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Prevalence of Scorpion Bite in Pediatric Age Group

Ujjwala Laxman Shirsath[1], Sunil Natha Mhaske[2], Ganesh Misal[3]

Author Affiliation: [1]Assistent Professor, [2]Professor, [3]Senior Resident, Department of Paediatrics, Dr. Vithalrao Vikhe Patil Foundation's Medical College & Hospital, Ahmednagar, Maharashtra 414111, India.

Corresponding Author: Ujjwala Laxman Shirsath, Assistent Professor, Department of Paediatrics, Dr. Vithalrao Vikhe Patil Foundation's Medical College & Hospital, Ahmednagar, Maharashtra 414111, India.

E-mail: shirsathujjwala7@gmail.com

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Abstract

Background: Scorpion sting is a frequent, life-threatening medical emergency in children. They constitute a significant public health problem in many underdeveloped countries, including India. A case series type of study was conducted to study the prevalence of scorpion stings in pediatric age group.

Method: This is an observational study of 35 cases of scorpion sting, admitted to our hospital. An 11-month case series type of study was done to study the prevalence of scorpion sting in pediatric age group.

Result: Maximum admissions were in the 3–10 age group (56%) followed by 28% in 1–3 years age group. Prevalence was very low in children less than 1 year of age group. Males were affected more than females, M:F ratio 5:2. Mortality was mainly in 1–3 years age group and 3–10 years age group. Percentage wise mortality more in 1–3 years age group (28.5%) than 3–10 years age group (14.28%).

Conclusion: Scorpion stings is a serious, potentially fatal emergency in our area. Cardiovascular manifestations are most common and life threatening. Scorpion stings constitute an "Occupational Hazard"for children employed as agricultural laborers. Administration of prazosin, as early as possible, is probably, the single most effective intervention in preventing complications and mortality.

Keywords: Scorpion bite; Prevalence; Age group; Mortality.

Introduction

Scorpion envenomation is an important public health hazard in tropical and sub-tropical regions. Envenomation by scorpions can result in a wide range of clinical effects, including, cardiotoxicity, neurotoxicity and respiratory dysfunction. Out of 1500 scorpion species known to exist, about 30 are of medical importance. India is a country where agriculture forms the infrastructure of the nations economy. The majority of land is under green belts for cultivation or is occupied by dense forests. Increased deforestation in recent years have increased the exposure of the tribals and other people living in rural areas to various forms of wild life. This has lead to increased incidences of various bites and stings. Scorpions are found commonly in our country. Hence, scorpion stings constitutes an important health hazard. They are specially quite common in the rural and coastal areas.

In lndia, about 86 species of scorpions are found of which are only two are known to be poisonous.

These are

1. Mesobuthustamulus (The red scorpion)
2. Palamneus swammerdami (the black scorpion)[2]

In Maharashtra, stings by the red scorpion are quite common in Konkan area and the dry districts of Ahmednagar and Aurangabad. Scorpion stings are relatively less hazardous in adults, but may lead to serious toxicity in children. Hence, it assumes so much clinical importance in children.

Materials and Methods

Source of Data

All the children admitted for scorpion sting in our Hospital formed the material for the supply.

Method of Collection of Data

Study group

All the children admitted for scorpion sting in our institute during the period of 11month formed the study group.

Inclusion criteria

(1) All cases of definite scorpion sting in children upto 18 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 >18 years of age.

(2) Unknown bites and cases where the clinical manifestation was not compatible with scorpion sting envenomation were excluded.

Study Design

Thirty-five cases of scorpion sting, admitted to our institute from 15 July 2011 to 15 June 2012 were included in the study. On admission, a detailed clinical history, including the time of sting, symptomatology, details of treatment received before admission was taken. Further 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 amylaze levels, was done in all the cases. Chest radiograph was done in cases with evidence of myocarditis or pulmonary edema. 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. 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. We visited 32 places where'the cases-of scorpion stings were reported. This was done to obtain a first-hand knowledge of the habitats of scorpions and to verify the various epidemiological factors that predispose to a high prevalence of scorpion sting in our community.

Results

The study was carried out in the setting of a medical college hospital and its urban health center during the period from 15 July 2011 to 15 June 2012 (11 months).

Prevalence

The prevalence of scorpion stings is given in Table 1 which shows the percentage of admissions due to scorpion sting out of all the admissions due to snake and insect bites in pediatric age group. The same distribution is shown in Fig. 1.

