



ISSN : 2320 4850

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MONTHLY

# Asian Journal of Pharmaceutical Research And Development

(An International Peer Reviewed  
Journal of Pharmaceutical  
Research and Development)

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Volume - 01

Issue - 04

JULY-AUG 2013

website: [www.ajprd.com](http://www.ajprd.com)  
[editor@ajprd.com](mailto:editor@ajprd.com)



## Research Article

## EVALUATION OF 'DASHANGA AGADA' (HERBO-MINERAL COMPOUND) IN THE MANAGEMENT OF SCORPION STING ENVENOMATION

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Received: 25 June 2013,

Revised and Accepted: 16 July 2013

### ABSTRACT

Despite scorpions being locally abundant in many parts of the world, scorpion sting is a poorly defined clinical condition. It is an overwhelming & an endemic public health problem in some part of the India. Scorpion sting can result in a wide range of clinical effects such as neurotoxicity, cardiotoxicity and respiratory dysfunction including pulmonary edema. Ayurveda recommend several medicinal preparations for the management of scorpion sting but so far very little statistical data is available regarding the efficacy of these medicines. This Paper focuses on the efficacy of one of such preparations, Dashanga Agada which was a part of research as internal medication. Clinical study was conducted in 2005 at Pappinissery Visha Chikitsa Kendra, Kannur. Total 10 subjects suffering from Scorpion sting satisfying inclusion criteria were selected and after obtaining informed written consent, treated with Dashanga Agada for four days. Thorough clinical assessment was done before and after the treatment. The result was analyzed statistically with paired t-test which was found highly significant in reducing the cardinal symptom, pain, erythema & inflammation in scorpion sting ( $P < 0.001$ ). Drug also proved effective in reducing other associated symptoms like burning sensation & itching sensations in Scorpion sting.

**Key words:** Scorpion sting, Pain, Dashanga Agada, Ayurveda, Mesobuthus, Anti venom.

### INTRODUCTION

Scorpion sting is a distressing endemic public health problem in several developing countries including India. It is an acute life-threatening, time-limiting medical emergency of villagers.[1] In India, most lethal Scorpions are restrained to Thane, Raigad and Ratnagiri districts of Maharashtra, Rayalaseema in Andhra Pradesh, Bellary in Karnataka, Chennai and Madurai in Tamilnadu.[2,3,4] Scorpion stings are prevalent especially in tropical and subtropical regions.[5]

Approximately 1,500 species of the Scorpion are found worldwide. Commonest species found in India are *Mesobuthus tamulus* (Indian Red Scorpion) in houses (Fig.2), *Heterometrus swammerdami* (Indian Black Scorpion) (Fig.3) and *Buthus landersoni* on coconut and palm trees in southern part of India. Other includes *Lychas* and *Isometrus* species.[6,7] Except for *Hemiscorpius lepturus*, all venomous scorpion species belong to the large family *Buthidae*. Scorpions are venomous arthropods belonging to the class *Arachnida* phylum *Arthropoda*. [8] There are 50 species out of 700, in India, which can cause grave illness.[5] During 60s and 70s, cases fatality rate of up to 30% were reported from Kokan region. The estimated annual number of scorpion stings is 1.2 million leading to 3250 deaths.[9] Epidemiological data on scorpion stings in Asia is insufficient. But among the Asian countries, India is the most

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affected nation with a reported incidence of 0.6%. Majority of stings produce severe pain at the site of sting, erythema, swelling, vomiting, local urticaria and severe burning sensation are common signs symptoms. Few may present with cardiovascular and neurological involvements. It can also result in multi-organ system failure leading to death. It is stated that for every person killed by a poisonous snake, 10 are killed by poisonous scorpions.[5] Few studies have been focused on patho-physiology of scorpion envenomation by critical observations of clinical, neurotransmitters studies, radioisotope studies, echocardiography and haemodynamic patterns.[10,11,12,13]

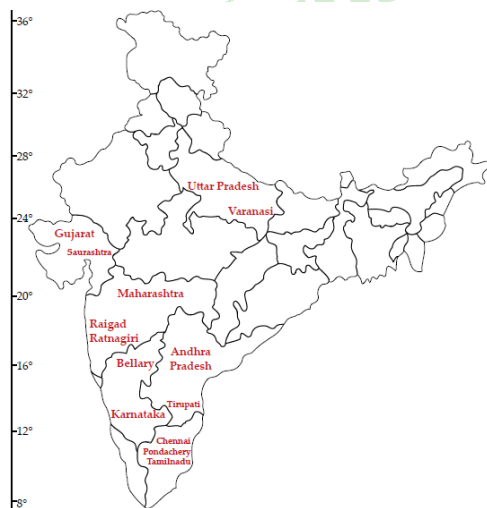


Fig. 1: Endemic regions of venomous scorpion sting in India [24]

