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# Ethnomedicinal plants used for snake envenomation by folk traditional practitioners from Kallar forest region of South Western Ghats, Kerala, India

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## ABSTRACT

**Background:** The traditional medicinal systems of Indian folklore abundantly use medicinal plants or its derivatives for the treatment of snakebites. However, this traditional knowledge is on the verge of extinction, and there is an immediate necessity to conserve this oral traditional knowledge primarily by proper documentation and scientific authentication. The present ethno botanical study carried out among the folk medicine practitioners in the rural settle mental areas of Kallar forest region of southern Kerala, aims to document the folk herbal knowledge particularly for snake envenomation. **Materials and Methods:** The survey was conducted during the period of June 2012-July 2013 in the rural and forest settlement areas of Kallar in the Thiruvananthapuram district of Kerala. Direct observation and oral communications with local folk medicine practitioners in this region were adopted to collect valid information regarding the herbal formulations used to treat snake bite patients. **Results:** The study enumerates a list of 24 plant species belonging to seventeen families with anti-venomous potential. The scientific, vernacular and family names of these plants, along with the part used and their application modes are also enumerated in this communication. **Conclusions:** Plants are believed to be potent snake bite antidotes from centuries back, and knowledge about the use of plants is strictly conserved among tribes through generations without recorded data. It is the need of the hour to document these old drug formulations and is the cardinal responsibility of the scientific community to validate it and come up with new potent drug molecule for the benefit of snake bite victims.

KEY WORDS: Ethnomedicine, folk tradition, medicinal plants, snake antidote, South Western Ghats

## INTRODUCTION

The folk medicinal system has a deep rooted history among rural populations in India. This unique system of knowledge has been evolved from the harmonious living of aboriginal people with nature from time immemorial. Even today the various indigenous communities and many local populations in the country rely on this century old therapeutic tradition to meet their health care and to treat many anomalies. The ayurveda medicine, a well-established medical paradigm from ancient India is believed to be emerged from folk medicine date back to over 2000 years [1]. The folk medicine uses medicinal plants abound; nearly 25,000 effective plant based formulations are believed to be in credit [2]. The art of healing practices in the folk tradition are purely based on knowledge, skills and practices over century old experience of trial and error and many times it is shrouded by religious myths and beliefs.

Death due to snake envenomation has been a major socio-economic and medical emergency of many tropical and subtropical countries with heavy rainfall and humid climate [3,4]. This is mainly because of the working habit of rural folks and also due to the increased settlements of humans in the natural habitats of snakes. The annual statistical information counts more than two lakh snake bite cases with 35,000-50,000 deaths in India [5,6]. Serotherapy is the only accepted therapy so far in modern medicine, but it is found expensive and often produces adverse side-effects in the bite victims [7]. The rural and tribals people living in a remote area greatly depend on folk medicines for the treatment of bites from any venomous creatures. Nowadays these herbal antidotes used in folk traditional medicine gained much attention by toxicological research groups worldwide for developing a new alternative, effective, cheap and less allergic venom inhibitors to counteract venom toxins [8].

Kerala lying in the southern tip of Indian subcontinent is known for its cultural diversity and also for biological diversity. Kallar-Ponmudi reserve forest is a part of South Western Ghats of Kerala and is about 45 km from state capital city, Thiruvananthapuram. Due to the varied climate and topographic conditions, the forest shows remarkable diversity of vegetation and is a great emporium of ethnobotanical wealth. A wide number of ethnobotanical surveys conducted previously in many tribal pockets and rural parts of Kerala have reported a countable number of medicinal plants with high therapeutic effect, but much larger number of folk medicine have still remained endemic to certain rural pockets [9,10]. The present study aims at conserving largely the herbal knowledge for snake envenomation used by the folk practitioners in the Kallar region of South Western Ghats, Kerala and avail it to the scientific community.

## MATERIALS AND METHODS

### Study Areas

The present field survey was conducted in the rural settle mental areas of Kallar forest region (08°30´ N latitude and 076°56´ E longitude) [Figure 1], which is in Thiruvananthapuram district of Kerala. The Kallar region is marvellous for evergreen forest of South Western Ghats; the nearby hill station Ponmudi is 15 km away from Kallar. The climate here is moderately hot and humid. The major tribal group inhabiting the area is Kani tribals, one of the largest tribal groups in Kerala. Ethnobotanical explorations were undertaken in rural pockets of Kallar panchayat, where the local population lives in blend with nature and have their own customs and traditions.

