International Journal of Pharmacology & Toxicology / 5(1), 2014, 10-17.

e - ISSN - 2249-7668
Print ISSN - 2249-7676

International Journal of
Pharmacology & Toxicology

www.ijpt.org

SCORPION STINGS – A SHORT REVIEW

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ABSTRACT

Scorpions belong to class arachnide and are quite commonly encountered in India. The scorpions venom containing short neurotoxin polypeptides consists of low molecular weight proteins, Which have mechanisms of lethal and paralytic effect. In many tropical and subtropical countries, venoms from medically important scorpion species are still used in the production of anti-venoms to the treatment of envenomation. The objective of this review is to update knowledge on the management of scorpion stings. Literature search was started in January 2013 in the following electronic and non electronicdatabases : Medline, Ebsco, Pubmed, Dove Press, Vels school of pharmaceutical library and the Cochrane library. We performed a search over a period of 16 months only on scorpion stings were included, key search terms were as follows ; Indian, Australian, Chinese scorpion species and etc. The result of scorpion stings management as neutralizes the circulating venom with anti-venom and as we know that, no action in reversing the effects of already raised catecholamine and tissue-bound venom. Cold extremities occur due to alpha receptor stimulation as a result of vasoconstriction, and delay the venom absorption in circulation from site of sting. Hence necessity need for health personnel training follows, regarding optimum treatment protocols. It should be extended to all countries where the incidence of scorpion stings is high.

Keywords: Scorpion, India, China, Australia, anti-venom and Respiratory failure.

INTRODUCTION

A scorpion's body becomes more slender toward the end and has a five-segmented tail that can be arched over the back. On the end of the tail is a bulb-like poison gland or stinger. Scorpions have four pairs of legs and two large, pincer-bearing arms (Pedipalps) in front. Scorpions are well-equipped to defend themselves or attack prey with their pincers and stinger. Between the last pairs of legs are comb-like structures called the pectines, which are sensory organs used to sense surface textures and detect prey.

Scorpions have two eyes on the top of the head and usually two to five pairs of eyes along the front corners of the head. They do not see well, however, and must rely on the sense of touch, using their pectines and other organs for navigation and detecting prey. They have a well-developed sense of hearing. Worldwide, scorpions range in size from ½ inch to 7 ¼ inches long (including the tail), depending on the species.

Figure 1. Indian red scorpion (Mesobuthustamulus)

Scorpions are nocturnal, hiding during the day and becoming active at night. This behavior helps them manage temperature and water balance, which are important functions for survival in dry habitats. Many

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species dig burrows in the soil. Their bodies are flat, which allows them to hide in small cracks and under stones, bark, wood, or other objects on the ground. From these hiding places they wait or search for prey. Chief foods are small insects, spiders, centipedes, earthworms, and other scorpions. Once they capture their prey, they use their large pincers to crush and draw it toward the mouth so the prey's body juices can be ingested.

Some scorpion species may live for 20 to 25 years, but the typical life span is 3 to 8 years. Adult scorpions may have several broods of young. Following an elaborate mating process that lasts 24 to 36 hours, the female undergoes a gestation period ranging from 5 months to more than 1 year. The young are born alive in semitransparent sacs. As soon as the young scorpions free themselves from these thin wrappers, they climb onto their mother's back . The striped bark scorpion mates in the fall, spring or early summer and the gestation period lasts about 8 months. Females usually give birth to 13 to 47 young, with an average of 31. The immature scorpions molt 3 to 7 days after birth and remain on the mother for another 3 to 7 days. There are five or six molts to maturity. A striped bark scorpion lives for approximately 4 years.Scorpion have been able to survive in heat, drought, freezing conditions for weeks, desert condition and starvation for months and total immersion of water for days. This remarkable power of adoption makes their survival independent of ecological condition and gives the species an unbroken continuity in adverse climatic conditions. During the day time scorpions take shelter under bark of trees, dry firewood or cow dung, in the piles of bricks, paddy husk, beddings, loose tiles of hut, in the shoes left empty over night, pockets of trousers and shirt, carving, crevices of windows and doors.[1]

Scorpions are a very homogenous group of arthropods comprising about 1500 species of which about 30 all belonging to the family buthidae are potentially dangerous to humans. They are shy creatures of universe active at night during the hot season but often live in houses or inhabited areas which explains the high incidence of scorpion stings involving both adult and children in many parts of the world. The venomous apparatus of the consists of a venom vesicle comprising a pair of joined glands in telson (ie) the last segment of the post abdomen. This venom vesicle is surrounded by a striated muscular layer facilitating and regulating the ejection of venom. This ability partly explains the variation In intensity of symptoms and the possibility of dry stings (ie) without inoculation of venom.

