



## Ethnobotanical survey of folk plants for the treatment of Snakebites in Tiruchrapalli district of Tamil Nadu, South India

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### ABSTRACT

An ethnobotanical survey was carried out between January 2009 and January 2010 in surveys was conducted in indigenous groups in Tiruchirappalli District Tamilnadu, India, using a questionnaire. The herbal practitioners in the study area were interviewed, and information on medicinal plants was collected from the traditional healers called "Nattu Vaithyer". This survey covers 54 medicinal plants belonging to 38 families that are used for the treatment of snakebite in a traditional way.

**Keywords:** Snakebite; Medicinal plants; indigenous groups; Traditional uses

### INTRODUCTION

From time immemorial, man has been dependent on nature for survival. This dependency led the aboriginal people living in harmony with nature to evolve a unique system of knowledge about plant wealth by trial and error methods. Traditionally, this treasure of knowledge has been passed on orally from generation to generation without any written document (Perumal Samy and Ignacimuthu, 1998, 2000), and is still retained by various indigenous groups around the world. In India, there are about 54 million indigenous people of different ethnic groups inhabiting various terrains. Over 16,000 species of higher plants occur in India, of which approximately 9,000 are known to be economically useful. Of these, 7500 are used for healthcare by various ethnic communities in India (Arora, 1997). These indigenous groups possess their own distinct culture, religious rites, food habit and a rich knowledge of traditional medicine (John, 1984; Pushpangadan and Atal, 1984; Anuradha *et al.*, 1986; Harsha *et al.*, 2002; Parinitha *et al.*, 2005). Even today, indigenous and certain local communities practice herbal medicine to cure a variety of diseases, with plants particularly used as folk medicine to treat snakebites (Siddiqui and Husain, 1990; Martz, 1992; Houghton and Osibogun, 1993). Snakebite is a serious medical, social and economic problem in many parts of the world, especially in the tropical and subtropical countries. Envenomations due to snakebites are commonly treated by pa-

renteral administration of horse or sheep-derived polyclonal antivenoms aimed at neutralization of toxins. However, despite the widespread success of this therapy, it is still important to search for different venom inhibitors, either synthetic or natural, that could complement or substitute for the action of antivenoms.

Traditional herbal medicine is readily available in rural areas for the treatment of snakebite. Application of the plant or its sap onto the bite area, chewing leaves and bark or drinking plant extracts or decoctions are some procedures intended to counteract snake venom activity. Plants are used either single or in combination, as antidotes for snake envenomation by rural populations in India and in many parts of the world. Plants are reputed to neutralize the action of snake venom, with a plethora of plants claimed to be antidotes for snakebites in folk medicine (Kirtikar and Basu, 1975). In another report, the aqueous ethanolic extract of the aerial part of *Eclipta prostrata* Linn. (Compositae), known as an antidote to snakebite in Brazil and China, has been tested against South American rattlesnake (*Crotalus durissus terrificus*) venom (Mors *et al.*, 1989). *Gymnema sylvester* R.Br. (Asclepiadaceae) root and the whole plant of *Andrographis paniculata* Nees (Acanthaceae) are used against snakebites in folk medicine (Russell, 1980). Phytochemical agents such as flavonoids inhibit snake venom phospholipase A2 activity (Alcaraz and Hoult, 1985). Flavonoid glycoside rutin is also effective in increasing survival time of rats injected with cobra venom (Gujral and Dhawan, 1956). Hence, several substances have been isolated from plants and tested against the lethal action of the venoms (Mors *et al.*, 1989; Pereira *et al.*, 1994). As a result, a large number of plants have been found to be effective as antidotes against snake venoms in India (Chopra *et al.*, 1956; Usher, 1974; Kirtikar and Basu, 1975; Nadkarni, 1976; Lewis and Elvin-Lewis, 1977; Alam and Gomes,

