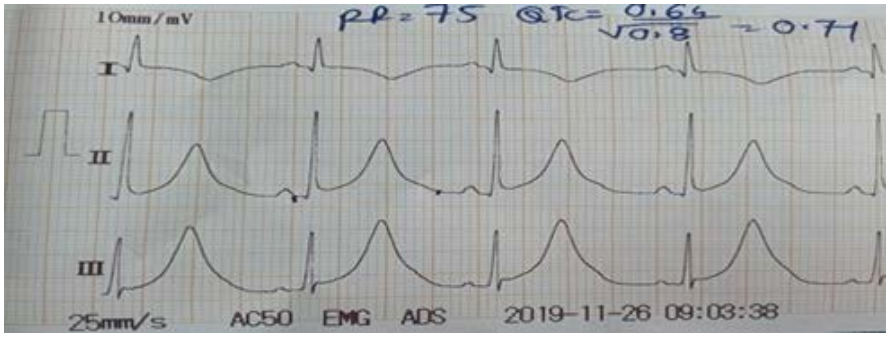

Figure 1: ECG showing tall T- waves

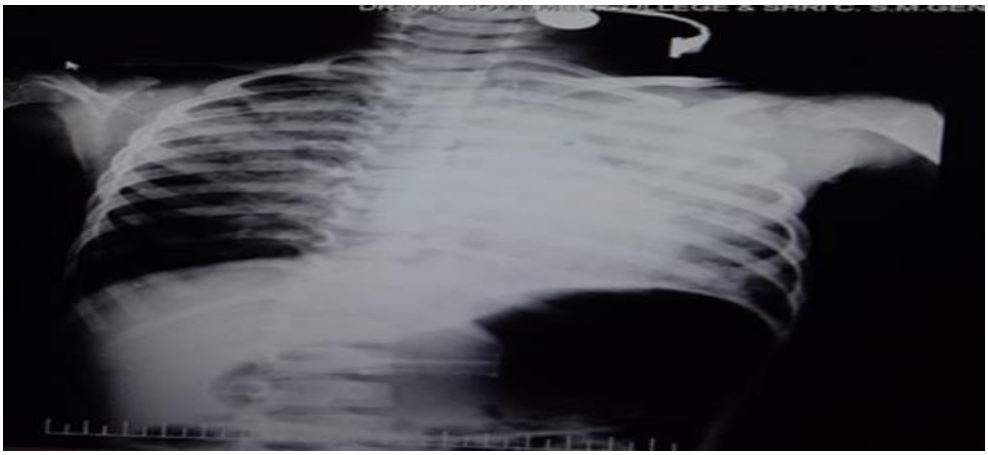

Figure 2: Chest x-ray of scorpion sting patient showing pulmonary edema

Results

A Prospective, observational study conducted from July 2018 - August 2020 in a Tertiary Care Centre on 60 patients of scorpion stings.

In present study, total number of cases admitted in hospital were 7200, out of which total number of cases of scorpion sting were 60 (0.025%) in study period (Table 1). Total number of cases between 0-2 years are 04 (6.67%), between 3-5 years are 08 (13.33%), between 6-8 years are 12 (20%), between 9-11 years are 20 (33.33%),and between 12-14 years are 16 (26.67%). Maximum number of children was between 9-11 years of age (Table 2).

Table 1: Point-prevalence of scorpion sting in children in our hospital

Parameter	Number of cases	Percentage
Total number of cases admitted	7200	100%
Total number of scorpion sting cases	60	0.025%

Table 2: Age wide distribution of children with scorpion sting

Age in years	Number of patients	Percentage
0-2 years	04	06.67%
3-5 years	08	13.33%
6-8 years	12	20.00%
9-11 years	20	33.33%
12-14 years	16	26.67%
Total	**60**	**100%**
Mean ± SD of Age	**8.51 ± 3.64 years**	

*Standard Deviation

Out of total 60 patients, number of males were 44 and total number of females were 16. In our study of scorpion sting, we found male predominance i.e. 44 (73.33%)(Figure 3).