Scorpions belong to class arachnide (Comprising eight legged creatures) and are quite commonly encountered in india. The scorpions venom containing short neurotoxin polypeptides consists of low molecular weight proteins, Which have mechanisms of lethal and paralytic effect. It has been estimated that 100,000 distinct peptides exist in scorpion venom but only few peptides have been described. In many tropical and subtropical countries, venoms from medically important scorpion species are still used in the production of antivenoms to the treatment of envenomation. The reasons of this is the absence of vaccines or other effective agents against envenomations on the other hand, source of variation in animal orgin interval of venom extraction time and method and differences in the genetic makeup of population in one species, hence quality control and homogeneity of venom to production antivenom are a crucial point. [2] The objective of this review is to update knowledge on the management of scorpion stings.

EPIDEMIOLOGY

Scorpion stings are a common and important health problem in developing countries. In India 30-50% fatality occur due to acute pulmonary edema .whereas, uncommon clinical presentations of scorpion sting were seen in 86 species of scorpions. Some species are medical importance mesobuthus tumulus (Red scorpion) and *Palamneus swanmerdami* (black scorpion). *Mesobuthus tamulus* scorpion is common in western Maharashtra, Saurashtra (Gujarat), Kerala, Andhra Pradesh, Tamil Nadu and Karnataka states where morbidity and mortality due to scorpion stinging have been reported. The Iranian scorpion (scorpionide) fauna consists of over 44 species from 23 genera in two families, Buthidae and scorpionidae, species of *Hemiscorpius lepturus*, *Androctonus crassicaude* and *Mesobuthus eupeus* are the main species responsible for stings. Where *H.Lepturus* is the most venomous of all types of scorpions in Iran. It contributes 95% of all mortalities in scorpions sting patients. *A crassicaude* is the second most dangerous scorpion in Iranand has a large geographical distribution in both the world and Iran. This scorpion species distributed in Iran, Iraq, Pakistan and Yemen. However, *H.falcifer* and *H.flagelliraptor* from oman. About 1000-2000 deaths are caused by scorpion bite eachyear in mexico and high mortalities occur in Brazil, Israel, Trinided, Algeria, India, Pakistan and Jordan. [3]

Among scorpions living in northafrica, 12 species are very important and involved in severe accident cases. Androctonus australis (Aa); Androctonus mauretanicus (AM); *Androctonus crassicauda* (AC); *Buthus occitamus* (BO); *Odontobuthus doriae* (OD); *Hottentott Schach* (HSch); *Hottentotta Jayakari* (HJ); *Mesobuthus eupeus* (Me); *Hemiscorpius Lepturus* (He); *Hemiscorpius Persicus* (HP); *Leiurusquin questriatus* (LQ); Their venom toxicity is variable and also depends on the injection route and animal body weight. [4]

In Turkey, there are 23 distinct scorpion species and of those, the most venomous scorpion to humans belongs to the Buthidae family. *M. eupeus* and *M. gibbosus* are members of Mesobuthus genus, Buthidae family. These species common from west Anatolia to the east of Anatolia are considered a medically important species. Ozkan et al. stated that the majority of scorpion stings were observed in the Mediterranean, Aegean, Central and East Anatolia regions of Turkey. [5]

In southern Australia *cercophonius squame* is the only known scorpion from Tasmania. Lioctheles species are widely distributed along the eastern coast of Australia being found from northern mew south wales north wards to cape York in queens land. Representatives of the genus are also recorded in the northern territory and in remnant rainforest in the Kimberley region of western Australia. Liocheles defy the stereotypical view of scorpions as desert animals and are restricted to rainforest and other mesic tropical and subtropical environments.