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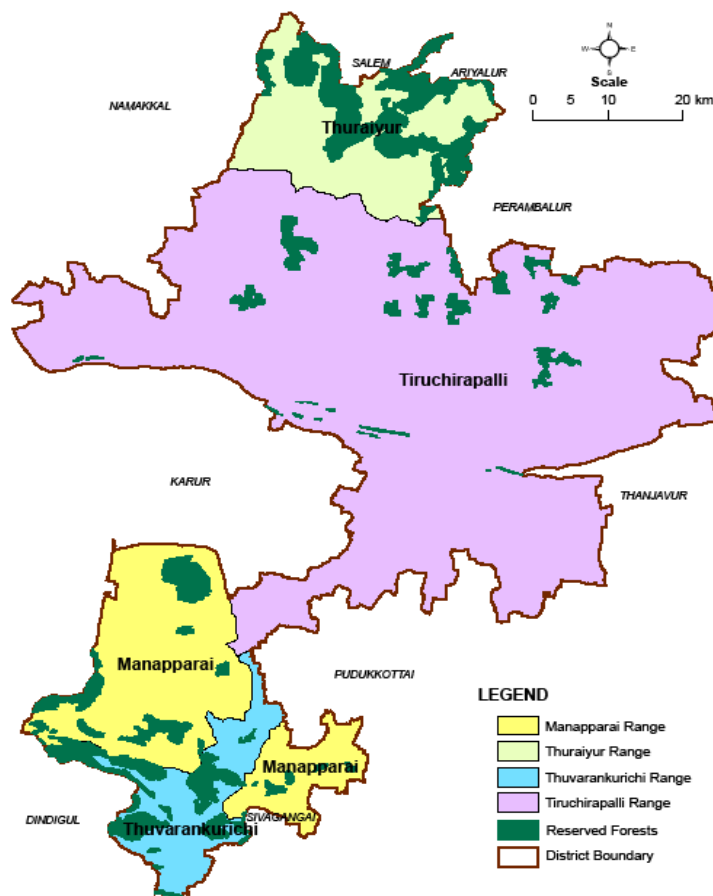
Contact: +91-8973533148

Received on: 29-07-2011

Revised on: 16-09-2011

Accepted on: 27-11-2011

### Tiruchirapalli Forest Division



**Figure 1: Showing the location of map for the ethnobotanical survey of the folk medicinal plants and its various parts used as therapeutic potential conducted at different settlements such as Pachchamalai hills, Semmalai hills RFs and Ayyalur hill RFs. Part of Pachchamalai hills in Musiri taluk. Musiri and Thuraiyur taluk present a gently undulating upland area. Lalgudi taluk is fairly plain part of Tiruchi dt Tamilnadu, India**

2003). However, in most cases the efficacy of this traditional treatment regimen is unproven. Thus, the study of herbal antidotes against snake venom is of great importance in the management of snakebite. There are few survey reports that reveal the practice of herbal medicine by either folk or indigenous communities (Bhandary *et al.*, 1996; Harsha *et al.*, 2002, 2003; Parinitha *et al.*, 2005). To date, only a few species have been scientifically investigated with their active components isolated and characterized both structurally and functionally. Hence, the present study is focused on the preliminary survey of medicinal plants for therapeutic application of snakebite and extensive traditional use in indigenous groups in the part of Tiruchirappalli District in Tamilnadu, India.

#### MATERIALS AND METHODS

##### Collection of medicinal plants and survey area

##### Study Area

The Tiruchirapalli out of total geographical area of 4403.83 hectare of revenue district 46306.87 hectare. area falls under Reserve Forest and Reserve Land.

##### Boundaries

- The district is situated between 78°10' to 79°5'. East longitudes and 10°15' and 11°2' North latitude.
- Geocode: East longitude 78°10' to 79°5'
- North latitude 10°15' to 11°2' Tiruchirapalli Forest Division is bounded on the north-east by Perambalur district, north, west by Namakkal district, east by Thanjavur district, West by Karur district, south-east by Pudukkottai district, and South by Sivagangai and Madurai district.