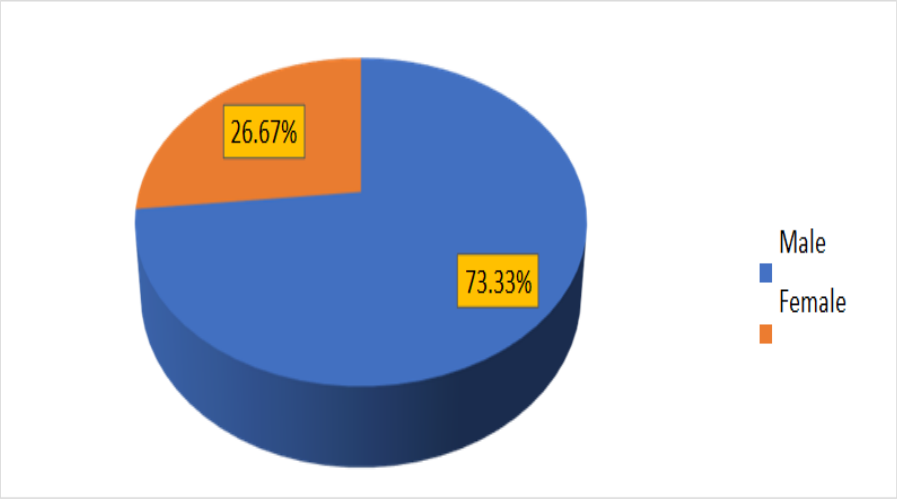

Figure 3: Gender distribution in studied scorpion sting cases

In this study, 14 patients had scorpion sting at daytime (23.33%) and 46 patients had scorpion sting at night-time (76.67%). Scorpion sting happened mostly on night-time i.e. 46 (76.67%) (Table 3). In addition, 10 patients had scorpion sting during winter season (16.66%), 18 patients had scorpion sting during summer season (30%), 32 patients had scorpion sting during Monsoon (53.33%). Mainly scorpion sting found in this study to be happened in monsoon i.e. 32 (53.33%) followed by summer i.e. 30.00% respectively (Table 4).

Table 3: Distribution of study subjects according to time of scorpion sting cases

Time of scorpion sting	Number of patients	Percentage
Day time (6am-6pm)	14	23.33%
Night time (6pm-6am)	46	76.67%
Total	**60**	**100%**

Table 4: Distribution of scorpion stings with respect to seasonal variation

Seasons	Number of patients	Percentage
Winter (November-February)	10	16.66%
Summer (March-May)	18	30.00%
Monsoon (June-September)	32	53.33%
Total	**60**	**100%**

In present study, 42 Patients had scorpion sting by Red Scorpion (70%) and 03 patients by black scorpion (5%), 15 patients had unknown bite in whom clinical features were suggestive of Scorpion Sting. As far as type of scorpion is concerned, study found mostly scorpion sting from red scorpion i.e. 42 (70.00%) (Table 5) and23 patients had Scorpion sting at indoor (38.33%), while 37 patients had scorpion sting at outdoor (61.67%). Most of the scorpion sting happened in our study outdoor i.e. 37 (61.67%) (Table 6). Out of total 60 cases, 04 patients had scorpion sting on the trunk (6.67%),02 patients had scorpion sting over face, neck and scalp (3.33%), 24 patients had scorpion sting over upper limbs (40%) while, 30 patients had scorpion sting over lower limb (50%). Maximum number of scorpion sting happened on lower limbs i.e. 30 (60.00%) (Table 7).