### Data Collection

For ethnobotanical exploration, periodic field trips were undertaken in the rural and forest settle mental areas of Kallar in the Thiruvananthapuram district of Kerala. The study was conducted using a survey method during the period of June 2012-July 2013. The study randomly selected five families

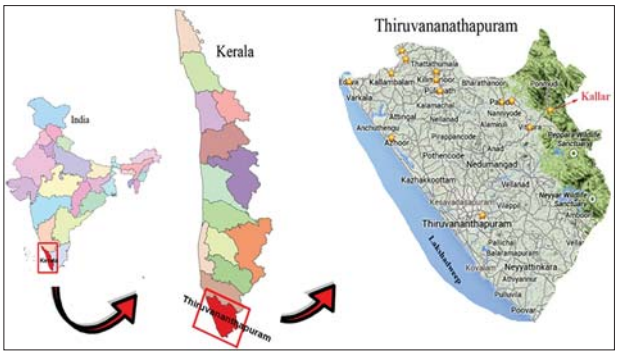


**Figure 1:** Map of Kallar forest region in Thiruvananthapuram district of Kerala, India

of local snake envenomation practitioners in the site, which are dispersed in and around the forest area. Either direct observations or oral communications with local practitioners were adapted to collect valid information regarding their venom envenomation treatment mode using medicinal plants. Detailed information about the use of plants in the treatment of snake venom envenomation including the parts used for the treatment, methods for the preparation of medicine, mode of administration in the patient and dose used in the treatment were collected and documented. Information collected from different local practitioners were further cross-checked and compared. A digital camera (Nikon D 3100), a global positioning system (Garmin 76 CS), a field book and a pocket lens were also used for the work. The documented plants were further authenticated by Dr. Valsala, Herbarium Curator, Department of Botany, University of Kerala, Thiruvananthapuram.

## RESULTS

The present ethnobotanical survey provides information on a few plants that are used either as first aid or as an antidote for snake venom by the folk practitioners in the Kallar region of Kerala. The plants are used in different ways to treat different persons based on the physical need of the victims and also based on its local availability. The survey listed a total of 24 plant species belonging to seventeen families [Figure 2]. The documented plants arranged in Table 1 represent their botanical names, followed by the vernacular name, family name, useful part and its application mode. Application of the plant or its sap onto the bite area, chewing leaves and bark or drinking plant extracts or decoctions, nasal application of plant juice etc., are some procedures intended to neutralize snake venom activity.

## DISCUSSION

The present ethnobotanical survey confirmed that the local population of the country still largely depends on medicinal herbs in and around their surroundings as the traditional tool to meet their primary health care. As they are living close to nature, the local inhabitants have acquired outstanding knowledge about the medicinal use of the regional herbal resources. However, many times medicinal practices may

