

## **The Outcome of 428 Cases of Scorpion Sting Syndrome in Atbara Locality, North Sudan**

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### **Abstract:**

**Objectives:** To determine the prevalence and outcome of scorpion sting in Atbara and to give a brief pathophysiology, clinical aspects, and management options.

**Methods :** This is a retrospective study conducted at Atbara Teaching Hospital, Sudan, to look into the records of 428 scorpion envenomation cases in five years period from (2005-2009).

**Results:** Males constituted 51.2%, children below 15 were 37.2%, the overall death rate was 4.7% (n=20) and all of them were children. Most cases (88.4%) presented during the hot season.

**Conclusion:** Scorpion sting is a life-threatening condition in children in Atbara, a better understanding of the condition and a proper management protocol may save lives.

**المخلص:** مصير 428 من المصابين بمتلازمة التسمم بلدغة العقرب في مدينة عطبرة بشمال السودان  
**الأهداف:** هدفت هذه الدراسة إلى تحديد نسبة الإصابة و مصير المصابين بمتلازمة التسمم بلدغة العقرب في مدينة عطبرة , كما تم التعرف الي الصور السريرية والمرضية, و التدابير العلاجية.  
**الطريقة:** في دراسة استرجاعية تمت مراجعة ملفات المصابين بلدغات العقارب بمستشفى عطبرة بالسودان لمدة خمسة أعوام (2005 – 2009م) واستخلصت منها البيانات الشخصية ومصير المصابين .  
**النتائج:** شكل الذكور نسبة 51.2% وكان الأطفال اقل من 15 عاما بنسبة 37.2% و معدل الوفيات 4.7% (عدد 20) كلهم من الأطفال. وكانت نسبة الإصابة عالية (88.4%) في فترة الصيف.  
**خاتمة:** تشكل لدغات العقارب خطرا مهددا للحياة في عطبرة وبخاصة لدى الاطفال وقد يؤدي الفهم الدقيق لهذه الحالة ووضع خطط علاجية مناسبة الي انقاذ حياة العديد من الأشخاص.

**Key words:** scorpion sting, envenomation, Atbara, Sudan

### **Literature review:**

Scorpion envenomation is a common public health problem worldwide and children are at greater risk of developing severe cardiac, respiratory and neurological complications<sup>(1)</sup>. The problem is more common in tropical and subtropical countries, and is an

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important cause of morbidity and mortality, especially among children<sup>(2)</sup>. Scorpions are second only to snakes in causing human fatalities from envenomation. Species of scorpions capable of inflicting fatal stings are living in North and South Africa, the Middle East, India, America, Trinidad, and Tobago.<sup>(3)</sup>

Scorpions possess a highly specialized organ that produces, secretes and disposes the venom components. The last postabdominal segment, named telson, contains a pair of venomous glands connected to the stinger.<sup>(4)</sup>

Numerous scorpion toxins are identified. The most prominent components of scorpion venoms are the peptides responsible for the neurotoxic effects associated with their sting, for which more than 350 different types have been described.<sup>(4-6)</sup> Most of these toxins are structurally related disulphide-rich short proteins (23–75 amino acid residues long), which affect cellular communication by modulating Na<sup>+</sup> or K<sup>+</sup> ion-channels permeability<sup>(7)</sup>. The unopposed effects of alpha-receptor stimulation lead to myocarditis. Acute rise in blood pressure due to sympathetic stimulation, rupture of unprotected perforating arteries, intracerebral hemorrhage and cerebral infarction due to DIC and central respiratory failure are reported in scorpion stings.<sup>(4,8)</sup>

The venom stimulates the neuroendocrinal-immunological axis by its ability to release catecholamines, corticosteroids, pro-inflammatory mediators, including leukotrienes, prostaglandins, platelet activation factors, kinins and nitric oxide which are important in the pathophysiological manifestations of human and experimental animals.<sup>(2,9,10)</sup>

Severity ranges from local pain and paresthesia to fatal cardiotoxicity and encephalopathy. Symptoms include: tachycardia, vomiting, abdominal pain, salivation, dehydration, muscle rigidity and twitching, tremor, seizures, coma, hyperthermia, tachyarrhythmias and occasionally bradyarrhythmias, hypertension, and less often hypotension, pulmonary edema and cardiac failure.<sup>(1,2,11,12)</sup>

Disseminated intravascular coagulation and vascular injuries are well known complications following scorpion stings, and there are several reports of thrombotic and microangiopathies events *i.e.*, stroke and multiple cerebral and cerebellar infarctions and hemolytic uremic syndrome that explain vascular injuries following envenomation.<sup>(13-16)</sup>

Laboratory findings include: increased TWBCs, raised serum levels of glucose, lactate dehydrogenase, creatine phosphokinase, aspartate aminotransferase and alanine aminotransferase as well as international normalized ratio.<sup>(1,11)</sup>

