

## A CRITICAL REVIEW ON ANTI-SCORPION ACTIVITY OF HERBS

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## ABSTRACT

Scorpion bite is a common global public health problem including India. Despite various species of scorpions, only few of these can be potentially lethal to humans. In India, the annual number of scorpion stings cases exceeds 1.23 million, of which over 32,250 may be fatal. This can be attributed to various hurdles in the scorpion bite treatment like poor health services, difficult and untimely transportation facilities, wrong traditional beliefs, delay in anti-scorpion venom administration which ultimately leads to substantial amount of mortality and morbidity. Scorpion bite can result in a wide range of clinical effects such as neurotoxicity, cardiotoxicity and respiratory dysfunction including pulmonary edema. Administration of anti-scorpion venom is the only specific treatment available in India but has many limitations like species specificity, difficulty in availability, affordability and ideal storage conditions. *Ayurveda* has explained numerous medicinal plants in the management of *Vrishchika Damsha* (Scorpion bite). These medicinal plants widely used by traditional healers. Wide arrays of the plants and their active principles have been evaluated for pharmacological properties which is useful in the treatment of scorpion bite. This review is an attempt to present a comprehensive account of numerous Indian herbal plants used in the treatment of scorpion bite in any forms like topical application or oral formulation for pain relief and venom neutralization purpose.

**Keywords:** *Ayurveda, Samhita, Scorpion sting, Anti-scorpion venom, Herbal Drug.*

## INTRODUCTION

Scorpion sting is one of the common life threatening acute medical emergencies and also can be considered as a neglected public health problem in tropical and sub-tropical countries including India.<sup>[1]</sup> From the ancient times poisonous animal bites is a serious issue in world. Millions of people die every year because of poisonous animals' bites. Scorpion bite is also a common and global public health problem associated with substantial morbidity and mortality. It constitutes an occupational hazard especially in field of agriculture for farmers, farm labors, villagers, migrating population and hunters. The factors mainly re-

sponsible for high mortality associated with scorpion bite are poor health services, difficult and untimely transportation facilities, wrong traditional beliefs, delay in anti-scorpion venom administration. It is estimated that in India, the annual number of scorpion stings cases exceeds 1.23 million, of which over 32,250 may be fatal. In Asia, epidemiological data on scorpion stings is scarce. India is the most affected, with a reported incidence of 0.6 %<sup>[2]</sup>.

The estimates are arbitrary as the majority of cases go unreported. In rural areas, where most of the scorpion bite cases occurs,

the victims are mostly taken to traditional healers, who neither documents the case nor report them to the authorities, hence paucity of reliable epidemiological data. Numerous envenomation cases remain unreported making it difficult for calculating true incidence. Case fatality rates of 3-22% were reported among the children hospitalized for scorpion stings in India<sup>[3-7]</sup>.

Globally, 1988 species of scorpions are known to occur of which, 113 valid species of 25 genera under 6 families exist in India<sup>[8]</sup>. Among the 86 species of scorpion in India, *Mesobuthus tamulus* and *Palamneus swammer-dami* are of medical importance<sup>[9]</sup>. There are different opinions regarding the treatment of scorpion sting. In the past years, various regimens have been tried including lytic cocktail, insulin, atropine, nifedipine, betablockers and captopril, but all these have failed to reduce mortality and morbidity substantially. Even Serotherapy has been a matter of debate and controversy in this matter.<sup>[10]</sup>

In Scorpion bite cases, it is necessary to give immediate treatment but the patient cannot receive treatment immediately due to lack of transport facility and the Scorpion Anti-venom used for Scorpion bite is not available easily on village. The administration of anti-scorpion venom (ASV) is the only specific treatment available for scorpion bite, but has been a matter of debate and controversy during last five years<sup>[11]</sup>. In this context, the only available option for scorpion bite treatment is herbal treatment as these herbs are common, easily available.

Herbal medicine also referred to as alternate medicine/traditional medicine, has been in use in India since time immemorial. Nearly 80% of the human population is reported to be dependent on plant-based medicines in India<sup>[12]</sup>. The use of different parts of several medicinal plants to cure specific ailments

has been practiced since ancient times. Various cultural traditions are associated with use of wild plants as medicinal herbs. In *Ayurveda* numerous medicinal plants are mentioned in the management of *Vrishchika Damsha* (Scorpion bite).

### **Aim and Objective**

To present a comprehensive account of numerous Indian medicinal plants used in the treatment of scorpion bite.