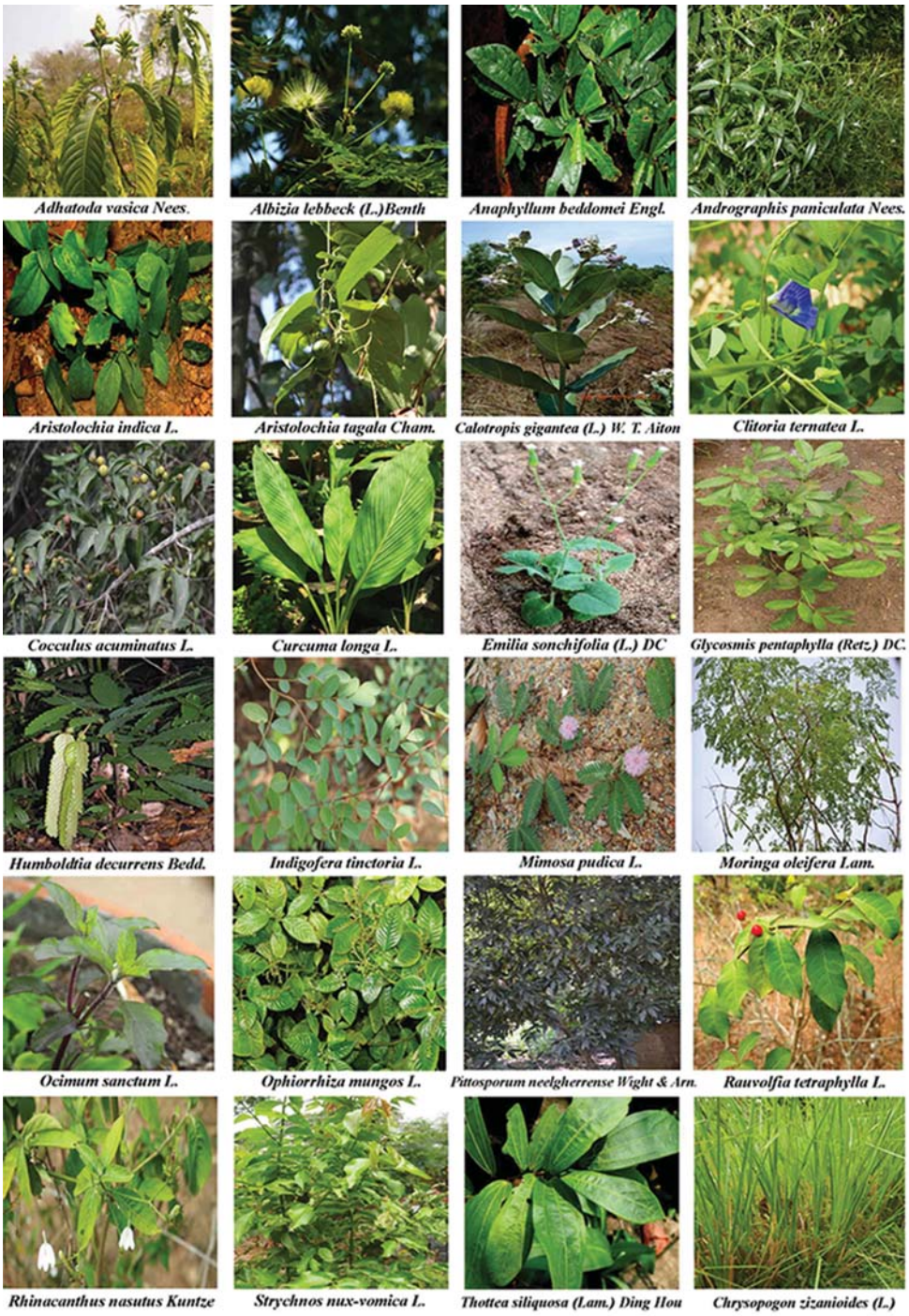


**Figure 2:** Anti-snake venomous plants documented from the Kallar region of South Western Ghats

incorporate or base themselves on spiritual beliefs. From the words of a folk physician, one gets venom or poison through five different routes-*damshanam** (bite), *sparshanam** (touch), *shwasanam** (breath), *snanam** (bath) and *panam** (drink) and treatment should be done carefully by monitoring the route of penetration of poison. The practitioners utilize a number of herbal antidotes to treat the patients challenged with snake venom. The healers administer the herbal combination both externally and internally to counteract the venom toxicity. The treatment practices are also influenced by mysticism and are followed by a strict dietary schedule to promote the complete cure.

## CONCLUSIONS

India is one of the twelve mega-biodiversity countries in the World. Kerala, the southernmost state of India, is having rich biodiversity with a wide variety of therapeutic plants. The tropical forest of Western Ghats ranges offers the most diverse biological resources to the state. The rural people and different ethnic