Table 1: Prevalence of scorpion stings in pediatric age group

Diagnosis	Male	Female	Total (%)
Scorpion sting	25	10	35 (26.92%)
Snakebite	28	19	47 (36.15%)
Others	22	26	48 (36.92%)
Total (%)	75 (57.69%)	55 (42.31%)	130 (100%)

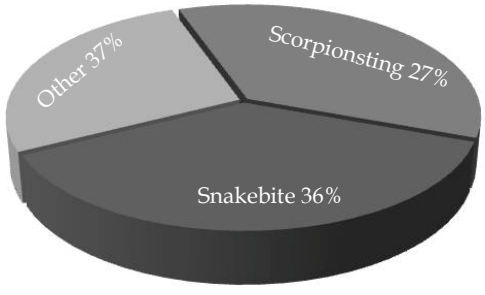

Fig. 1: Prevalence of scorpion stings in pediatric age group.

Scorpion stings accounted for 27% of total admissions due to insect and snakebite.

Discussion

Scorpion sting is an acute life threatening, time-limiting medical emergency of villages. Numerous envenomations go unreported and the true incidence is not known.[2] Dominant clinical effects vary from species to species and from one geographical location to another.[5] Case fatality rates vary widely among different regions from 3 to 22% and over the years, with improvement in management protocols, there has been a dramatic reduction in mortality.[2]

The proportion of cases in the 0–3 years, 4–6 years, 7–12 years and beyond 13 years age groups were 16%, 38%, 32% and 14% respectively. Children aged between 6 and 12 years are more exploratory and tend to wander outside homes in the darkness and hence are more susceptible to stings.[6] Studies in the past have also shown that most of the admissions for scorpion sting, in pediatric departments are in children between 1 and 10 years of age.[7]

There was a male preponderance in this study. This has also been noted in the past by various authors.[8,9] This could be because boys, especially toddlers, tend to be more exploratory and wander outside. Further, older boys are frequently employed as agricultural laborers, thus exposing them to field related scorpion stings.[10] Clustering of cases was noted in the summer months (22%) and in the rainy months (30%). No study has documented the seasonal pattern of scorpion sting, but it is widely observed that cases of scorpion stings increase dramatically in summer and are lowest in winter.[2] This is in keeping with the hibernatory behavior of scorpions in winter. Scorpions tend to creep out of the burrows in summer, thus increasing the risk of accidental human contact and thus leading to an increased incidence of stings.[5]

The incidence of scorpion sting is higher in children living in kaccha houses. Kaccha houses have mud floors and walls and thatched roofs. Scorpions inhabit the crevices and underground burrows in dwellings and these houses provide a safe haven for them. In contrast, pakka houses with tiled floors and cemented walls and roofs are safer.[4] A higher incidence of sting was noted in lower socioeconomic groups. The high incidence of stings in this group is probably due to the type of housing and to their predominantly agricultural presents.[5]

A majority of cases (72%) were from rural areas. Scorpion sting is mainly a rural emergency with habitats of scorpions being primarily, paddy fields, and sugarcane, coconut and banana plantations.[2]

The proportion of scorpion stings, sustained indoor were slightly more to that sustained outdoors. However, female children and children from urban areas were more likely to be stung indoors, when compared to male children from rural population. Rural male children are more often involved in agricultural activities and hence are more at risk of accidental contacts with scorpions in the fields. This could explain the high incidence of stings sustained outdoors in them.

Most of the stings sustained outdoors were in the fields (48%), when children accidentally trod over or handled the scorpion and were stung. Bare-foot walking also increased the risk of sustaining a sting. Stings sustained indoor, were mostly when children were sleeping on the floor. Infants were stung, while sleeping in a cradle or a swing made of cloth and hung on the roof (Hammock). Stings also occurred when scorpions were hidden in clothes and in poorly lighted rooms. Outdoor stings are more common than indoor stings in all parts of the world.[5,11] However we noted a significant number of indoor stings especially in the urban areas and in females. Further, a number of stings in infants were related to the cradles and hammocks used to put babies to sleep. This should be considered when suggesting appropriate measures for prevention of scorpion stings.

Stings due to Mesobuthus species (Red scorpion) were slightly more common than those due to Palamneus species (Black scorpion). This preponderance of stings due to Mesobuthus species, in hospital admissions, has been reported in the past.[5,10] This could be because of an increased prevalence of scorpions of the Mesobuthus species. Further, scorpions of this species being more venomous, could result in increased rates of hospitalization in children with stings due to this species.[6]

Daytime stings were more common in our study. This is in contrast to earlier studies, which showed a preponderance of stings sustained during night time due to nocturnal habits of the scorpion.[1,2] This could be because a significant proportion of stings in our study were sustained outdoors while engaged in agriculture-related activities which is a daytime occurrence. Although any part of the body can be exposed to sting, in 76% of cases in our study, the sting was sustained on the extremities. This is comparable to many studies in the past which

showed an increased incidence of stings on the peripheries of 60–80%.[4,11] Most of the cases in our study were stung when accidentally trodding over or handling scorpion in fields or in poorly lighted rooms. Thus, most of the stings were sustained on extremities.