Table 1. In this review major group of scorpions in Australia summary of the clinical effects and circumstances of stings. [6,12]

Scorpion Group	Location	Circumstances	Clinical Effects/Severity
Lychas spp. (family Buthidae)	Australian mainland	Indoors, at night; often trodden on or picked up inadvertently	Severe pain in most cases (90%) with a median duration of 2 h (IQR 1–8 h); systemic effects in 13% of cases; other local effects include numbness (13%), paraesthesia (11%) and tenderness (37%)
Isometrus spp.; *Isometroides* spp. (family Buthidae)†		Indoors, at night	Similar to Lychas spp.; severe pain in 67% of cases; no systemic effects in six cases; other local effects include numbness, paraesthesia and tenderness
Cercophonius squama (family Bothriuridae	Tasmania and Southern Australian mainland	89% indoors and the majority during daylight hours	Severe pain in 73% of cases with a median duration of 1 h (IQR 45 min–2 hrs); systemic effects in 9% of cases; other local effects include tenderness (36%)
Urodacus spp. (family Urodacidae)	Australian mainland	More common outdoors, mainly during daylight; often trodden on	No cases of severe or persistent pain; no other local effects except swelling and redness; no systemic effects reported
Liocheles spp. (family Liochelidae)	Northern Australia	Outdoors, during daytime	Pain and swelling

Table 2. 53 species of 12 genera of five families (Buthidae, Chaerilidae, Euscorpiidae, Hemiscorpiidae and Scorpionidae) are recorded in China: [7]

Family	Genera	Species (Endemic)	Distribution
Buthidae	*Hottentotta*	*Hottentotta alticola*	▲ 1
		Hottentotta songi	Xizang (endemic)
	Isometrus	*Isometrus maculatus*	Hainan and Taiwan
		Isometrus hainanensis Lourenço,	Hainan (endemic)
		Isometrus tibetanus	Xizang (endemic)
	Lychas	*Lychas mucronatus*	Guangxi, Hainan and Yunnan
		Lychas scutilus	Shanghai
Buthidae	*Mesobuthus*	*Mesobuthus bolensis* Sun,	Xinjiang (endemic)
		Mesobuthus caucasicus Intermedius	Xinjiang
		Mesobuthus caucasicus Przewalskii	
		Mesobuthus eupeus mongolicus	Gansu, Inner Mongolia (Neimenggu) and Ningxia
		Mesobuthus eupeus thersites	Xinjiang
		Mesobuthus karshius	Xinjiang (endemic)
		Mesobuthus longichelus	
		Mesobuthus martensii martensii	The South side of 43°N and the north side of the Yangtze River, bordered by the Helan Mountains and the Tengger and MoUs sand

			desert in the west and limited by the sea in the east
		Mesobuthus martensii Hainanensis	Hainan (endemic)
	Orthochirus	*Orthochirus scrobiculosus*	North-West
	Razianus	*Razianus xinjianganus* Lourenço	Xinjiang (endemic)
		Chaerilus conchiformus Zhu,	
Chaerilidae	*Chaerilus*	*Chaerilus dibangvalleycus*	Xizang (endemic)
		Chaerilus mainlingensis	Xizang (endemic)
		Chaerilus pictus	Xizang
		Chaerilus tessellatus	Xizang (endemic)
		Chaerilus tricostatus	Xizang
		Chaerilus tryznai	Xizang (endemic)
		Chaerilus wrzecionkoi	
Euscorpiidae	*Euscorpiops*	*Euscorpiops asthenurus*	*Xizang*
		Euscorpiops kamengensis	Xizang (endemic)
		Euscorpiops karschi Qi,	Yunnan
		Euscorpiops kubani	Xizang (endemic)
		Euscorpiops puerensis Di,	Yunnan (endemic)
		Euscorpiops shidian	
		Euscorpiops vachoni	Yunnan (endemic)
		Euscorpiops validus	Yunnan (endemic)
		Euscorpiops xui	
		Euscorpiops yangi Zhu,	
Chaerilidae	*Scorpiops*	*Scorpiops atomatus* Qi,	Xizang (endemic)
		Scorpiops hardwickii	Xizang
		Scorpiops jendeki Kovařík,	Yunnan (endemic)
		Scorpiops langxian Qi,	Xizang (endemic)
		Scorpiops leptochirus Pcock,	Xizang
		Scorpiops lhasa	Xizang (endemic)
		Scorpiops luridus Qi,	
		Scorpiops margerisonae	
		Scorpiops petersii Pocock,	Xizang
		Scorpiops pococki Qi,	Xizang (endemic)
		Scorpiops tibetanus	
Hemiscorpiidae	*Liocheles*	*Liocheles australasiae*	Hainan
	Tibetiomachus (endemic)	*Tibetiomachus himalayensis*	Xizang (endemic)
Scorpionidae	*Heterometrus*	*Heterometrus longimanus*	▲ 2
		Heterometrus tibetanus	Xizang (endemic)
		Heterometrus petersii	▲ 3

▲ 1–3: the localities of these species are indecisive.