## CLASSIFICATION OF SCORPIONS



Fig.2: *Mesobuthus tamlus*

Kingdom	Animalia
Phylum	Arthropoda
Subphylum	Chelicerata
Class	Arachnida
Order	Scorpiones

Although a variety of different scorpion species subsist, majority of them produce similar cardiovascular effects. Frequent sites of the sting are lower extremities while hot seasons are durations of more cases of stings i.e. June to October. The first and foremost sensation which can be felt by a person is severe unbearable pain with burning sensation. In case of scorpion sting, it has been stated that severe the pain, less venomous the scorpion and better the prognosis and vice versa.[5] Medicinal plants are significant component of indigenous medical systems in India and all over the world. In *Ayurveda*, *Vrishchika* are considered as one of the *Kita* possessing the property to produce fatal signs and symptoms, and have been explained under the context of *Kita Visha Pratishedha* by all the sages. But it can produce more fatal symptoms as compared to other *Kitas*. So it is no wonder that *Ayurveda* tried to classify these *Vrishchika* according to its potency to produce fatality. [14,15,16]



Fig. 3: *Heterometrus swammerdami*

Fig. 4: *Hemiscorpius lepturus*Fig. 5: *Buthus landersoni*

### NEED OF THE STUDY

Tremendous local as well as radiating pain with erythema & inflammation are the most common signs and symptoms found in case of Scorpion sting which may be persisting for more than 72 hours.[17] It may also influence mood, functional status, and quality of life and so be associated with increased health service use.[18,19] Management including scorpion antivenom, vasodilators, intensive care have been tried by several scholars to alleviate the systemic effects of envenoming but most of the time local effects are neglected in non venomous scorpion stings. *Ayurveda* has explained numerous both external as well as internal medicinal preparations for the management of *Vrishchika Damsha* but so far very little statistical data is available regarding the efficacy of these medicines. Few studies suggest the anti-venom effect of certain medicinal plants in the conditions of envenomation.[20] Present study was an effort to find out the efficacy of one of such preparations '*Dashanga Agada*' (A.H.U. 37/28) in the management of Scorpion sting. Two more symptoms which are commonly found in Scorpion sting are Local burning sensation and Itching sensation. Effect of this preparation on these two symptoms was also evaluated after applying proper Numerical Rating Scale.

### DRUG PROFILE

### MATERIALS AND METHODS

A randomized clinical trial was conducted from July to September of 2005 in *Pappinissery Visha Chikitsa Kendra*, Kannur, Kerala. This paper highlights only the effect of *Dashanga Agada* which was the part of therapy given in one of the groups. Total 10 subjects suffering from Scorpion sting satisfying inclusion criteria were selected and were treated with *Dashanga Agada* after obtaining consent in a dose of 1 gm B.I.D. after food. Ordinal Numerical Rating Scale was utilized to record the intensity of the cardinal symptoms pain, erythema, inflammation, burning sensation and itching sensation.

### INCLUSION CRITERIA

- Subjects irrespective of sex, caste and religion with age between 15 to 65 years.
- Subjects suffered from scorpion sting with duration not more than 48 hours.
- Patients with cardinal symptom pain, erythema & Inflammation due to scorpion sting.

### EXCLUSION CRITERIA

- Subjects with severe systemic manifestation due to scorpion sting.
- Patients who have already undergone for any other treatment for pain.
- Patients who are not in position to give consent.

Ingredients of <i>Dashanga Agada</i>	(A.H.U. 37 / 28)
<i>Vacha</i>	<i>Acorus calamus</i> Linn.
<i>Hingu</i>	<i>Ferula narthex</i> Boiss.
<i>Vidanga</i>	<i>Embelia ribes</i> Burm.
<i>Saindhava</i>	Rock salt
<i>Gajapippali</i>	<i>Piper chaba</i> Hunter.
<i>Patha</i>	<i>Cyclea peltata</i>
<i>Prativisha</i>	<i>Aconitum heterophyllum</i> Wall.
<i>Shunthi</i>	<i>Zingiber officinale</i> Rosc.
<i>Maricha</i>	<i>Piper nigrum</i> Linn
<i>Pippali</i>	<i>Piper longum</i> Linn.

