

## Herbal medicinal plants concerning scorpion sting envenomation by ethnic groups of Paderu division, Visakhapatnam district, Andhra Pradesh, India

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### Abstract

Worldwide, both traditional and modern medicine relies heavily on plants. In this work, we looked at local medicinal herbs and their use as a kind of treatment for scorpion sting envenomation. Information from the local tribal people from the research area for the year 2021 regarding phytotherapy for the treatment of scorpion stings was collected. Personal interviews were used to gather ethnobotanical data throughout multiple field trips. According to the study, the tribal chiefs have been treating scorpion stings with 20 different plant species from 17 different plant families. Most of the time, roots and paste forms were used. Cow urine, garlic, ginger, and pepper were occasionally combined with primitive medicines made from plants.

**Keywords:** Ethnobotany; Scorpion sting; Traditional medicine; Visakhapatnam

### 1. Introduction

More than 3.3 billion people worldwide use traditional medicine, which relies heavily on medicinal plants. To satisfy the needs of basic healthcare, traditional medical systems have recently gained prominence on a global scale. The most typical locations for the application of traditional medicine are developing nations like China, India, Japan, Pakistan, Sri Lanka, and Thailand. Additionally, there is a cultural and spiritual significance to herbal remedies. In India, ethnic groups living in distinct territories use plants as a source of medicine to treat a variety of diseases [1]. Over 5000 years have passed since the use of herbal remedies in conventional medicine began. Particularly in rural areas, knowledge of using herbal cures has been passed down the years. These treatments have been used to cure a wide range of illnesses, including envenomation from scorpion stings [2, 3]. All cultures have used the diverse range of medicinal plants in Andhra Pradesh as a source of medicine.

The world is inhabited by numerous highly venomous scorpions [4]. Several studies [5, 6] found a significant prevalence of scorpion stings, ranging from 1% in adults to 20% in youngsters. The combination of numerous neurotoxins, cardiotoxins, nephrotoxins, and hemolytic agents in scorpion venom has acute toxicological effects on humans [7] and can result in a wide range of symptoms, from severe local reactions to neurologic, respiratory, and cardiovascular collapse [8,9]. The amount of venom that the victim receives, its species, and how his body reacts to it all influence how deadly the attack is [10]. Severe pain, inflammatory responses, and occasionally metabolic anomalies such as respiratory and cardiovascular collapse in individuals may result in multisystem failure and death as the main symptoms [7, 11, 12 and 13]. Annually, 1.23 million scorpion sting cases are reported in India, with 32,250 of those instances being deadly [14]. According to numerous accounts, the frequency of snake bites and scorpion stings has increased as a result of deforestation and the movement of these toxic creatures toward human settlements [15]. There are 113 species of scorpions in India, belonging to 25 genera and 6 families, out of a total of 1988 species worldwide [16]. Among these *Mesobuthus tumulus* and *Palamneus swammer-dami* have medicinal importance [1].