##### The division is now administered with the following 4 territorial ranges

1. Tiruchirapalli Range
2. Manapparai Range
3. Thuvrankurichi
4. Thuraiyur Range

Table 1A: List of folk plants used for the treatment of snakebite

Plant no.	Plant species	Family	Vernacular name	Voucher no.	Parts used	Direction
1	<i>Abrus precatorius</i> L.	Fabaceae	Kundumani	M-21	Roots	Unknown
2	<i>Abutilon indicum</i> (L.) Sweet	Malvaceae	Thuthi	M-68	Leaf, Fruits	Leaf juice mixed with jaggery
3	<i>Acacia leucophloea</i> (Roxb.) Wild	Mimosaceae	Velvelan	M-52	Bark	Bark paste
4	<i>Acalypha indica</i> L.	Euphorbiaceae	Kuppaimeni	M-65	Leaf	Paste
5	<i>Achyranthes aspera</i> L.	Amaranthaceae	Nayuruvi	T-96	Leaf, Stem	Paste
6	<i>Acorus calamus</i> L.	Acoraceae	Vasambu	P-201	Rhizome	Paste
7	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Vilvam	P-200	Root bark	Water Decoction
8	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae	Koolaipoo	T-110	Rhizome	Unknown
9	<i>Alangium salvifolium</i> (L.f) Wangerin	Alangiaceae	Alingi	T-210	Root bark	Decoction
10	<i>Allium cepa</i> L.	Amaryllidaceae	Vengayam	T20	Skin bulb	Paste
11	<i>Andrographis paniculata</i> (Burm.f.) Walli- chi ex Nees	Acanthaceae	Siriyangai	L-17	Whole plant	Decoction, Paste
12	<i>Argemone mexicana</i> L.	Papaveraceae	Brahmathandu	T-10	Leaf Seed	Decoction
13	<i>Aristolochia indica</i> L.	Aristolochiaceae	Eesvaramuli	P-235	Root	Paste
14	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Vembu	T-56	Flower	Decoction, Paste
15	<i>Calotropis gigantean</i> R. Br	Asclepiadaceae	Erukku	T-68	Root	Paste with ghee
16	<i>Cassia alata</i> L.	Caesalpiniaceae	Senna	TH-54	Leaf	Paste
17	<i>Cassia tora</i> L.	Caesalpiniaceae	Thagarai	T-98	Leaf	Decoction
18	<i>Curcuma longa</i> L	Zingiberaceae	Manchal	T-25	Rhizome	Paste
19	<i>Cymbopogon citrates</i> (DC.) Stapf	Poaceae	Vasanaipullu	S-78	Whole plant	Fresh plant
20	<i>Cyperus rotundus</i> L.	Cyperaceae	Koraipullu	S-69	Rhizome	Decoction

### Physiographic

Tiruchirapalli district is irregular in shape. Barring few hills and hillocks, the district is composed of plains, valley bottoms, undulating upland area and broken chain of Eastern Ghats viz., Pachchamalai hills, Semmalai hills RFs and Ayyalur hill RFs. Part of Pachchamalai hills in Musiri taluk. Musiri and Thuraiyur taluk present a gently undulating upland area. Lalgudi taluk is fairly plain. North and North-western parts of Tiruchirapalli

present a vast stretch of flat flood plain of Cauvery alluvium with morphology associated with meandering river system. The southern and south Eastern parts present undulating plains to level plain topography.

The western part of Manapparai taluk includes hilly reserve forests, Semmalai hill RFs and Ayyalur hill RFs, rock hills in the central part and undulating plains in the rest of the part. In this taluk dykes are prominent.