### **Scorpion Venom**

scorpion venom is a cocktail of several neurotoxins, cardiotoxins, nephrotoxins, hemolytic toxins, nucleotides, amino acids, oligopeptides, phospholipase-A, hyaluronidase, acetylcholine esterase, histamine, serotonin, 5-hydroxyptamine and proteins that inhibit protease, angiotensin's and succinate dehydrogenase.<sup>[11]</sup>

### **Mechanism of action Scorpion venom**

Scorpion venom is a potent sodium channel activator.<sup>[13]</sup> It causes, delay in closing of neuronal sodium channels, which results in "autonomic storm" leading to sudden pouring of endogenous catecholamine's into circulation leading to transient sympathetic and parasympathetic stimulation.<sup>[13]</sup>

### **Scorpion bite symptoms**

Scorpion venom (sting) causes massive release of neurotransmitters, which result in various clinical features resulting from envenomation.<sup>[14]</sup> Scorpion bite Symptoms such as profuse sweating, vomiting, increased salivation, bradycardia, priapism, cold extremities or transient hypertension followed by development of severe cardiovascular manifestations such as hypotension, tachycardia, pulmonary edema, tingling numbness and restlessness.<sup>[9]</sup> Morbidity and mortality are result due to acute refractory pulmonary edema, cardiogenic shock and multi-organ failure<sup>[15]</sup>.

### **PLANTS USED FOR SCORPION BITE TREATMENT:**

Important plants which are being used for scorpion bite treatment in any form i.e. oral form for pain relief and venom neutralization and local application form for pain relief or

sting wound healing purpose are mentioned in the accompanying table. Various *Samhita*, indexed, non-indexed Indian journals were studies for the precise information.

**Table No- 1. Medicinal plant use for Scorpion bites mention in *Samhita*.**

Sr no .	Botanical Name	Vernacular Name	Rasa	Veerya	Vipak	Guna	Karma	Form of Application
1	<i>Valeriana wallichii</i> <sup>[16,17,18,19]</sup>	Tagara	<i>Katu, Tikta, Kashay.</i>	<i>Ushana</i>	<i>Katu</i>	<i>Laghu, Snigdha</i>	<i>Vedanasthapan Vranropan Vishaghana</i>	<i>Lepa, Pana.</i>
2	<i>Terminalia chebula</i> <sup>[16,17,20]</sup>	Haritaki	<i>Madhur, Amla, Katu, Tikta, Kashay.</i>	<i>Ushana</i>	<i>Madhur</i>	<i>Laghu, Ruksha</i>	<i>Vedanasthapan Shothahar Hridya</i>	<i>Lepa, Pana.</i>
3	<i>Zingiber officinale</i> <sup>[16,18,21,22]</sup>	Sounth	<i>Katu</i>	<i>Ushana</i>	<i>Madhur</i>	<i>Laghu, Snigdha</i>	<i>Vedanasthapan Shothahar Hridya</i>	<i>Lepa, Pana.</i>
4	<i>Ocimum sanctum linn.</i> <sup>[16,18,21,23]</sup>	Tulsi	<i>Katu, Tikta.</i>	<i>Ushana</i>	<i>Katu</i>	<i>Laghu, Snigdha, Tikshna</i>	<i>Vedanasthapan Shothahar Hridya Vishaghana</i>	<i>Lepa, Pana.</i>
5	<i>Curcuma longa linn</i> <sup>[16,18,21,24]</sup>	Haridra	<i>Tikta, Madhur</i>	<i>Ushana</i>	<i>Katu</i>	<i>Laghu, Ruksha</i>	<i>Vedanasthapan Shothahar Hridya</i>	<i>Lepa, Pana.</i>
6	<i>Andrographis paniculata</i> <sup>[16,21,25]</sup>	Kalmegh	<i>Tikta</i>	<i>Ushana</i>	<i>Katu</i>	<i>Laghu, Ruksha</i>	<i>Vranasthapan Shothahar Vishaghana</i>	<i>Lepa</i>
7	<i>Aristolochia indica L.</i> <sup>[16,18,26]</sup>	Eswari/Gandh-Nakuli	<i>Tikta, Madhur, kashay.</i>	<i>Ushana</i>	<i>Katu</i>	<i>Laghu, Ruksha</i>	<i>Shothahar Hridya Vishaghana</i>	<i>Lepa, Pana.</i>
8	<i>Calotropis procera</i> <sup>[16,17,18,27]</sup>	Arka	<i>Katu, Tikta.</i>	<i>Ushana</i>	<i>Katu</i>	<i>Laghu, Ruksha, Tikshana</i>	<i>Vedanasthapan Shothahar Vranshodhana</i>	<i>Lepa</i>
9	<i>Albizia lebeck (L.)</i> <sup>[16,17,18,21,28]</sup>	Shireesh	<i>Tikta, Madhur, kashay.</i>	<i>Ushana</i>	<i>Katu</i>	<i>Laghu, Ruksha, Tikshana</i>	<i>Vedanasthapan Shothahar Vishaghana</i>	<i>Pana</i>