Table 5: Type of scorpion which were involved

Type of scorpion	Number of patients	Percentage
Red Scorpion	42	70.00%
Black Scorpion	03	05.00%
Unknown Bite	15	25.00%
Total	60	100%

Table 6: Place of scorpion sting –indoor & outdoor

Place of sting	Number of patients	Percentage
Indoor	23	38.33%
Outdoor	37	61.67%
Total	60	100%

Table 7: Distribution of site of scorpion sting

Site of scorpion sting	Number of patients	Percentage
Trunk	04	06.67%
Face, Neck and Scalp	02	03.33%
Upper limb	24	40.00%
Lower limb	30	50.00%
Total	60	100%

Based on distribution of symptoms, in this study, 58 patients had pain at site (96.67%), 34 patients had salivation (56.67%), 42 patients experienced diaphoresis (70%), 20 patients had vomiting (33.33%), 20 patients had local swelling (33.33%), 14 patients complained of dyspnoea (23.33%), 02 patients had pain in abdomen (3.33%), 06 patients had restlessness (10%). Most of the symptoms were overlapping (Figure 4). Similarly, based on clinical signs, 34 patients had tachycardia (56.67%), 14 patients had tachypnea (23.33%), 03 patients had altered sensorium (05.00%), 14 patients had priapism (23.33%), 06 patients were in shock (10%), 12 patients had tenderness (20%), 25 patients had cold extremities (41.66%). Most signs were overlapping (Figure 5).