**Table 1B: List of folk plants used for the treatment of snakebite**

21	<i>Dalbergia melanoxylon</i> Guill. & Perrott	Fabaceae	Veeliparuthi	P-58	Stem bark	Decoction
22	<i>Eclipta alba</i> (L.) Hassk	Compositae	Manchal karisalan-kanni	M-78	Whole plant	Paste
23	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Amman pacharisi	L-99	Whole plant	Decoction
24	<i>Erythrina excelsa</i> Baker	Fabaceae	Mullumurungai	M-11	bark	Juice/paste
25	<i>Feronica limonia</i> (L.)	Rutaceae	Elephant -apple	TH-36	Root	Juice
26	<i>Gloriosa superba</i> L.	Colchicaceae	Kalappaih kilangu	T-33	Tuber	Paste
27	<i>Gymnema sylvestre</i> R.Br.	Asclepiadaceae	Sirukurunjan	T-17	Root	Tincture
28	<i>Helianthus annuus</i>	Asteraceae	Suriyakanthi	S-91	Seed	Oil
29	<i>Hemidesmus indicus</i> (L.) Schult.	Asclepiadaceae	Nannari	S-268	Root	Decoction
30	<i>Tragia involucrate</i> (Bojer ex. Prain) Mull. Arg.	Euphorbiaceae	Naippallu	S-300	Whole plant	Juice
31	<i>Morus alba</i> L.	Moreaceae	Mulberry Ilai	T-45	Leaf	Juice
32	<i>Madhuca longifoila</i> (L.) JF Macbr	Sapotaceae	Ilupai	T-22	Nut	Paste
33	<i>Mimosa pudica</i> L.	Mimosaceae	Thottasurungi	L-9	Whole plant	Paste
34	<i>Momordica charantia</i> L.	Cucurbitaceae	Pakakai	L-3	Flower	Paste with olive oil
35	<i>Moringa oleifera</i> Lam.	Moringaceae	Murungaih	T-5	Bark Root	Tincture
36	<i>Musa paradisiaca</i> L.	Musaceae	Valaimaram	M-123	Skin bark	Juice
37	<i>Nerium oleander</i> L.	Apocynaceae	Aralli	TH-325	Seeds	Paste
38	<i>Ocimum basilicum</i> L.	Lamiaceae	Thiruneetrapachilai	S-201	Whole plant	Decoction
39	<i>Ocimum sanctum</i> L.	Lamiaceae	Thulasi	T-145	Leaf	Juice
40	<i>Oldenlandia umbellata</i>	Rubiaceae	Imbooral	T-133	Leaf Root	Paste
41	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Nelli	T-205	Fruit	Juice
42	<i>Phyllanthus niruri</i>	Eurbiaceaeapho	Keelanelli	L-10	Flower	Paste
43	<i>Phyllanthus reticulatus</i> Poir.	Eurbiaceaeapho	Potato bush	P-159	Leaf	Infusion
44	<i>Piper nigrum</i> L.	Piperaceae	Milaku	S-257	Flower	Paste with ghee
45	<i>Pluchea indica</i> (L.) Less.	Asteraceae	Andhimandari	MU-111	Seed, flower	Paste/Juice

The present investigation was carried out between “2009 and 2010” and the surveys were conducted using questionnaire in Thiruchirappalli district in TN which are in and around the Reserved Forests (Fig. 1), which is one of the place with a rich biodiversity in Tamilnadu. Traditional healers, called “Nattu Vaidyars”

from indigenous group were targeted for documentation of the uses of medicinal plants our main focus was to collect the oral information about the medicinal plants used by natives (different indigenous groups) for treatment of snakebite; we did not use any “statistical survey” in this study.

**Table 1C: List of folk plants used for the treatment of snakebite**

46	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Sarpghandha	S-157	Root	Unknown
47	<i>Sapindus emarginatus</i> Vahl	Sapindaceae	Puvam kottai	P-327	Bark	Paste
48	<i>Semicarpus anacardium</i> L.	Anacardiaceae	Mudthiri	P-355	Root	Unknown
49	<i>Solanum torvum</i> Swartz	Solanaceae	Kandangkathri	L-121	Flower	Paste
50	<i>Strychnos nux-vomica</i> L.	Loganiaceae	Etti	S-222	Stem bark	Paste
51	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Navel	MU-120	Stem bark	Decoction
52	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Kolingi	L-29	Root	Decoction
53	<i>Terminalia arjuna</i> (DC) W &	Combretaceae	Marutham	MU-58	Bark	Paste
54	<i>Vitex negundo</i> L.	Lamiaceae	Nochi	S-217	Leaf	Paste