## STATISTICAL ANALYSIS & RESULTS

Observations were done before & after completion of treatment. Study showed following results-

**Table 1: Effect of the Therapy on Pain**

Mean Score		M. diff.	% Relief	SD	SE	t – value	P value
BT	AT						
2.9	0.2	2.7	93.10	0.948	0.300	9.03	P < 0.001

Table 1. Shows that mean score of 10 subjects for the Pain before the start of the treatment was 2.9 which reduced to 0.2 after 4 days. Mean Difference was  $2.7 \pm 0.946$  Percentage of relief obtained was 93.1%. Statistically the result was found highly significant ( $P < 0.001$ ).

**Table 2: Effect of the Therapy on Erythema**

Mean Score		M. diff.	% Relief	SD	SE	t – value	P value
BT	AT						
1.8	0.1	1.7	94.44	0.482	0.1524	11.18	P < 0.001

Table 2. Shows that Mean score of Erythema of 10 subjects was reduced from 1.8 to 0.1 Mean difference was  $1.7 \pm 0.482$ . Percentage of relief obtained was 94.44% which was statistically highly significant ( $P < 0.001$ ).

**Table 3: Effect of the Therapy on inflammation**

Mean Score		M. diff.	% Relief	SD	SE	t – value	P value
BT	AT						
3.1	0.2	2.9	93.54	0.567	0.179	16.2	P < 0.001

Inflammation was found in all 10 subjects (Table 3) where mean score was reduced from 3.1 to 0.2 with mean difference of  $2.9 \pm 0.567$ . Percentage of relief obtained was 93.54%. In this case also result was found statistically significant ( $P < 0.001$ ).

**Table 4: Effect of the therapy on Burning Sensation**

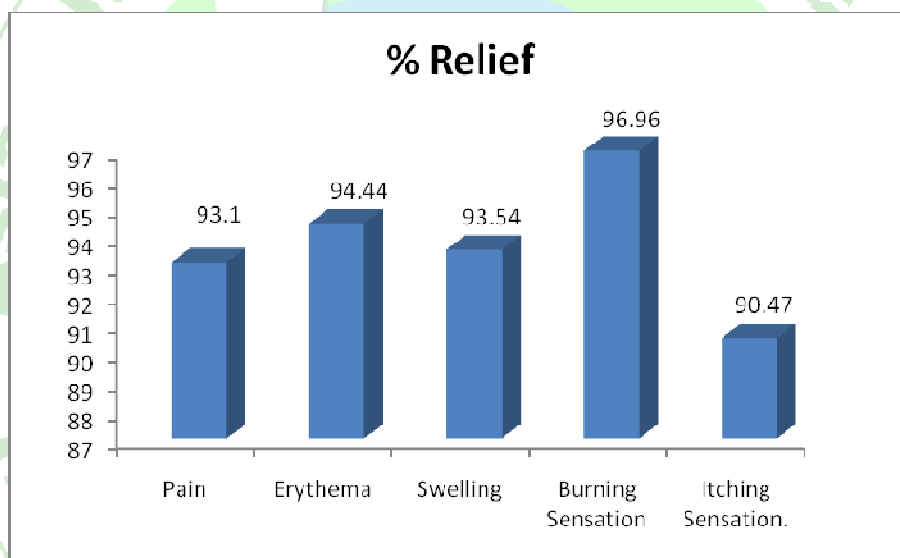
Mean Score		M. diff.	% Relief	SD	SE	t – value	P value
BT	AT						
3.3	0.1	3.2	96.96	0.632	0.199	16.08	P<0.001

Table 4 shows the effect of the treatment on burning sensation. The mean score for the burning sensation before the treatment was 3.3 which was later, reduced to 0.1 after the completion of the treatment. Mean difference was 3.2 with SD of + 0.632. Percentage of relief obtained was 96.96%. 't' value was found highly significant (P <0.001).