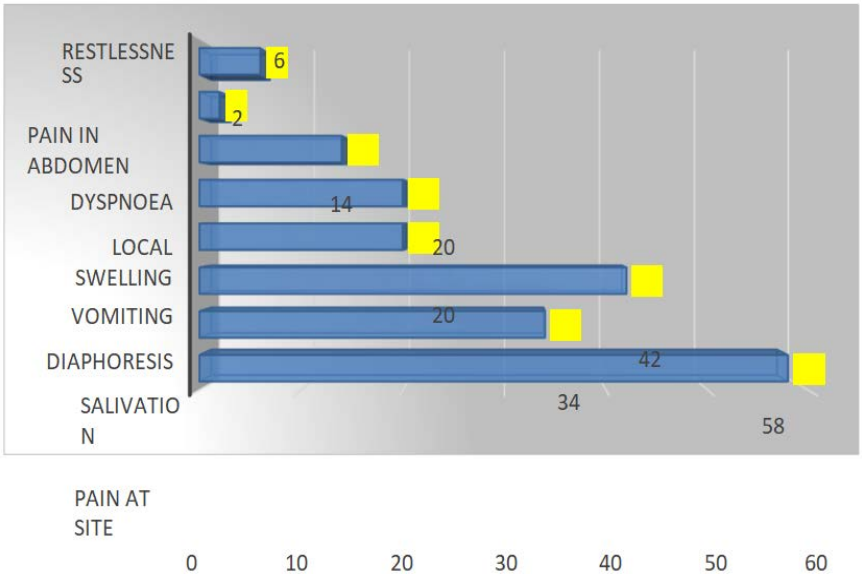

Figure 4: Distribution of symptoms after scorpion sting

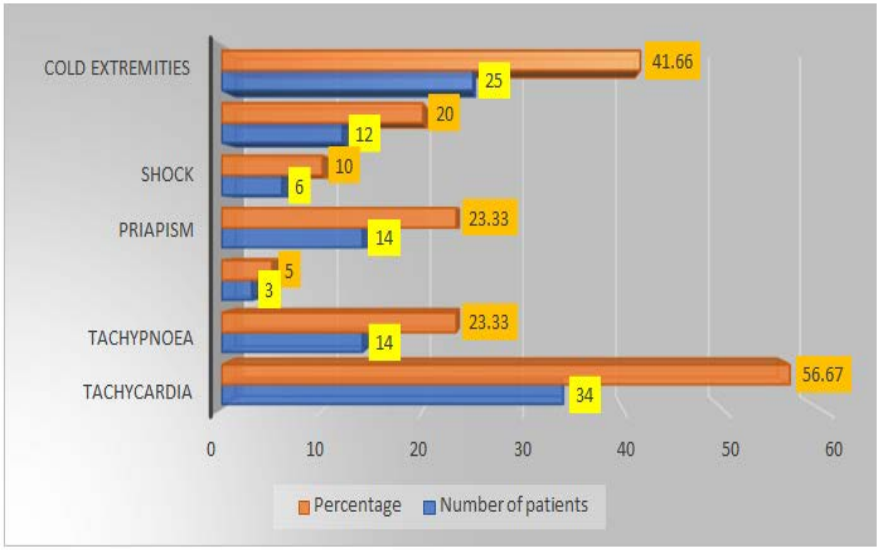

Figure 5: Distribution of clinical signs in scorpion stings

Based on time from sting to arrival to hospital, out of 60 cases, 16 patients presentedwithin 1 hour after scorpion sting (26.66%), 22 patients presented within 1-3 hours after scorpion sting (36.66%), 10 patients presented within 3-5 hours after scorpion sting (16.66%), 12 patients presented after 5 hours after scorpion sting (20%) (Table 8) and 14 patients were in grade 1 (23.33%), 33 patients were in grade 2(55%), 13 patients were in grade 3 (21.66%) (Table 9).

Table 8: Showing time from sting to arrival to hospital

Time interval of presentation	Number of patients	Percentage
<1 Hour	16	26.66%
1-3 Hours	22	36.66%
3-5 Hours	10	16.66%
>5 Hours	12	20.00%
Total	60	100%

Table 9: Showing cases according to severity of envenomation

Grades of scorpion sting	Number of patients	Percentage
Grade 1	14	23.33%
Grade 2	33	55%
Grade 3	13	21.66%

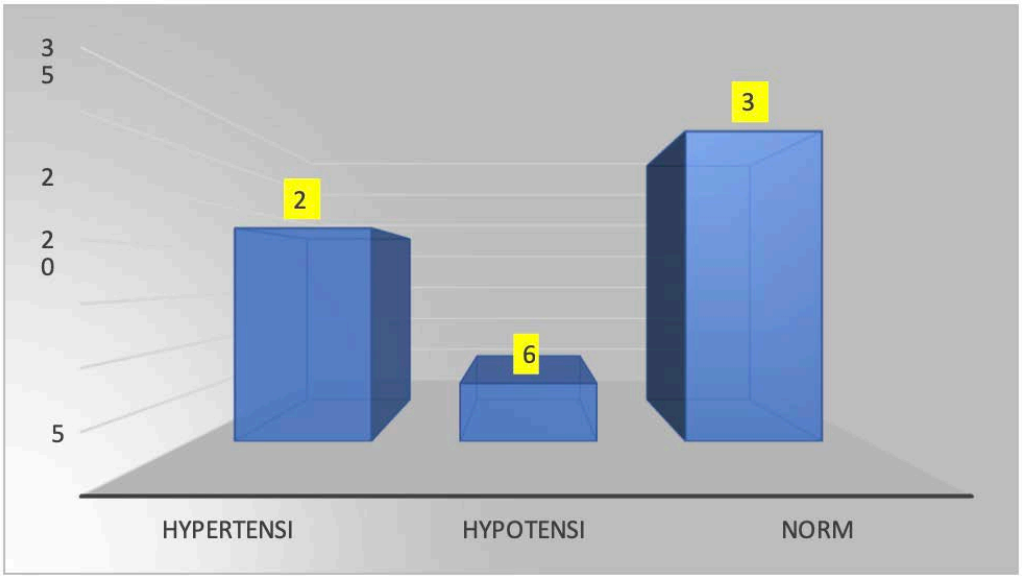

Figure 6: Changes in blood pressure after scorpion sting

In present study, 22 patients had hypertension (36.67%), 06 patients had hypotension (10%), 32 patients were normotensive (53.33%) (Figure 6) and based on ECG changes in patients with Scorpion sting, in 26 patients ECG was normal (43.33%), 30 patients had tachycardia (50%), 04 patients had bradycardia (6.66%), 03 patients had Tall T waves (5%) (Table 10).

