

A Clinical Study on Management and Outcome of Scorpion Envenomation in Pediatric Cases**B Subhash¹, Sri Divya², A Narendra³, P Pramod Kumar⁴**¹Assistant Professor, Department of Pediatrics, GMC Wanaparthy, Telangana.²Assistant Professor, Department of Pediatrics, GMC Wanaparthy, Telangana.³Assistant Professor, Department of Pediatrics, GMC Wanaparthy, Telangana.⁴Assistant Professor, Department of Pediatrics, GMC Wanaparthy, Telangana.

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Conflict of interest: Nil

Abstract:

Background: Scorpion stings pose a significant threat to children, particularly in tropical and subtropical regions. Due to their smaller body size, children are more vulnerable to the effects of venom. Common symptoms include intense pain at the sting site, but severe cases can progress to autonomic storm, affecting heart rate, breathing, and sweating. Early intervention is crucial, with prazosin being a key medication to manage the envenomation. We in the current study tried to evaluate the management and outcome of scorpion envenomation in pediatric patients reporting to our hospital.

Methods: This hospital-based observational study was conducted in the Department of Pediatrics, Government Medical College and Hospital, Wanaparthy, Telangana. Institutional Ethical approval was obtained for the study. Written consent was obtained from the parent/guardian of the cases in the study after explaining the nature of the study in the vernacular language.

Results: A total of 40 cases of scorpion stings were included in the study. Most of the cases were males (75%) and females were (25%). The medications and interventions were administered to patients (n=40) after they were hospitalized due to scorpion stings. All patients (100%) received intravenous fluids (IV Fluids) and prazosin. In this study, 20% of patients received a single dose of prazosin, 30% received 2 doses, 17.5% received 3 doses, and 30% received over 4 doses. Dobutamine (35.0%) was used in some cases, due to potential cardiovascular complications in some patients.

Conclusion: The study finding shows that Early and effective use of prazosin treatment showed good outcomes in patients. Fewer complications were seen in patients who received first aid before hospitalization. This study concludes that the majority of patients were exposed to complications due to a shortfall in education, awareness, and pre-hospitalization (first aid).

Keywords: Scorpion Sting, Pediatric Cases, Prazosin, Complications.

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Introduction

In tropical and subtropical regions, scorpion sting envenomation represents a significant public health concern, particularly for the pediatric population, due to the potential for severe and potentially fatal clinical manifestations [1-3]. Approximately 50 of the estimated 2,000 scorpion subspecies worldwide possess venom capable of inflicting harm on humans [1]. Within India, *Mesobuthus* (red scorpion) and *Palamnaeus* (black scorpion) are the only recognized venomous scorpion species, with *Mesobuthus tamulus* (Indian red scorpion) classified as the most lethal [4]. These scorpions are found abundantly in specific regions of India, including western Maharashtra, northern Karnataka, Andhra Pradesh, Saurashtra, and Tamil Nadu [4].

Scorpion envenomation is a significant global health concern, particularly for children, who are estimated to account for over one million cases annually [5]. It ranks as the second most common envenomation after snakebites (reference needed). Children are more susceptible due to their smaller body size, and scorpion stings can lead to multiple organ dysfunction syndrome (MODS) [6]. Prazosin, an alpha-blocker medication, plays a crucial role in managing this condition. The effectiveness of prazosin therapy in scorpion envenomation was established in the mid-1980s by Bawaskar et al. [1] and subsequently confirmed by numerous studies. While timely intervention and referral have improved outcomes, children's natural curiosity and mobility increase their risk of encountering scorpions. However, the lack of adequate emergency medical facilities in rural areas

continues to contribute to high morbidity and mortality rates from scorpion envenomation [8]. Therefore, this study aims to investigate the clinical profile, management practices, and outcomes of pediatric patients admitted with scorpion envenomation.

Material and Methods

This hospital-based observational study was conducted in the Department of Pediatrics, Government Medical College and Hospital, Wanaparthy, Telangana. Institutional Ethical approval was obtained for the study. Written consent was obtained from the parent/guardian of the cases in the study after explaining the nature of the study in the vernacular language.

Inclusion Criteria

1. Pediatric patients with scorpion stings admitted to the pediatric ward
2. Aged below 12 years.
3. Males and females.
4. Willing to participate in the study.