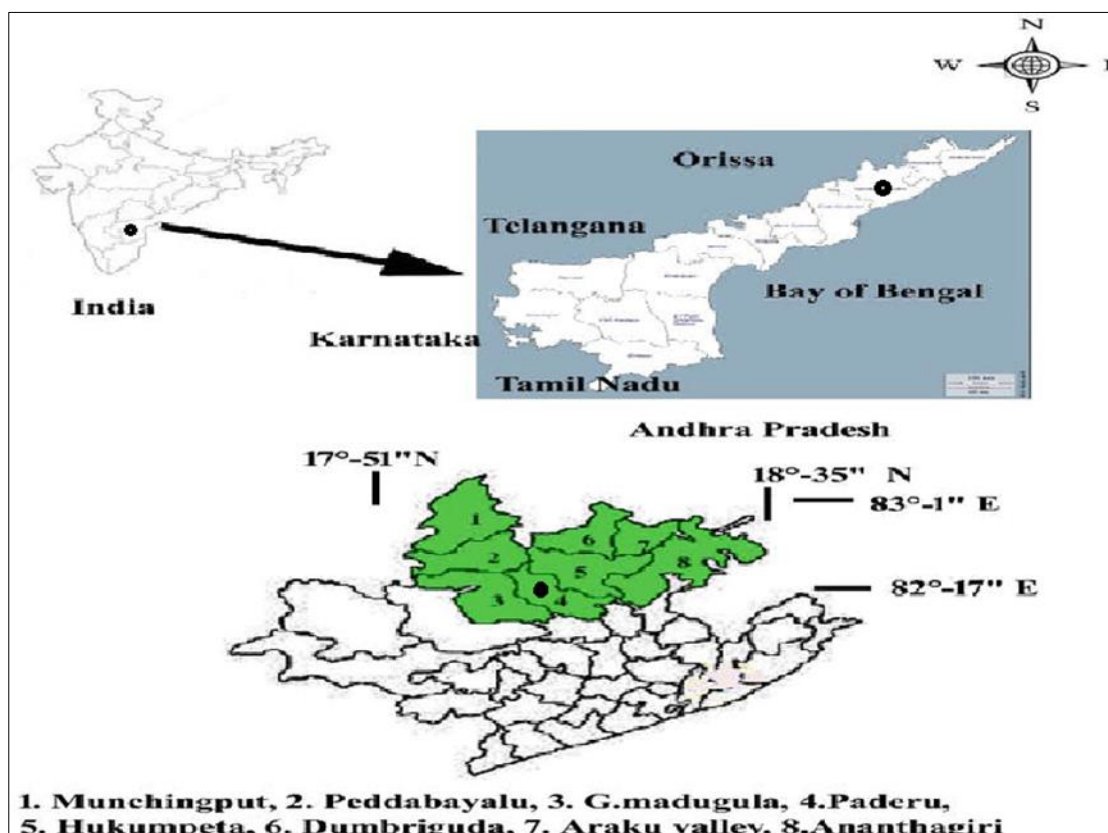
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In tribal communities, a variety of medicinal plants are utilized as folk medicine to cure scorpion stings. It is deemed vital to record the traditional knowledge of medicinal plants among the local communities due to the growing interest and significance of ethnobotanical surveys [17]. Even while the evidence emphasizes the value of indigenous knowledge for therapeutic applications, particularly in cases of scorpion stings, extreme caution should still be exercised because scorpion stings can be lethal and require emergency attention [18]. Deaths from scorpion stings and snake bites have been documented in Asian nations and have been rising annually [19]. In light of this, the purpose of the current study was to record traditional indigenous knowledge regarding medicinal herbs used in particular for the treatment of cases of scorpion stings. Currently, several indigenous cultures have reported using anti-venoms derived from plants. Despite the therapy's general success, other plant-based venom inhibitors need to be researched [20].

## 2. Material and methods

### 2.1. Description of the study area

Paderu division is situated in the Visakhapatnam District of Andhra Pradesh State, India. It is located in the steep north Eastern Ghats in the higher altitude region between 900 and 1600 meters above sea level, 110 kilometers to the north of the district capital Vishakhapatnam and 45 kilometers from Araku valley. It is located between latitudes of 17°- 50' and 18°- 35' N North and longitudes of 82°-17' and 83°-1' E, covering a total area of 3,24,965 ha. The area covered by this forest was 104811.91 hectares. This region's 1800 mm annual rainfall average and nutrient-rich soils support a wide variety of flora. Primitive tribal groups such as the Malis, Kondus, Reddi Dora, Porja, Bagata, Valmiki, Kotia, Mukha Dora, Gadaba, Konda Doras, Kammara, Kulia, Manne Dora and Nooka Dora are also present in this area. The predominant vegetation in this region is a tropical dry deciduous forest, with a huge variety of medicinal plants.