Table 10: ECG changes in patients with Scorpion Sting

ECG changes	Number of patients	Percentage
Normal	26	43.33%
Sinus tachycardia	30	50.00%
bradycardia	00	00.00%
ST segment elevation or depression	04	06.66%
Tall T waves	03	05.00%
Arrhythmias	00	00.00%

Based on number of doses of Prazosin given, 24 patients single dose of Prazosin was used (40%), in 16 patients 02 doses of Prazosin were used (26.67%), in 06 patients 03 doses of Prazosin were used (10%), while in 14 patients Prazosin was not used, inotropes were used in only 6 cases, whereas rest 54 cases, inotropes were not used, 14 patients required O2 support (23.33%), while 46 patients did not required O2 support (76.67%) and in 24 patients Autonomic storm was reversed within 12 hours (40%), in 22 patients autonomic storm was reversed after 12 hours (36.66%), while in 14 patients no autonomic storm was seen (23.33%) (Table 11).

Table 11: Treatment variables in patients with Scorpion Sting

Variable	Number of Patients	Percentag
Number Of Prazosin Doses		
01	24	40.00%
02	16	26.67%
03	06	10.00%
04	00	00.00%
Not Used	14	23.33%
Use Of Inotropes		
Yes	06	10.00%
No	54	90.00%
O2 Supplementation		
Required	14	23.33%
Not Required	46	76.67%
Time For Reversal Of Autonomic		
Up to 12 Hours	24	40.00%
More Than 12 Hours	22	36.66%
No Autonomic Storm	14	23.33

Table 12 shows that after scorpion sting we found shock in 06 patients (10.00%), pulmonary edema in 2 patients (3.33%) , myocarditis in 4 patients (6.67%), seizure in 1 patient (1.67%), respiratory failure in 2 patients (3.33%). Out of all patients, shock was most common complication and PICU stay maximum up to 3 days were 19 cases i.e. 31.67% and no PICU stay in 36 cases i.e. 60.00% (Figure 7). Additionally, based on hospital stay, 12 patients were admitted <3 days, 3-5 patients were admitted for 35 days and >5 patients were admitted for 13 days. Maximum duration of stay in hospital found in our study were 3-5 days i.e. 35 (58.33%) (Figure 8).

Table 12: Distribution of Scorpion sting patients according to Complications

Complications	Number of Patients	Percentage
Shock	06	10.00%
Pulmonary Edema	02	03.33%
Myocarditis	04	06.67%
Seizure	01	01.67%
Respiratory Failure	02	3.33%
Encephalopathy	00	00.00%