Exclusion Criteria

1. Patients with unknown stings
2. Not willing to participate in the study

All case sheets were analyzed for various parameters, including age, gender, time and location of the sting, site of the sting, sting-to-prazosin interval, hospital stay duration, and prazosin dose. Recorded signs and symptoms encompassed pain at the sting site, autonomic storm, vomiting, palpitations, headaches, abdominal pain, altered sensorium, loss of

consciousness, and vital signs such as heart rate, respiratory rate, and blood pressure. Treatment details, including the administration of IV fluids, prazosin, tetanus toxoid, diclofenac, pheniramine maleate, lignocaine, dopamine, paracetamol, dobutamine, and ventilatory care, were also analyzed. Outcomes were assessed, and data was obtained in a pre-structured format.

Statistical Analysis: All the available data was uploaded to an MS Excel spreadsheet and analyzed by SPSS version 21 in Windows format. The continuous variables were represented as mean, standard deviation, and percentages, and the categorical variables were represented as p values. The values of p (<0.05) were considered as significant.

Results

Scorpion sting envenomation is a relatively common, occasionally life-threatening, time-sensitive medical emergency often seen in hospitals. This type of accident frequently occurs in rural areas. However, the true incidence may not be known due to underreporting from the rural and tribal areas where such incidents are very common. Table 1 shows the age distribution of 40 scorpion bite cases. The table covers children from 0 to 12 years old. The commonly affected groups were males with 30/40 (75%) and females with 10/40 (25%). The age group 0-3 years old has the highest frequency of scorpion bites, accounting for 16 cases (40.0%). The frequency of cases gradually decreases with increasing age groups. Age 4-6: 12 cases (30.0%) Age 7-9: 3 cases (7.5%) Age 10-12: 9 cases (22.5%).

Table 1: Age-wise distribution n=40 cases of scorpion bite

Age in years	Frequency (%)
0-3	16 (40.0%)
4-6	12 (30.0%)
7-9	3 (7.5%)
10-12	9 (22.5%)
Total	40 (100%)

The data available in Table 2 indicates that scorpion stings were more prevalent on the lower limbs, which could be due to higher exposure when walking or working outdoors, particularly in rural and tribal settings. The higher incidence of outdoor stings suggests a correlation with activities performed outside the home, where scorpions are more likely to be encountered. Additionally, the

predominance of cases in tribal and rural areas highlights the increased risk in these locations, possibly due to factors such as living conditions, occupation, and proximity to scorpion habitats. The relatively low number of urban cases may reflect better housing conditions and less exposure to scorpion-prone environments.

Table 2: Characteristics of scorpion sting in 40 cases in the study

	Frequency	Percentage
Site of sting		
Upper limb	12	30.0
Body	06	15.0
Lower limb	22	55.0

Place of sting		
At home	15	37.5
Outdoor	25	62.5
Location of patient		
Tribal	22	55.0
Rural	15	37.5
Urban	03	7.5

Figure 1 shows that the largest proportion of cases (42.5%) received prazosin within 1 to 2 hours after being stung. This interval appears to be the most common timeframe for seeking and receiving medical treatment. The second most frequent interval was less than 1 hour, with 22.5% of cases, indicating that nearly a quarter of patients received prompt treatment. The 2 to 3-hour interval accounted for 20% of cases, showing a significant number of patients experienced moderate delays.

Fewer cases were treated in the 3 to 4-hour interval (12.5%), and only a small fraction (2.5%) received prazosin more than 4 hours after the sting. The data suggests that timely administration of prazosin is crucial, with a significant majority (85%) of cases receiving treatment within 3 hours of the sting. This rapid response is likely beneficial for mitigating the severity of symptoms and improving patient outcomes.