**Table 5: Effect of the therapy on Itching Sensation**

Mean Score		M. diff.	% Relief	SD	SE	t – value	P value
BT	AT						
3.3	0.1	3.2	96.96	0.632	0.199	16.08	P<0.001

Table 5 Shows that the mean score for the itching sensation was present at the site of sting in 7 subjects. The score was reduced from 3 to 0.28 with mean difference 2.72 & SD of  $\pm 0.94$ . Percentage of relief obtained was 90.47%. 't' value was found to be 7.74 which was also statistically significant (P <0.001).



**Fig. 6: Percentage of relief in local signs and symptoms**

**Table 6 : Percentage of relief obtained in specific Dosha predominance**

Dosha	Group II		
	BT	AT	% of Relief
Vaata-Pittaja (n=6)	12.5	1	92
Pitta-Kaphaja (n=2)	13.5	0.5	96.29
Kapha-Vaataja (n=2)	15	0.5	96.66

Table 6 Shows percentage of relief obtained in specific *Dosha* condition. In *Vaata-Pittaja* condition, total mean score was reduced from 12.5 to 1 giving 92 % of relief (n=6) In *Pitta-Kaphaja* condition percentage of relief obtained was 96.29% (n=2). In *Kapha-Vaataja* predominant condition total mean score was reduced from 15 to 0.5 with 96.66 % of relief (n=2).



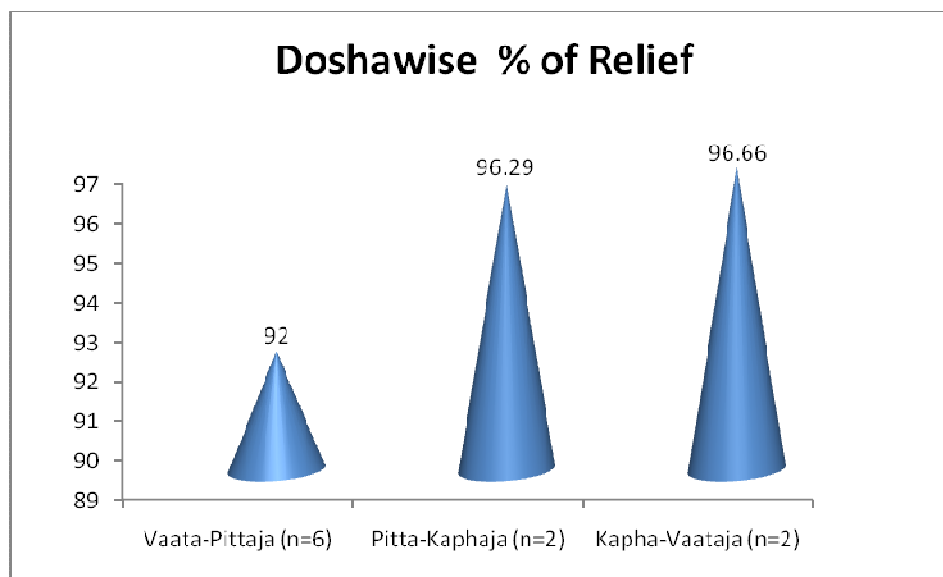


Fig. 7: Percentage of relief in Dosha predominant conditions

## DISCUSSION

Clinical manifestations in scorpion envenomation depend upon the species of scorpion, lethality and dose of venom injected at the time of sting. It is also related to age and size of scorpion, the season of the sting and time elapsed between sting and hospitalization. The consequence of scorpion venom are mainly due to stimulation of the hypothalamus, leading to hypothalamic discharges, and causing intense effect on sympathetic and parasympathetic systems. The present study has focused on the local signs and symptoms of the scorpion stings which are devoid of systemic involvements.

### Probable action of Dashanga Agada

Proportionate distribution of various properties possessed by *Dashanga Agada* shows that 70% individual drugs are *Ushna Veerya* among them 70% are *Vaataghna* and 70% are *Kaphaghna*. Similarly 70 % percentage contents are *Teekshna dravyas*. These properties may help to reduce Pain, Swelling as well as itching sensation, which is due to *Kapha* in the case of Scorpion sting. It contains *Vacha* (*Acorus calamus* Linn) and *Saindhava*, which are considered as a *Mootrajanana* (diuretics) drugs. Again this may be helpful in inflammatory condition. Drug like *Patha* (*Cyclea peltata*) is a *Vishaghan* (Anti-poisonous) drug.