Patients who develop severe toxicities are more likely to have fever, confusion, convulsion, hemoglobinuria, and reduction in hemoglobin level below 10 g/dL. Renal toxicity which is one of the serious systemic effects, can progress to severe renal and cardio-respiratory failure if not treated early by administration of the polyvalent antivenom.<sup>(17,18)</sup>

The medical care provided depends upon the distinction between patients stung by scorpions and patients actually poisoned. The first category of patients are to be monitored up to four hours after the scorpion sting, while the poisoned patients need intensive care including the administration of specific antivenom.<sup>(1,19)</sup>

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Treatment with prazosin, is reported to be more effective than the antivenom and if initiated early, may prevent cerebrovascular, manifestations of scorpion sting<sup>(14)</sup>. It is also effective in treatment of cardiovascular manifestations and pulmonary edema.<sup>(20,21)</sup>

**Materials and Methods:**

The records of subjects who presented to Atbara Teaching Hospital with a history of scorpion sting during 1<sup>st</sup> January 2005 through 31<sup>st</sup> December 2009 were reviewed. Atbara is 310 km north to Khartoum. The total population of the locality is 134586. Atbara Teaching Hospital is a 400 bed tertiary care facility.

The data obtained were coded, entered, validated and analyzed using Statistical Package for Social Science (SPSS) version 13.0. The age, sex, residence and outcome were identified. The ethical approval for the study was obtained from the local Ethical Committee of the Nile Valley University.

**Results:**

A total of 428 records for scorpion sting subjects were reviewed, 51.2% were males and 48.8% females. Children below 15 years constituted 37.2% (n=159), among them 38.4% (n=61) were below 5 years. The age group 15 - 44 constituted 53.1% of patients. Most patients (94.3%) were from urban Atbara. There is seasonal variation of scorpion sting with most cases (88.4%) occurring during the hot season, April through September, (59.4%) in April and May alone. Fifty percent of cases presented in the year 2005. Most cases (88.7%) had a short stay period in hospital: (30.3%) were treated in casualty and 58.4% were admitted for one day. In four adults the sting was complicated by myocarditis and all cases recovered .Twenty patients died, constituting 4.7% and all of them were children, 9 (14.7 %) of them were below 5 years. The causes of death were attributed to pulmonary edema (14 patients), irreversible shock (4 patients) and encephalopathy (2 patients). Five of those died had received the polyvalent antivenom.

**Table (1): Age group of scorpion sting patients (n=428)**

Age group (years)	Number	Percentage
Under 5 years	61	14.2%
5 – to less than 15 years	98	22.9%
15 – 44	227	53.1%
Above 44	42	9.8%

**Table (2): The outcome of scorpion sting patients (n=428)**

Outcome	Number	Percentage	
Short stay/recovery	380	88.78%	
	Treated in casualty	130	30.3%
	Admitted for one day	250	58.4%
Developed complications/recovery	28	6.5%	

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	Myocarditis	4	0.9%
	Other complications	24	5.6%
<b>Death</b>		20	4.7%
	Children below 5years	9	2.1 %
	Children 5 years and above	11	2.6%

**Discussion:**

Scorpion envenomation is a life-threatening condition in Atbara, Sudan particularly among children. The aim of this study was to report the recorded data about the condition and to brief the pathophysiology and management. Four hundred and twenty eight records were obtained from the unit of statistics; the whole number of cases may be a bit little more than the obtained records because some of the mild cases might have been treated but not recorded. The scorpion sting syndrome is definitely more prevalent in Atbara city than the number reported because other smaller hospitals and health centers also deal with the condition but not included in this study. In addition some patients treat themselves with local medications.

Males and females are similarly affected. As reported in other studies, the lower limb is the most common site affected <sup>(1,11)</sup>, and most cases presented during night, coinciding with the nocturnal predatory behavior of the scorpion <sup>(2)</sup>. Most cases (88.4%) presented during the hot season, (April to September), this finding is in agreement with that reported in Saudi Arabia, Tunisia and Turkey <sup>(2,11,12)</sup>. The overall mortality is 4.7% which is lower than that reported from Tunisia (7.5%)<sup>(12)</sup>. Mortality among children is high, 20 out of 159, (12.6%) indicating the highly venomous nature of the scorpion species in Atbara, particularly during April and May (16 cases). Following the availability of the polyvalent antivenom (PVA) late in the year 2005, for the first time, in Atbara, and its administration to children showing manifestations of severe envenomation, a dramatic decrease in mortality rate was observed (9.4% in 2005 alone to 3.1% in the subsequent 4 years collectively). This may indicate the effectiveness of the PVA, but other factors should also be considered such as doctors' awareness, adherence to a management protocol, and the public awareness regarding the seriousness of the condition, therefore early presentation to hospital. Due to limited resources the PVA was not given to every patient, yet the prognosis had improved with symptomatic management that included: intravenous fluids, anti-allergic drugs, analgesics and proper dealing with the complications.

**Conclusion:**

Scorpion sting envenomation is a life-threatening condition in children in Atbara: better understanding of the condition by doctors, adherence to a management protocol, use PVA, as well as raising public awareness may help to decrease mortality.

**Acknowledgements**

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