**Figure 1** The study area's location in India's Andhra Pradesh

### 2.2. Methodology

To gather and document the ethnomedicinal plants of the Paderu division, Visakhapatnam district, field studies were carried out in 2021. Personal interviews with locals utilizing semi-structured open-ended questionnaires were used to gather verbal data, which was then recorded. Throughout the study, information about the plant's native name, parts

used, drug preparation, and delivery technique was recorded. The recovery process and adverse effects of locals who utilized traditional remedies for scorpion stings were discussed. Flora was used to identify the plant species. We also spoke with the locals about the need to preserve the variety of therapeutic plants and the significance of preserving their traditional knowledge. Following accepted procedures, plants were collected, and they were identified using floras and written sources. The herbarium was gathered, maintained according to protocol and placed in the Andhra University Botany Department Herbarium. The plants used to treat scorpion stings are listed here, along with information about the families, regions, scientific names, plant parts used to treat the ailment, and preparation and administration techniques (Table 1).

### 3. Results and discussion

Table 1 includes the medicinal plants that are dispersed throughout diverse places in the research region and are used to cure scorpion stings in alphabetical order by the plant's scientific name. These species are spread throughout 17 families, with four plants from the Lamiaceae family having the most presence. Only one medicinal plant per family was present in the following families: Malvaceae, Mimosaceae, Amaranthaceae, Combretaceae, Cucurbitaceae, Caesalpiniaceae, Apiaceae, Menispermaceae, Colchicaceae, Boraginaceae, Violaceae, Martyniaceae, Fabaceae, Asclepiadaceae, Meliaceae and Asteraceae. The information revealed that the medicinal plants' various sections were utilized for their potential as antivenom sources.

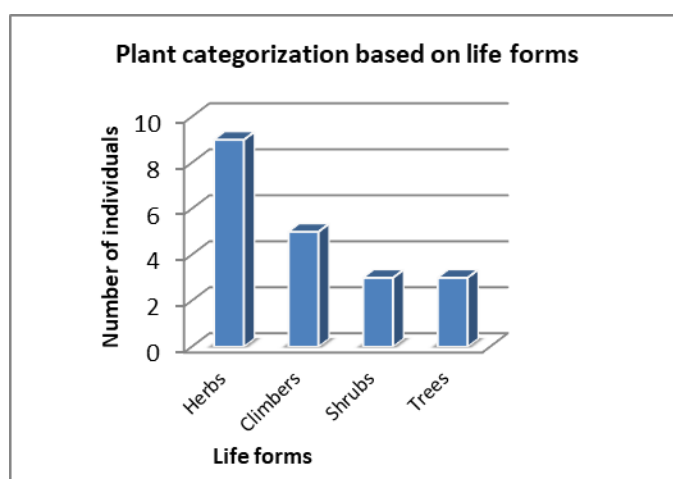


Figure 2: Distribution of medicinal plants based life-forms.

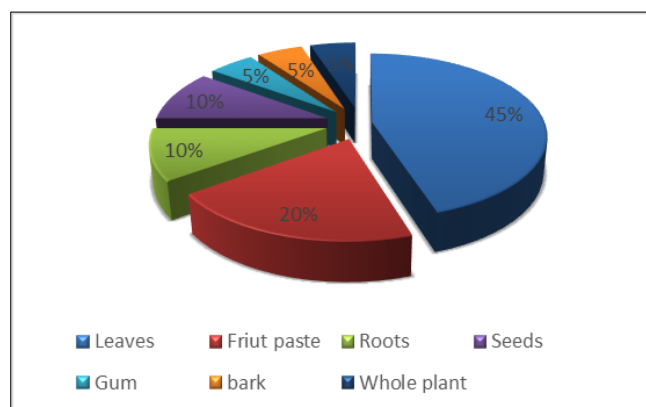
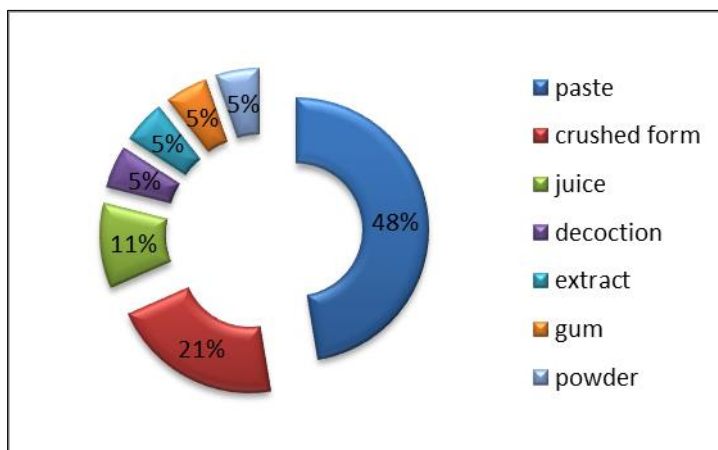