Table 3. Clinical Features of Scorpion Stings [8]

Grade	Symptoms
I	Localized pain (sometime associated with local paresthesia, erythema, ecchymosis, blisters)
II	Mild systemic envenoming: Idem grade I + hyperthermia + Cardiovascular and respiratory symptoms: tachycardia, arrhythmia, dyspnea, hypertension/hypotension, electrocardiographic abnormalities, priapism Hypersecretory syndrome (salivation, sweating, bronchorrhea, nausea, vomiting, diarrhea, urination) Digestive tract: abdominal distension, abdominal cramps

	Neuromuscular disorders: dysfunction of either skeletal or cranial muscles: confusion,agitation, fasciculation, dystonia, vision disorders, ptosis, aberrant eye movements Biological disorders: hyperleucocytosis, hyperglycemia, acidosis
III	Life-threatening envenoming: idem grade II + multivisceral failure Cardiovascular symptoms: heart failure, cardiogenic shock, pulmonary edema Diaphoresis Neuromuscular disorders: dysfunction of both skeletal and cranial muscles: convulsions,paralysis, Glasgow score #6 (in absence of sedation) Biological disorders: SaO2 , 90%, increasing biomarkers of cellular necrosis, electrolytic anomalies (decrease of Na+ and Ca++, increase of K+)

Diagnosis: Electrocardiogram and echocardiography, which are essential tools for the optimum management of scorpion stings.

Table 4. Clinical investigation of scorpion stings

Brain	Lungs	Blood	Heart	Kidney	Liver
CT Scan	Chest radiograph	CBC	Blood Pressure	Serum Electrolytes	SGOT
MRI Scan	Respiratory rate	Arterial blood Gas analysis	ECG	GFR rate	SGPT
			Pulse Rate	CT	Bilirubin
			2D Echocardiography	MRI	CT/MRI

PATHOPHYSIOLOGY

Scorpion venom is a water-soluble, heterogeneous mixture. This heterogeneity of the venom may reflect the different reactions that could happen due to scorpion sting. The scorpion venom is composed of neurotoxins, cardiotoxins, nephrotoxins, hemolytic toxins, histamines, phosphodiesterases, serotonin, and cytokine releasers. The venom enters the circulation very rapidly; it has high volume distribution with a peak tissue concentration in about 37minutes after the sting. Experimentally, after intravenous administration of Tc-99m labeled venom, the venom was found within 5 minutes in the blood (28%), muscle (30%), bone (13%), kidney (12%), and liver (11%). The labeled venom was excreted through kidneys and hepatobiliary system. The maximum renal uptake of 32% at 30 minutes dropped to 22% at 3 hours, indicating that clearance of labeled venom from the kidney is slow. Neurotoxin is the most potent of venom components; it has 2 classes that act by altering ion channel permeability causing cellular impairment in nerves, muscles, and the heart. The cardiovascular effects of venom are primarily the result of sympathetic stimulation and release of tissue catecholamines. In addition, the venom inhibits angiotensin converting enzyme, resulting in accumulation of bradykinin, which is involved in the development of pulmonary edema and acute reversible pancreatitis. Alpha receptor stimulation plays a major role in the pathogenesis of pulmonary oedema. Angiotensin II stimulates alpha adrenergic receptors in the myocardium and hypoxia results from coronary spasm as well as from the accumulation of free fatty acids and free radicals leading to cardiac arrhythmias and sudden death. Venom-induced biochemical changes include hyperkalaemia and hyperglycaemia. Severe scorpion toxicity causes hypertension, increased myocardial contractility and dysrhythmias and neuromuscular hyperactivity. Severe envenomation usually appears within 1-3 hours following a sting and death most commonly results from left heart failure and pulmonary edema. [9]

COMPOSITION OF SCORPION VENOM

Scorpion venom is composed of toxins and enzymes with neurological tropism acting on ion channels of excitable cells. Toxins is based on four distinct criteria: the involved ion channel (in particular those for sodium, potassium, chlorine and calcium); the specific receptor to which the toxin binds within the ion channel; the three-dimensional structure of the toxin; and the type of response induced (activation/inactivation of the receptor). The venom of the same scorpion can have multiple toxins that may interact with each other, modulating the response of the ion channels involved and leading to complex and rapidly progressive symptoms. [10]