*Vacha* (*Acorus calamus* Linn) *Hingu* (*Ferula narthex* Boiss) and *Pippali* (*Piper longum*) also act as a *Sadnyasthapana dravya*. As mentioned earlier, *Pippali* (*Piper longum*) is also having the properties like anti-allergic [21] Anti pyretic [22], Analgesic [22] and Anti-inflammatory [22]. It is shown to enhance the bioavailability of various structurally and therapeutically diverse drugs. Previous studies show that *Piperine* is absorbed very fast across the intestinal barrier. It may act as an apolar molecule and form apolar complex with drugs and solutes. It may modulate membrane dynamics due to its easy partitioning thus helping in efficient permeability across the barriers. Embelin present in *Embelia ribes* has non-narcotic analgesic property which acts centrally. [23] A heterophyllum is potential enough to inhibit sub-acute inflammation by interruption of the arachidonic acid metabolism. [24] *Zingiber officinale* is known anti-inflammatory herb. [25, 26]

Through analysis of *Dashanga Agada* with *Ayurveda* point of view shows that among all the contents 10% are *Sheeta Veerya*, 20% are *Anushnasheeta*, and 20% are having *Madhura Rasa*. All these *Pittaghna* properties together may be useful to reduce the erythema and burning sensation in a case of Scorpion sting. Pharmacodynamic properties of *Dashanga Agada* are summarized in the Table No. 7 which clearly indicates that *Dashanga Agada*

is *Teekshna* in property by virtue of its *Katu Rasa* and *Katu Vipaka*. Most of the ingredients are either *Vaatakaphaghna* or *Tridoshaghna* with *Ushna Veerya*. In *Vrishchika Damsha*, predominant *Dosha* is

considered as *Vaata*. All the above said properties of *Dashanga Agada* are ready to lend a hand in this condition especially in *Vaata-Kapha* predominant case of scorpion stings.

**Table 7: Pharmacodynamic properties of *Dashanga Agada***

No.	Property	Percentage
1.	<i>Rasa</i>	
	• <i>Madhura</i>	0%
	• <i>Amla</i>	0%
	• <i>Lavana</i>	10%
	• <i>Katu</i>	80%
	• <i>Tikta</i>	30%
2.	<i>Veerya</i>	
	• <i>Ushna</i>	70%
	• <i>Sheeta</i>	10%
	• <i>Anushnasheeta</i>	20%
3.	<i>Vipaaka</i>	
	• <i>Madhura</i>	20%
	• <i>Amla</i>	0%
	• <i>Katu</i>	80%
4.	<i>Guna</i>	
	• <i>Guru</i>	10%
	• <i>Laghu</i>	90%
	• <i>Rooksha</i>	30%
	• <i>Snigdha</i>	40%
	• <i>Teekshna</i>	70%
5.	<i>Doshaghna</i>	
	• <i>Vaataghna</i>	70%
	• <i>Pittaghna</i>	0%
	• <i>Kaphaghna</i>	70%
	• <i>Tridoshaghna</i>	30%

scorpion envenoming in humans is an intricate concern in humans as current patho-physiological and biochemical knowledge is meager.[27] The conventional treatment of administration of local anesthetics for pain may sometimes results in adverse reactions.[28,29] General Management of *Vrishchika Damsha* mentioned in classical *Ayurvedic* texts can be divided in two major elements, *Daivavyapashraya* and *Yukti vyapashraya Chikitsa*. [30,31,32] The epidemiology, features, manifestation, complications, therapeutic response and prognosis are variable in scorpion sting cases. However, early recognition and appropriate intervention may influence the final outcome.

#### GOALS OF THE THERAPY

- Decreased severity of the pain.
- Induced general sense of well being.
- Decreased health care utilization.
- Reduced medication usage.

#### LIMITATIONS & RECOMMENDATIONS

- Since pain is a subjective feeling, the precision of its intensity is difficult.
- In certain severe cases presenting with myocardial involvement may require further interventions accordingly.
- Other medicinal Plants with anti-scorpion venom properties may also be prescribed internally for better results.



- Present study was conducted with ordinal numerical grading scale. Grading scale may be précised for further studies.

## CONCLUSION

In present study, *Dashanga Agada* showed promising results in relieving the cardinal signs and symptoms of scorpion stings especially burning sensation and inflammation. The treatment was found to be cost effective and less perilous as compared to conventional local anesthetic drugs. Painful but relatively harmless scorpion stings need to be distinguished from the potentially lethal envenomations that are produced by few species. Further studies recommended on larger sample size on specific species of Scorpion and in specific season to redefine final outcome.

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