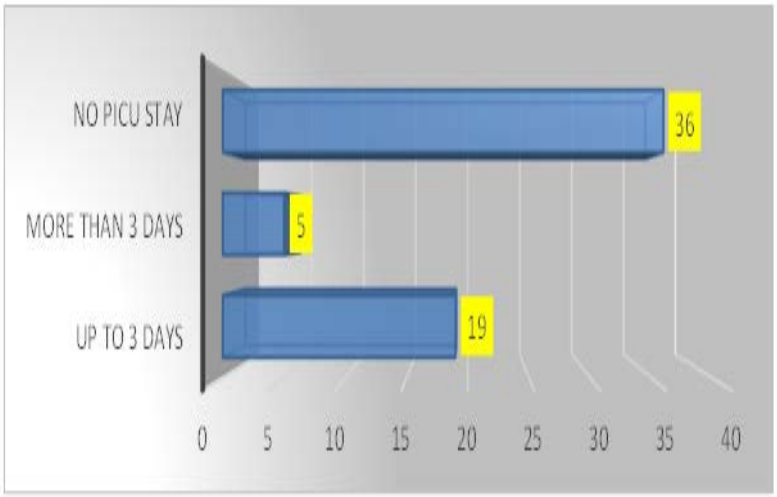

Figure 7: Distribution of scorpion sting cases according to PICU stay

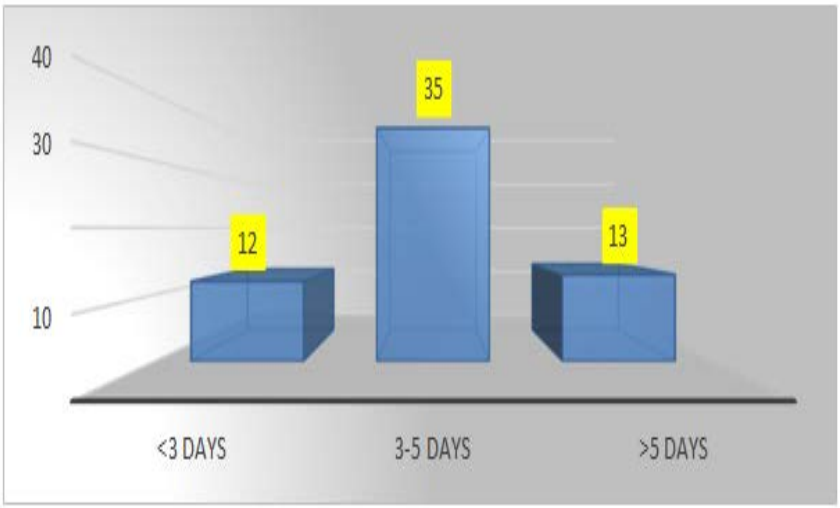

Figure 8: Duration of stay in hospital of studied cases

Based on outcome, out of 60 patients, 59 patients recovered and 1 patient expired (Figure 9).

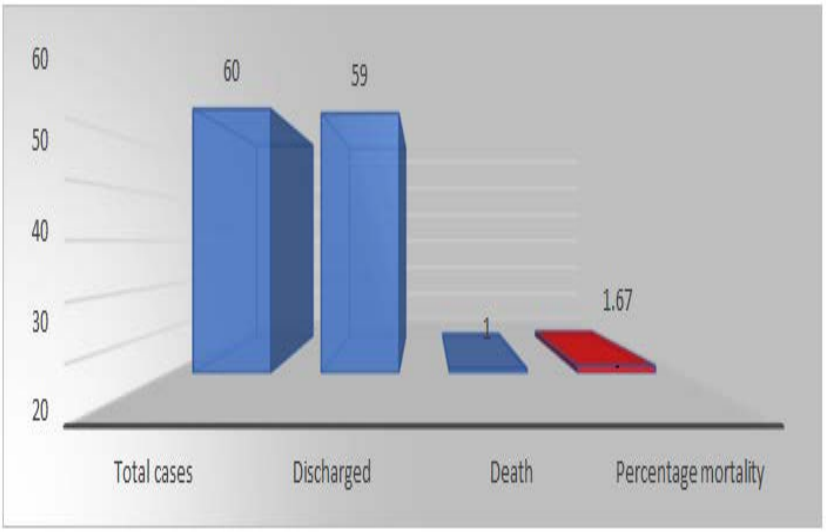

Figure 9: Outcome of scorpion sting cases

Discussion

A Prospective, observational study conducted from July 2018 - August 2020 in a Tertiary Care Centre on 60 patients of scorpion stings. Our study population was all scorpion sting children less than 14 years of age in our tertiary care hospital.