Table 5.Prevention of scorpion stings in terrestrial region

Location	Do	Don’t
False ceiling, under loose tiles of roof and bamboo cot	Use of mosquito net while sleeping	Don’t sleep in bamboo cot and loosened floor tiles.
In endemic areas of venomous sting clothing, beddings, shoes,	Materials should be vigorously shaken out and checked for scorpion without blindly putting	Don’t cover blanket without snaken out.

	hands.	
Under herb and shrubs venomous sting are present in forest and children park	Wear boot while walking in the deep forest and also playing in the children park	Sandal did not prevent sting
In endemic areas of venomous sting present paddy field	Pesticides like organophosphates, pyrethrins and chlorinated hydrocarbons are known to kill scorpions.	Don't use petroleum products to kill scorpions
Under wooden tables and furniture	At times of opening the school the tables and rooms (roof, walls and floor) should be thoroughly cleaned and washed	Don't use tables and room not in use for long period of time.

MANAGEMENT

A) Local Treatment

Nearest medical center which, usually, has no sufficient facilities, but this management is important because it may delay the systematic absorption of the venom, and consequently decreases the morbidity. Note : The employment of many traditional remedies may worsen the patient.

It includes:

1) Reassurance of the patient.

2) Stabilization of Vital Organs: This step is very important in case of scorpion bite, meanwhile, transfer to nearest hospital for further appropriate treatment if necessary.

3) Use of the pressure-immobilization bandage : This help us, retard venom transport via the lymphatic system. This technique can virtually stop venom movement into the blood circulation.

4) Analgesics: because pain is frequent and intense, it can be useful to administer analgesics with an anti-inflammatory action, such as salicylates. Morphine or its derivatives or analogs (tramadol) should be avoided because the opioid receptor agonists inhibit norepinephrine reuptake, which may potentiate their effects

B) On Hospital Admission

Treatment start in a critical care area of the hospital, such as intensive care unit or emergency department, where complications arising from envenomation or reactions to polyanitvenom can be bestway to manage the toxins .

1- Stabilization of Vital Functions (Supportive Care):

ABCD of any emergency situations is done by establishing airway, breathing, and circulation. Continuous monitoring of the vital signs is important; blood pressure, heart rate, respiratory rate, pulse oximetry, and temperature.

If the patient has not developed any symptoms or signs of envenomation, close observation of the patient for a period of 6-12 hours is advised, during this period an hourly check of the patient should be done assessing the level of consciousness, pulse rate and rhythm, blood pressure, respiratory rate and any new symptoms or signs.

2-Pharmacotherapy includes the anti-venom therapy and ancillary treatment.

a-Anti-venom therapy

i. Indication of anti-venom therapy is when the patient has signs and symptoms other than local manifestation.

ii. The decision of giving the anti-venom is very important as it significantly decreases the level of circulating unbound venom within the first hour.

iii. The intravenous administration of anti-venom therapy is considered to be the effective route, intramuscular or subcutaneous routes should be discouraged due to the slower rate of absorption and therefore delayed response, and the possibility of formation of large hematomas at the site of injection especially in patients with coagulopathy. For intravenous infusion, dilution of the antivenom1 in 5 or 1 in 10 in physiological saline helps to reduce the incidence of reactions and gives better control over the rate of administration. For the cases with history of allergy, further dilution with 1:100 or 1:1000 is required. Slow intravenous injection of undiluted anti-venom at a rate not exceeding 2 m1 per minute. If response to anti-venom is not satisfactory, use of additional doses is advocated. However, no studies establishing an upper limit are available. Infusion may be discontinued when satisfactory clinical improvement occurs even if recommended dose has not been completed. Children must be given the same dose of antivenom as adult or may be larger, in view of relative larger volume of venom in relation to body surface [13].

Perform a skin test prior to administering the anti-venom. First, dilute 0.1 mL of antivenom in a 1:10 ratio with isotonic sodium chloride solution. Second, administer 0.2 ml intradermally. A positive test result is if a wheal develops within 10 minutes. The skin test has a sensitivity of 96% and a specificity of 68% [14].