Figure 3 Percentages of various plant components that are used to make traditional medicines

According to the study's findings, the native population utilized 20 different plants. Herbs (09), climbers (05), shrubs (03) and trees (03) have different tendencies (Fig. 2). As demonstrated in Fig. 3, the usage of leaves predominated among these (45%), followed by fruit paste (20%), roots (10%), and seeds (10%). In 5% of cases, plant gum was employed, while in 5% of scorpion envenomation patients, stem bark was administered. To cure scorpion envenoming, the entire plant (5%) was utilized in some instances. Most of the time, roots and paste forms were employed. Practitioners noted that the plants were utilized either as a single plant part or in conjunction with other plant parts when prescribing the medication. Cow urine, garlic, ginger and pepper were occasionally combined with primitive medicines made from plants. Paste (48%), crushed form (21%), juice (11%), powder, decoction, extract, and gum (5% each) are the most common pharmacological preparation techniques (Figure 4). These species' success in treating scorpion stings can be attributed to the existence of secondary metabolites with intriguing biological properties (anti-nociceptive, anti-inflammatory, antioxidant, and anticoagulant).



**Figure 4** Percentages of various medication formulations used in conventional medicine

### 3.1. Enumeration of Plants

**Table 1** List of plants that are used to treat scorpion stings

S. No	Plant name	Family	Vernacular name	Mode of treatment
1	<i>Abelmoschus moschatus</i> Medik. Syn: <i>Hibiscus abelmoschus</i> Linn.	Malvaceae	Adavi kasturibenda S: Latakasturika H: Maskadana E: Muskmallow.	Seeds ground with alcohol is taken
2	<i>Acacia ruguta</i> (Lam.) Fawc & Rendle Syn: <i>Mimosa sinuta</i> Lour.	Mimosaceae	VN: Sikaya S: Amala H: Ritha E: Soap pod tree	Along with one spoon of <i>Piper betel</i> juice, a pinch of pod paste is given
3	<i>Achyranthus aspera</i> L.	Amaranthaceae	VN: Duchheru S: Apamarga H: Chirchitta E: Prickly chaff flower	To minimize the poison and suffering, leaf paste is applied to the affected areas, or root paste is attached to the affected areas.
4	<i>Anisomeles malabarica</i> (Linn.) R. Br.	Lamiaceae	VN: Magabeera S: Valikunth H: Gopal	Leaves are crushed and tied to the affected areas