### Identification of plants

The information recorded was further ascertained or crosschecked by consulting the beneficiaries, villagers and other traditional physicians. The collected plants were identified by Dr.S.Soosairaj Dept of Botany St Joseph's College, Trichirappalli Tamilnadu, India. The plant specimens were also identified according to different references concerning the medicinal plants of South India (Dhar *et al.*, 1968; Nadkarni, 1976; Matthew, 1981–1983) and voucher specimens were deposited in the Institute herbarium. The medicinal information given in this paper includes botanical term, family, local name, parts used and their therapeutic use. No monetary compensation has been given to the traditional healers for providing the medicinal information.

### RESULTS AND DISCUSSION

#### Plants used for the traditional treatment of snakebite

The survey of 54 plants (Table 1) reported to be employed in the treatment of snakebite represent some 38 families of flowering plants that are also widely used as snakebite remedies. The severely envenomed patients were given the water decoction, and a black stone was fixed on the wounded surface by the healers who strongly believed that the black stones could neutralize the poisons and act as an antidote. Though practiced widely, a proper record on the information from these healers were missing from the scientific point of view. However, the present findings also corroborate with the previous reports, which indicate that a kind of medicated stone, "Vishakallu" (poison stone), is used by the indigenous group "Kani" in Kerala, India, to treat snakebite. The stone, when placed directly on the bitten area, sticks to the body to absorb the poison, and then becomes detached when absorption seems to complete. The ingredients of Vishakallu Stone are leaves of *Ocimum sanctum*, *Anisomeles malabarica*, *Leucas aspera*, *Piper betle*, *Santalum album* and pebbles from the river bank (Rajasekharan *et al.*, 1992). We have recorded that the aqueous paste and decoction obtained from the leaves of *Andrographis paniculata* are widely used for snakebite by indigenous people of Southern India. The bitter taste of some

leaves and roots are also sometimes used for prognostic purposes (Whitaker, 1978;Yunus, 1983; Selvanayagam *et al.*, 1995; Al-Qura'n, 2005). If the plant material tastes bitter, the patient is judged free from danger, but if the materials are sweet to the taste, the patient needs urgent medical attention. Dosages are repeated until the taste returns to normal. Sometimes, especially when a patient cannot open his/her mouth, the juice of the plant is administered through nostrils or eyes, or applied liberally to the head (Anandan and Veluchamy, 1986; Anuradha *et al.*, 1986). A strict and complete dietary schedule for swelling, nausea, pain, and other effects during and after recovery is followed to promote a thorough cure (Whitaker, 1978). People in some areas believe that brushing the teeth daily with the stick of *Tephrosia purpurea* (Jain and Tarafder, 1963) and *Azadirachta indica* (Maheshwari *et al.*, 1986) will make the body resistant against the snake venom. In the present study, we also come across similar reports from the tribes during the ethnobotanical survey. The bark powder of *Moringa oleifera* is believed to have antisnake properties if sprinkled near the house to ward off snakes (Chandra *et al.*, 1989).

### CONCLUSION

The study highlighted the central role of traditional herbal medicine for the treatment of snakebite in Trichy districts. Due to the growing importance of ethnobotanical studies, it is necessary to collect the informations about the knowledge of folklore medicinal plants, preserved in local communities of various parts of Tamilnadu before it is permanently lost. Having the above facts in mind, an attempt was made to explore the medical remedies of some medicinal plants used by the local people of Trichi district in Tamilnadu for the treatment of snakebite. These ethnomedicinal data may provide a base to start the search the new compounds related to phytochemistry, pharmacology and pharmacognosy. This may provide new sources of herbal drugs and help to understand the molecular basis of their activities. Moreover, it may further be mentioned that over exploitation of these species in the name of medicine may lead some species ultimately to the disappearance in future. Therefore, attention

should also be made on proper exploitation and utilization of these medicinal plants

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