**Table 1: List of anti-snake venomous plants documented from Kallar region of South Western Ghats**

| Scientific name | Vernacular name | Family name | Useful part | Direction | Application |
|---|---|---|---|---|---|
| *Adhatoda vasica* Nees. | Aadalodakam | Acanthaceae | Leaf | Decoction, paste | Internal/external |
| *Albizia lebbeck* (L.) Benth | Nenmeni vaka | Mimosaceae | Root bark, bark | Paste | External |
| *Anaphyllum beddomei* Engl. | Keerikizhangu | Araceae | Rhizome | Paste | External |
| *Andrographis paniculata* Nees. | Kiriyath | Acanthaceae | Whole plant | Decoction, paste | Internal/external |
| *Aristolochia indica* L. | Cheriya arayan; Garudakodi | Aristolochiaceae | Whole plant | Decoction, paste | Oral/external |
| *Aristolochia tagala* Cham. | Valiya arayan | Aristolochiaceae | Whole plant | Decoction, paste | Oral/external |
| *Calotropis gigantea* (L.) W. T. Aiton | Erukku | Apocynaceae | Leaf and root | Paste | External |
| *Chrysopogon zizanioides* (L.) Roberty | Ramacham | Poaceae | Root | Paste | External |
| *Clitoria ternatea* L. | Sangupushpam | Fabaceae | Root | Juice | Internal |
| *Cocculus acuminatus* L. | Vally canjiram | Menispermaceae | Stem | Paste | External |
| *Curcuma longa* L. | Manjal | Zingibereaceae | Rhizome | Paste | External |
| *Emilia sonchifolia* (L.) DC | Muyal cheviyan | Asteraceae | Leaf | Decoction, paste | Oral/external |
| *Glycosmis pentaphylla* (Retz.) DC. | Panal | Rutaceae | Leaf | Decoction, paste | Oral/external |
| *Humboldtia decurrens* Bedd. Ex Oliv. | Neeruvatti | Fabaceae | Root | Paste | External |
| *Indigofera tinctoria* L. | Neela amari | Fabaceae | Root | Decoction | Oral |
| *Mimosa pudica* L. | Thottal vadi | Fabaceae | Root | Paste | External |
| *Moringa oleifera* Lam. | Moringa | Moringaceae | Root bark | Tincture | External |
| *Ocimum sanctum* L. | Krishnathulasi | Lamiaceae | Leaf, root | Juice | Oral |
| *Ophiorrhiza mungos* L. | Keeripacha | Rubiaceae | Root | Root | Oral |
| *Pittosporum neelgherrense* Wight and Arn. | Analivenga | Pittosporaceae | Bark | Decoction, paste | Oral/external |
| *Rauvolfia tetraphylla* L. | Paampumkolli | Apocynaceae | Root | Paste | External |
| *Rhinacanthus nasutus* Kuntze | Nagamulla | Acanthaceae | Leaves and roots | Paste | External |
| *Strychnos nux-vomica* L. | Kanjiram | Loganiaceae | Seeds and roots | Paste | External |
| *Thottea siliquosa* (Lam.) Ding Hou | Alpam | Aristolochiaceae | Root | Paste | External |

tribal groups are the repositories of valuable herbal medicine. This knowledge treasure is strictly conserved to specific people in the community and is little shared to the outside world. This traditional knowledge has been passed verbally through generations without any written documentation [11-13]; it may hold the key to several new discoveries and wonder drugs. Global estimation accounts that nearly three fourth of the herbal formulations used worldwide were descended from the plants first used in local folk therapy [2].

In view of the number of deaths caused by snake bite, particularly where anti-venom is not readily accessible, the development of thermo-stable cheap remedies suitable for emergency treatment is important. The folk traditional practitioners have a strong faith and belief in herbal medicinal care for snake bite treatment, and they acclaim that the survival rate is high even in the advanced stage of envenomation. The use of plants against snake venom has long been identified but closer scientific attention has been given only since the last 20 years [14].

The ethnomedicinal information hopes to play a vital role in developing new scientifically validated and standardized drugs for snake bite treatment. Nowadays traditional medicine and complementary and alternative medicine are getting more attention within the context of healthcare provision and health sector reforms [15]. Moreover, it may further be mentioned that over-exploitation of some rare plant species for medicinal purpose may ultimately lead to their disappearance in the future. Therefore, attention should also be made on proper exploitation and utilization of these medicinal plants. The present study highlighted the traditional or folk knowledge of Kallar region of southern Kerala for the treatment of snakebites. The knowledge of these medicinal plants used in the regional folk traditional system has been of great importance, especially as a lead for the discovery of novel drug molecules for snake bite treatment. Among the wealth of ethno pharmacological information listed in the present paper, the characterization and scientific validation of few plants are currently in progress in our laboratory. The root extracts of *Ophiorrhiza mungos* L., the bark of *Pittosporum neelgherrense* Wight and Arn., the leaf and root extracts of *Aristolochia indica* L. and the leaf extracts of *Glycosmis pentaphylla* (Retz.) DC. are currently under study of its claim of the snake antidote activity. The promising results obtained from the root extract of *O. mungos* L. antivenomous effect against *Daboia russelii* Shawb and Nodder venom has been published [16] and further studies are currently going on to isolate the active principles and to elucidate the exact mechanism of action of root extract components with viper venom proteins.

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*The words mentioned in the text are in Sanskrit language, an ancient and classical language of India.

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