	Syn: <i>Nepeta malabarica</i> Linn.		E: Devil frightener	
5	<i>Anogeissus latifolia</i> (Roxb.exDC.) Wall. Ex Beddome.	Combretaceae	VN: Chirumanu S: Dhavah H: dhava E: Gumghatti	<i>Desmodium gangeticum</i> paste made from the root of the plant is mixed with 10 gm of gum from <i>A. latifolia</i> and applied once to the afflicted areas.
6	<i>Benincasa hispida</i> (Thumb.) Cogn.	Cucurbitaceae	Budida gummadi S: Kusumandh H: Peltha E: Ashgourd	After the sting, fruit paste is immediately administered to the injured areas.
7	<i>Cassia auriculata</i> Linn.	Caesalpiaceae	Chinna tanthenu S: Avartiki H: Tarwar E: Tanner's cassia	The bitten area is treated with leaf extract.
8	<i>Cuminum cyminum</i> Linn.	Apiaceae	VN: Jeelakara H: Zira S: Jeerakam E: Cumin	To treat the bitten areas, seeds are crushed with salt, warmed with ghee, and applied.
9	<i>Cyclea peltata</i> (Lam.) Hook.f.& Thomas Syn: <i>Menispermum peltatum</i> Lam.	Menispermaceae	VN: Chantimaal uppidivera S: Patha H: Parvel E: Pataroof	Immediately following the bite, leaf juice is applied to the bitten areas.
10	<i>Gloriosa superba</i> L.	Colchicaceae	VN: Vanka vajram S: Langali H: Karibari E: Superb lilly	To relieve pain, root tuber juice is applied to the bitten region.
11	<i>Heliotropium indicum</i> L.	Boraginaceae	VN: Nagadanthi S: Vrikshali H: Siriyari E: Indian turnsole	Leaves are dipped in the castor oil heated or boiled and rubbed and bandaged on the affected areas.
12	<i>Hybanthus enneaspermus</i> (Linn.) Muell	Violaceae	VN: Ratnapurasa S: Charati H: Ratnapurus E: Spade flower	Fruits or roots are crushed and bandaged over the bitten area.
13	<i>Leucus cephalotus</i> (Roth.) Spreng.	Lamiaceae	VN: Tummi koora S: Drona puspini H: Goma	The bitten area is covered with leaf paste.
14	<i>Leonotis nepatifolia</i> (Linn.) R. br. SYN: <i>Phlomis nepatifolia</i> Linn.	Lamiaceae	VN: Ranaberi S: Granthi H: Hejurchi	Leaves are crushed and made into a paste that is rubbed on the bitten area.
15	<i>Martynia annua</i> Linn.	Marrtyniaceae	VN: Telukond S: Kakanasa	Fruits are powdered with water and the paste is applied to the bitten areas.

			H: Halatha-jorie	
16	<i>Mucuna pruriens</i> (Linn.) DC Syn: <i>Dolichos pruriens</i> Linn.	Fabaceae	VN: Duladama S: Kappkacchu H: Kivachu E: Cowitch	Leaf powder is sprayed on the bitten area.
17	<i>Pergularia daemia</i> (Forsk.)Chiov.	Asclepiadaceae	VN: Distiveru S: Kurutakah H: Uldran E: Whitlow	On the bitten region, root paste is placed and massaged.
18	<i>Soymidda febrifuga</i> (Roxb.) A.juss SYN: <i>Switetenia febrifuga</i> (Roxb.) A.juss	Meliaceae	VN: Sami chettu H: Chadra vallabha E: Rohan tree	The bitten area is covered with stem bark paste, and 10–20 mL of fresh stem bark juice is given orally.
19	<i>Tridax procumbens</i> Linn.	Asteraceae	VN: Gantimandhu S: Jayanthi E: Mexican daisy.	Whole plant paste is rubbed on the bitten area.
20	<i>Ocimum tenuiflorum</i> Linn. Syn: <i>Ocimum sanctum</i> Linn.	Lamiaceae	VN: Krishna tulasi S: Haripriya H: Kalatulasi E: Hollybasal	Leaf powder is sprayed on the bitten area.

#### 4. Conclusion

Scorpion stings can be fatal and require immediate medical attention. The authors of this study mentioned that phytotherapeutic substances and herbal medicines may have antivenom capabilities that can be used to treat scorpion envenomation symptoms. Scientists and medication developers who worked on herbal research for scorpion sting therapy may find the material above useful. Finding the phytochemicals that mitigate the negative effects of scorpion venom on these beneficial plants will require more investigation. Because of a lack of concern for the loss of indigenous knowledge, the variety of medicinal plants in Andhra Pradesh has been declining over time. The riches of the nation's traditional knowledge are in danger of disappearing because of improper documentation, overexploitation and environmental damage. A large number of significant therapeutic herbs are in danger of going extinct. There is a need to conserve medicinal plants and to create more public awareness.

#### Compliance with ethical standards

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##### Disclosure of conflict of interest

The authors declare that they hold no competing interests.

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