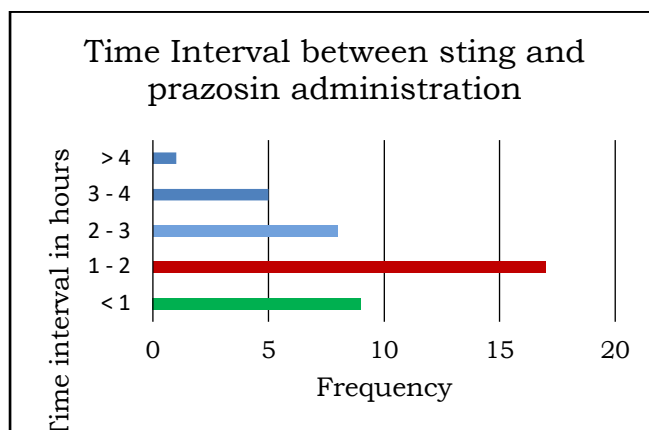


Figure 1: The interval between scorpion sting and administration of prazosin in 40 cases of the study

Figure 2 shows the frequency of symptoms reported in the cases of scorpion stings included in the study. Pain was the most prevalent symptom, reported in all 40 cases (100%). This aligns with the expectation that scorpion stings are inherently painful. A significant portion of patients (18 cases, 45%) displayed signs of autonomic storm, a group of symptoms affecting the involuntary nervous

system. Other symptoms were reported less frequently, including incessant crying (8 cases, 20%) - potentially indicative of severe pain or distress, particularly in younger children. Scorpion venom can affect the nervous system, causing pain and potentially leading to autonomic storm symptoms. Younger children might express distress through crying more readily.

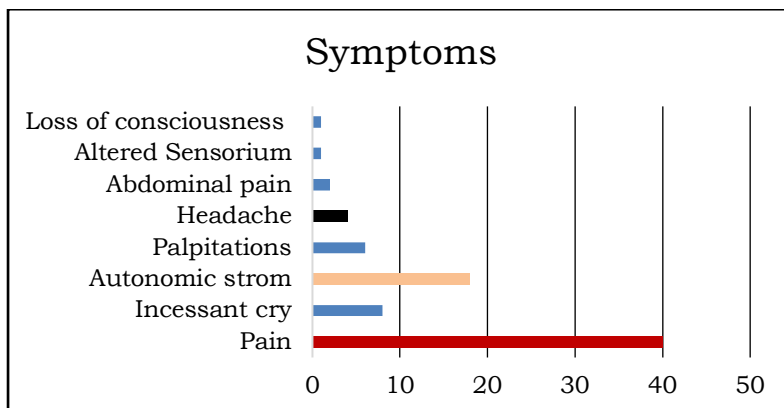


Figure 2: Presenting symptoms of the scorpion sting cases included in the study

The severity of envenomation (Table 3) was categorized based on Abroug's classification. class I: Localized symptoms such as pain, erythema, and paresthesia limited to the sting area. class II: Symptoms include shivering, cool extremities, excessive

sweating, nausea, vomiting, hypertension, and priapism. class III: More severe symptoms affecting the cardiovascular, respiratory, or neurological systems, such as cardiogenic shock, pulmonary edema, altered consciousness, and convulsive crises.

Table 3: showing the severity of scorpion sting in the cases of the study

Severity	Frequency	Percentage
Class I	8	20.0
Class II	20	50.0
Class III	5	12.5

Table 4 depicts the medications administered to patients (n=40) who were included in the study. The most common medication given was tetanus toxoid (14 cases, 35.0%). Prazosin, a medication specifically used to manage scorpion envenomation, was administered in 10 cases (25.0%).

Dobutamine (10 cases, 25.0%) and Diclofenac (4 cases, 10.0%) a pain reliever from local clinics, community health centers, and primary healthcare centers for first aid, pain management, and supportive care.

Table 4: Showing the medications received in the cases of scorpion sting

Medications	Frequency	Percentage
Tetanus toxoid	14	35.0
Dobutamine	10	25.0
Diclofenac	4	10.0
Dopamine	1	2.5
Prazosin	10	25.0
Pheniramine maleate	4	10.0
Paracetamol	1	2.5
Lignocaine	2	5.0

Table 5 shows the medications and interventions administered to patients (n=40) after they were hospitalized due to scorpion stings. All patients (100%) received intravenous fluids (IV Fluids) and prazosin. Dobutamine (35.0%) was used in a sig-

nificant portion of cases, due to potential cardiovascular complications in some patients. Paracetamol (80.0%) was used in a high number of cases, for pain management as a crucial aspect of treatment.