C) Specific Treatment

i. Cardiovascular complications such as hypertension, arrhythmia, heart failure, and pulmonary edema. Prazosin is selective $\alpha 1$- adrenergic blockers. It is recommended for the treatment of scorpion envenoming [15]. Prazosin is more effective than nifepidine which is a calcium channel blocker. Hydralazine is effective but it has several disadvantages, including tachycardia due to sympathetic stimulation, with a risk of myocardial infarction, and an increase in plasma renin, leading to urinary retention. Further, hydralazine administered parenterally produces a prolonged hypotensive response which is difficult to control. Captopril, a drug that inhibits the conversion of angiotensin has also been suggested [16]. Although prazosin use in children is not approved yet, some studies have showed its efficacy in the treatment of both adults and children with scorpion envenomation . In heart failure, dobutamine can be used alone or in combination with diuretics or anti-arrhythmics [17].

ii. Diazepam or midazolam can be used to treat neuromuscular disorders. Benzodiazepines are beneficial in the treatment of hypertension and could be the initial drug of choice in the treatment of scorpion envenoming.

iii. In general, anti-parasympathetic drugs, such as atropine, are not recommended routinely in the treatment of scorpion envenoming. These cause blockage of sweating, which is essential for temperature regulation, especially in children, and potentiate the adrenergic effects of scorpion venom, increasing hypertension and ischemic complications [18]. These drugs can be useful in cases of severe bradycardia or complete atrioventricular block, which are sometimes observed.

iv. Insulin administration in scorpion envenomation has helped in preventing multisystem failure. Some authors have showed the efficacy of insulin in humans with scorpion envenomation; they found that early start of insulin-glucose infusion has resulted in the recovery of cardiac, respiratory and metabolic derangements, and in significant decrease of mortality rate [19].

v. Corticosteroids do not have any role in decreasing mortalities or morbidities as well as they have effect on the ICU length of stay [20]. **The antidote of scorpion bite available in (Table 6) . World-wide Availability of Scorpion Antivenom [6,21].**

Androctonus aenas France: Antiscorpion Venom Serum, Pasteur Merieux *Androctonus amorexi* France: Antiscorpion Venom Serum, Pasteur Merieux *Androctonus australis* Algeria: Antiscorpion France: Scorpifav, Aventis Pasteur Germany: Scorpion Antivenom, Twyford *Androctonus crassicauda* Iran: Scorpion Antivenom Turkey: Anti-Scorpion *Androctonus mauritanicus* France: Antiscorpion Venom Serum, Pasteur Merieux Morocco: Serum antiscorpionique Androctonus species France: Antiscorpion Venom Serum, Pasteur Merieux Buthotus saulcyi Iran: Scorpion Antivenom *Buthus occitanus* France: Antiscorpion Venom Serum, Pasteur Merieux France: Scorpifav, Aventis Pasteur Germany: Scorpion Antivenom, Twyford	*Buthus gibbosus brulla* Turkey: Anti-Scorpion *Buthus tamulus* India: Anti-Scorpion Venom Serum (AScVS), Haffkine Centruroides species (elegans, gertschi, limpidus, suffuses, noxius, exilicauda) Mexico: Alacramyn, Bioclon Mexico: GGBR Polivalent Scorpion Antivenom Euscorpius carpathicus, italicus Turkey: Anti-Scorpion *Leiurus quinquestriatus* France: Antiscorpion Venom Serum, Pasteur Merieux France: Scorpifav, Aventis Pasteur Germany: Scorpion Antivenom, Twyford Israel: *Leiurusquin questriatus* Turkey: Anti-Scorpion *Mesobuthus eupeus* Iran: Scorpion Antivenom *Mesobuthus tamulus concanesis* India: Anti-Scorpion Venom Serum (AScVS), Haffkine Odontobuthus doriae Iran: Scorpion Antivenom Palamnaeus species India: Monovalent Red Scorpion Antivenom Serum Parabuthus species South Africa: Scorpion Antivenom, SAIMR Scorpio maurus France: Scorpion Antivenom Serum, Aventis Pasteur Iran: Scorpion Antivenom Turkey: Anti-Scorpion (subspecies fuscus) *Tityus bahiensis* Brazil: Soro Antiescorpionico, Instituto Butantan *Tityus serrulatus* Brazil: Anti Arachnidic Serum, Instituto Butantan Brazil: Soro Antiescorpionico, Instituto Butantan

CONCLUSION

Scorpion antivenom neutralizes the circulating venom and as we know that, no action in reversing the effects of already raised catecholamine and tissue-bound venom. Cold extremities occur due to alpha receptor stimulation as a result of vasoconstriction, and delay the venom absorption in circulation from site of sting. Hence necessity need for health personnel training follows, regarding optimum treatment protocols. It should be extended to all countries where the incidence of scorpion stings is high.

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