Pain at the site of sting was the commonest complaint noted and was invariably present in all the cases. The pain was usually mild. The high incidence of pain was also noted in previous studies.[5,6] Other common symptom noted were profuse sweating, restlessness, vomiting and excessive salivation.

Common physical signs noted were restlessness, cold peripheries, tachycardia and hypotension. Eighty-two percent of cases presented with "Autonomic storm", characterized by cold extremities, tachycardia and hypotension. Hypertension was noted in 10% 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.[5]

Complications were noted in 82% of the cases, with most of the complications being related to the effects of autonomic storm. Peripheral circulatory failure (PCF) was the commonest complication encountered and is a consequence of fluid loss in the initial cholinergic storm and also secondary to myocarditis.[2] High incidence of peripheral circulatory failure, ranging from 5 to 80% has been noted in various case series in India.[5,12] Most of the cases of Peripheral circulatory failure responded well to prazosin, fluid resuscitation and inotropic support.

Pulmonary edema was noted in 24% of the cases in our study. The reported incidence of pulmonary oedema secondary to scorpion sting in India is around 5%.[5,12] Although, a high incidence, similar to that seen in our study has been reported before.[7]

Popliteal artery thrombosis was an interesting finding noted in a 14-year old male child, stung by a red scorpion. Child was treated with heparin and oral aspirin. The child improved gradually, the lower limb pulses reappeared and pain subsided. On discharge, child had mild residual foot drop of left lower limb. Popliteal artery thrombosis is an extremely rare occurrence following scorpion sting and has not been reported in world literature to the best of our knowledge, though occurrence of deep venous thrombosis has been well reported.[5]

Complications were encountered more frequently in younger children. Similar findings were observed by other authors. [6,7] The dose of the venom relative to the weight is obviously higher in younger children, thus rendering them susceptible to more severe envenomation and greater risk of complications.[2]

The incidence of complications in males was slightly more than females. Bawaskar et al. have reported an increased risk of pulmonary edema and hypertension in males compared to females.[8]

Complications were more common in stings by Mesobuthus sps than Palamneus sps. The clinical effects and toxicity of scorpion venom varies considerably from species to species. Cardiovascular effects are particularly prominent following stings by Mesobuthus tamulus sps.[2] No published data, comparing the rate of complications in stings due to different species is available. Further, the identification of species of scorpion in our study was based on information provided by the bystanders and the victim, which may not always be reliable. A more objective study of the species of scorpion would be necessary before drawing any further conclusions.

Stings on the face and scalp had a higher incidence of complications compared to stings elsewhere. There is a paucity of literature relating the rate of complications to the site of sting. In a study published in Saudi Arabia, no significant relationship was found between the site of sting and toxicity.[13] However, closer proximity of sting to head and torso results in quicker venom absorption into the central circulation.[3] This could explain the findings noted in our study.

All the cases admitted, received a dose of prazosin, at admission and every 4 hours thence, till autonomic storm was reversed. Complications were noted less frequently in children who received a dose of prazosin early (within 4–8 hr of sting). This finding is comparable to studies done elsewhere in India, which show that early and effective administration of prazosin significantly reduced the incidence of complications and mortality.[1,14–16.]

Prazosin, an alpha adrenoceptor antagonist; is a physiological and pharmacological antidote of scorpion venom.[10] Cardiovascular morbidity and mortality depends on the time interval between sting and administration of prazosin.[10]

Two of the fifty study cases expired, giving a case fatality rate of 4%. Both the deaths occurred in younger girls and both had myocarditis, cardiogenic shock, massive pulmonary edema and encephalopathy. The mortality due to scorpion sting has dramatically declined over the years from up to 68% to less than 1%.[2,4]

Deaths due to scorpion sting occur mainly due to massive pulmonary edema, CCF with cardiogenic shock or recurrent seizures.[5,12,13] Improved management practices and early administration of prazosin are the important factors responsible for the decline.[17]

The relatively high incidence of mortality noted in our study is due to delayed referral and failure to seek medical care early. The delay in administration of prazosin (more than 24 hr) was significant and could have contributed to development of severe complications.

Our experience highlights the importance of a prompt referral to a tertiary center and early administration (within 4 hr of sting) of prazosin in the periphery to avert such tragedies in the future.

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