Table 5: Showing the treatment received by the cases after hospitalization

Management	Frequency	Percentage
IV Fluids	40	100.0
Prazosin	40	100.0
Dobutamine	14	35.0
Paracetamol	32	80.0

Table 6 provides the details of complications observed in 40 patients included in the study. The most frequent complications were related to the cardiovascular system. Peripheral circulatory failure (8 cases, 20.0%). Myocarditis (5 cases, 12.5%) cases. Congestive cardiac failure (1 case, 2.5%) and

Encephalopathy (1 case, 2.5%). Since scorpion venom has the most common effects on the heart and circulatory system most of the complications were recorded for them scorpion venom has also detrimental effects on the nervous system leading to encephalopathy as seen in this study.

Table 6: Showing the complications recorded in 40 cases of scorpion sting included in the study

Complications	Frequency	Percentage
Peripheral circulatory failure	8	20.0
Myocarditis	5	12.5
Encephalopathy	1	2.5
Congestive cardiac failure	1	2.5

Discussion

Scorpion sting envenomation is a frequent medical emergency in children, particularly in rural regions. In this study, the majority of scorpion stings in

children occurred in the 0 - 3-year age group. In contrast, Pol R et al. [10] identified the most affected age group as 2 to 7 years. In this study, 40 pediatric patients were enrolled, with a majority

being males (75%) compared to females (25%). The study indicates that male children had higher exposure to scorpion stings than females, a result that aligns with many other studies showing similar findings [2, 11]. This is likely due to boys spending more time outdoors and playing in areas where scorpions are commonly found (9). In the current study, we found that most stings occurred during the night (65%) compared to the daytime (35%). Similarly, Soren et al. reported that most stings happen at night, likely because scorpions are more active during this time [12]. Additionally, 27 patients (54%) had stings on the lower extremities, while 23 patients (46%) had stings on the upper extremities. Most stings were on the lower limbs, consistent with the observations of other similar studies [10, 11]. In this study, the majority of stings occurred outdoors (62.5%) compared to indoors (37.5%). Madhavan et al. [12] found that most scorpion stings in children happened indoors, whereas our study shows a higher incidence of outdoor stings. This discrepancy may be due to our child population engaging more in outdoor activities, such as playing in the fields. In our study, pain at the sting site was reported by 40 patients (100%) and resolved spontaneously within 12 to 24 hours without any local complications. Other common symptoms included autonomic storm in 20% headache in (4%), abdominal pain in (5%) of cases, and palpitations in (15%) of cases. Priapism was observed in nearly 15% of male children. Bawaskar et al. [2] noted these clinical symptoms in up to 10% of patients, which is consistent with findings from Balasubramaniam et al. [13].

The primary treatment for scorpion stings involves supportive care, symptom relief, and the administration of specific scorpion antivenom [14]. Minor symptoms were managed with antihistamines and analgesics [2]. The main purpose of using prazosin is to counteract the effects of catecholamines released by the brain. In this study, 22.5% of patients received prazosin within 1 hour, 42.5% within 1 to 2 hours, 20% within 2 to 3 hours, 12.5% within 3 to 4 hours, and 2.5% after 4 hours. Complications were less frequently observed in children who received a dose of prazosin early (<3 hours after the sting). Comparing other studies from India shows that early and effective administration of prazosin significantly reduces the incidence of complications. Some patients had pre-existing cardiac conditions such as myocarditis and circulatory failure. In this study, 20% of patients received a single dose of prazosin, 30% received 2 doses, 17.5% received 3 doses, and 30% received over 4 doses. The average hospital stay was 3 days. There were no mortalities due to scorpion envenomation during the study period. Most patients with myocardial dysfunction responded to

dobutamine treatment. The study findings indicate that early and effective use of prazosin is associated with good outcomes, with a shorter time from sting to prazosin administration leading to better results.

Conclusion

The study finding shows that Early and effective use of prazosin treatment showed good outcomes in patients. Fewer complications were seen in patients who received first aid before hospitalization. This study concludes that the majority of patients were exposed to complications due to a shortfall in education, awareness, and pre-hospitalization (first aid). We must create awareness and provide education to healthcare workers in all primary healthcare centers by distributing pamphlets to the public in and around hospitals about the first aid management of scorpion stings to reduce complications.

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