10	<i>Terminalia arjuna</i> W&A <sup>[16,17,29]</sup>	Arjuna	kashay.	Shita	Katu	Laghu, Ruksha	Vranshodhan Vishaghana Hridya	Pana
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**Table No. 2: Research on medicinal plants use for scorpion bite showing various pharmacological properties.**

Sr no.	Botanical Name	Vernacular Name	Family	Parts used In Scorpion Bite	Pharmacological Properties
1	<i>Valeriana wallichii</i> <sup>[30]</sup>	Tagara	Valerianeaceae	Leaves Juice applies externally and orally	Analgesic, Antidepressant, hypotensive
2	<i>Terminalia chebula</i> <sup>[31]</sup>	Haritaki	Combretaceae	Fruits Juice applies externally and orally	Cardioprotective Wound healing Analgesic
3	<i>Zingiber officinale</i> <sup>[32,33]</sup>	Sounth	Zingiberaceae	Juice applies externally and orally	Anti-inflammatory, Analgesic, Hepatoprotective activity
4	<i>Ocimum sanctum</i> linn. <sup>[34,35]</sup>	Tulsi	<i>Labiatae</i>	Juice applies externally and orally	Anti-inflammatory, Analgesic, Anti-histaminic
5	<i>Curcuma longa</i> linn <sup>[34]</sup>	Haridra	Zingiberaceae	Juice applies externally and orally	Anti-inflammatory, Analgesic, Antibacterial.
6	<i>Andrographis paniculata</i> <sup>[36]</sup>	Kalmegh	<i>Acanthaceae</i>	Aerial parts - Ethanolic extract for venom neutralization	Anti-scorpion venom effect
7	<i>Aristolochia indica</i> L. <sup>[37,38]</sup>	Eswari/ Gandha-Nakuli	<i>Aristolochiaceae</i>	The leaf juice is taken orally & Roots paste is applied externally.	Anti-scorpion venom property
8	<i>Calotropis procera</i> <sup>[39,40]</sup>	Arka	<i>Asclepiadaceae</i>	Latex is used for local application	Anti-inflammatory, Analgesic, Hepatoprotective
9	<i>Albizia lebeck</i> (L.) <sup>[41,42]</sup>	Shireesh	<i>Fabaceae</i>	Tonic is taken orally.	Anti-inflammatory Analgesic Hepatoprotective
10	<i>Terminalia arjuna</i> W&A <sup>[43,44]</sup>	Arjuna	Combretaceae	Wood ash is taken orally	Cardioprotective Anti-inflammatory, Wound healing, Anti-oxidant

Scorpion sting case fatality rate 3-22% was reported in India. Scorpion venom symptoms are produces are mostly classified into Two

## DISCUSSION

group Local and Systemic, in local-Swelling, sweating and radiating pain, along the involve dermatome. In systemic manifestation – vomiting, hyper salivation, midriasis, priapism, hypotension is sine. Pulmonary edema is common cause of fatality. Scorpion Anti-venom is one of the line of treatment in India, though it is specific antidote to venom action but in case of mesobuthus tamulus since anti-venin it does not prevent or reverse the cardio vascular morbidity.

So it is the time need to evaluate the Ant venom activity of medicinal plant. Since ancient time many herbs are use in the treatment of scorpion bite and it is also scientifically proved .there are so many plant which has a therapeutic value in the scorpion bite treatment.

In the present study (Table no-2) 10 plant was review for therapeutic value in scorpion bite, after study it was found that out of 10 plant, 2 plant -*Aristolochia indica* and *Andrographis paniculata* are produces the Anti-scorpion venom properties and 2 plant - *Terminalia chebula* and *Terminalia arjuna* are the cardio protective activities and other 6-*Valeriana wallichii*, *Zingiber officinale*, *Ocimum sanctum*, *Curcuma longa*, *Calotropis procear*, *Albizia lebbeck*, are produces the Analgesic, Anti-inflammatory, Anti-Oxidant, Anti-depressant, Hypotensive and Wound healing properties. After review in *Smahita* (Table No-1) most of the plant showing *Vedanasthapan Vranropan*, *Shothahar*, *Hridya*, *Vishaghana* which is scientifically proved. So the herbs used in the treatment of scorpion stings and are easily available, common and cheaper. The method of preparation and mode of action is also simple and convenient.

## CONCLUSION

Data mentioned above clearly envisage that the herbal medications have excellent potential to treat various ailments including scorpion bite. The herbs used in the treatment of scor-

pion stings are easily available, common and cheaper. The method of preparation and mode of action is also simple and convenient. They are comparatively safer than synthetic drugs However; further studies are required to identify the phytochemicals responsible for anti-scorpion activity of these medicinal plants

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