Table 13: Age distribution of scorpion stings

Studies	Most common age group
Present study	9-11 years
Paswan W et al[13] (2017)	5-10 years
Kumar JS et al[14] (2017)	1-3 years
Agrawal R et al[12] (2018)	1-6 years
Arivoli K et al[10] (2015)	Pre-school children
Laxmanan K et al[15] (2018)	1-3 years
Yuvaraja K et al[16] (2019)	<20 years

Table 14: Gender distribution of scorpion stings

Studies	Most common age group
Present study	Male- 73.33%
Paswan W et al[13] (2017)	Male- 64.87%
Kumar JS et al[14] (2017)	Male- 65.30%
Agrawal R et al[12] (2018)	Male- 66.67%
Arivoli K et al[10] (2015)	Male- 61.70%
Laxmanan K et al[15] (2018)	Male- 54.60%
Yuvaraja K et al[16] (2019)	Male- 56.00%

Madhavan J et al [17] (2015), Kumari MP et al [8] (2019) and Arivoli K et al [11] (2015), showed monsoon having greater number of cases than other seasons. Similar to present study, Arivoli K et al [11] (2015) and Laxmanan K et al [14] (2018) reported maximum bite from red scorpion.

Table 15: Results based on Place of scorpion sting

Studies	Results based on Place of scorpion sting
Present study	Outdoor- 61.67%
Arivoli K et al[10] (2015)	Outdoor- 63.20%
Madhavan J et al[17] (2015)	Indoor- 52.21%

Paswan W et al [13] (2017) and Laxmanan K et al [15] (2018) reported most common site of bite was lower limb while Arivoli K et al [10] (2015) found most common site was extremities. Similarly, based on symptoms and signs, Paswan W et al [13] (2017) and Laxmanan K et al [15] (2018) found most common was pain and shock i.e. 68% and 60% respectively. Like present study, Laxmanan K et al [15] (2018) showed the most common presentation of grade was with features of the autonomic storm(Grade 2) in 33% cases followed by Grade 1 with local symptoms and Madhavan J et al [17] (2015) similar to our study maximum cases were came between 0-6 hours i.e.36 (37.22%). [18]

Table 16: Results based on ECG changes afterscorpion sting

Studies	Results based on ECG changes afterscorpion sting
Present study	Sinus tachycardia- 50.00%
Agrawal R et al[12] (2018)	Sinus tachycardia- 74.67%
Arivoli K et al[10] (2015)	Sinus tachycardia- 55.00%
Laxmanan K et al[15] (2018)	Sinus tachycardia- 97.00%
Yuvaraja K et al[16] (2019)	Sinus tachycardia- 20.00%

Laxmanan K et al [15] (2018), showed that the first dose of prazosin was administered within 6 h in 26% cases and 8% cases received first dose of prazosin after 19 h ofthe sting. Similarly, Yuvaraja K et al [16] (2019), found that seventeen (34%) patients received prazosin within 5 h of sting, whereas 16 (32%) received prazosin in 5–10 h, 8 (16%) and 4 (8%) patients received prazosin in 11–15 h and 16–20 h, respectively, and 3 (6%) and 2 (4.0%) patients received in 21–25 h and >25 h, respectively and Meena Kumari P et al [8] (2019) found tachycardia i.e. 62% and Laxmanan K et al [15] (2018) found peripheral circulatory failure i.e. 60%, most common complication after scorpion bite. These findings were similar to our study.

Table 17: Results based on Outcome of scorpionsting cases

Studies	Results based on Outcome of scorpionsting cases
Present study	Percentage mortality found 01.67%
Paswan W et al[13] (2017)	Percentage mortality found 02.40%
Agrawal R et al[12] (2018)	Percentage mortality found 03.33%
Laxmanan K et al[15] (2018)	Percentage mortality found 05.15%
Meena Kumari P et al[8] (2019)	No mortality all discharged in good condition.

Conclusion

Time intervened between sting and admission is probably a key factor for better outcome. There is now professional confidence for successful management of scorpion sting in India. Scorpion sting envenomation is a common medical emergency among children. It is common in rural areas and among boys. The site of sting was predominantly in the lower limbs and during nights of monsoon season. Early medical attention, avoiding conventionally used harmful drugs like steroids, anti-histaminics and other cocktail of sedatives may reduce complications and mortality. Judicious use of inotropes like Dobutamine for management of shock and alpha-receptor blocker Prazosin has been found to be very useful and beneficial in decreasing morbidity and mortality of scorpion sting cases.

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