



Plants Used as an antidote against Snakebite in Akole Taluka of Ahmednagar District (MS), India

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Abstract

Ethnobotanical survey was conducted during 2006-2008 in Akole Taluka of Ahmednagar district in Western Ghats of Maharashtra State. The tribes such as Mahadev Koli, Ramoshi, Thakar and Bhills are dwelling in the study area, apart from other rural people. Information on 40 angiospermic species belonging to 38 genera of 24 families was gathered, as used as an antidote against snakebite by those people. The present paper reports botanical names, family, local names, parts used, preparation and mode of administration. Also a discussion on present data compared with already published reports on snakebite is included.

Key words : medicinal plants, antidote, Snakebite, tribals, akole

1. Introduction

Since ancient times, plants are used as medicines, food, insecticides; etc. by large population of people living in remote areas. These people have developed their own traditional knowledge related to plant medicine, which have become treasure trove and cultural heritage of our nation. Traditionally, this treasure of knowledge has been passed on orally from generation to generation without any written document [1, 2] 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. These indigenous groups possess their own distinct culture, religious rites, food habit and a rich knowledge of traditional medicine [3-7]. 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 [8-10].

Snakebite is a serious medical, social and

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economic problem in many parts of the world, especially in the tropical and subtropical countries. The conservative sources estimate that the number of accidents globally reach one million, resulting in 600,000 envenomations and more than 20,000 deaths annually [11]. In India, alone more than 200,000 cases are reported and an estimated 35000 to 50,000 people die each year by snakebite [12]. In the world, there are an about 200 of 2700 species of snakes are poisonous [13,14] while in India there are over 270 species of snakes, out of which about 52 species are venomous [11]. Envenomations due to snakebites are commonly treated by parenteral 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 [15]. As a result, a large number of plants have been found to be effective as antidotes against snake venoms in India [16-20].

Hence, the present study is focused on the preliminary survey of medicinal plants for therapeutic application of snakebite and extensive traditional use in Akole taluka of Ahmednagar district of Maharashtra state, India. There are

few ethnobotanical survey reports carried out in Akole and adjoining areas [21-24]. The medicinal plants available in this area have not been explored well; also the tribal population in the taluka is relatively large. Therefore the scope for ethnomedicine or ethnobotany in general is higher. Moreover, the main aim of the present study is to collect information on traditional uses of medicinal plants used in the preparation of herbal drugs against snakebite by the tribal people of the study area, for which no literature is still available. Since, the present investigation on the survey of plants used by tribals as an antidote against snakebite has been undertaken.

2. Materials and Methods

2.1 Study area

The study area concentrates in and around the forest areas of Akole taluka located in Ahmednagar district of Maharashtra state is included in Western Ghats. It lies an average about 800m in height above the mean sea level and situated at 19°15'N-74°20'E. It has many striking hill ranges such as Kalsubai (1646), Harishchandragad (1424), Ratangad (1297), Kulang (1470), Ajuba dongar (1375) and many other peaks (Fig. 1). The maximum temperature of this taluka is about 35° - 41°C and minimum of 4° - 15°C. The average rainfall is 508.9; some of the areas like Ghatghar and Bhandardara of Akole receiving highest rain i.e. 2000-3000 mm of rain every year. There are includes 150508 hector land; having agriculture land 98712 and remaining 41698 hectors land is under forest. There are 191 villages including 2, 71,719 total population [25].

2.2 Population

The country possesses a total of 427 tribal communities [26], about 47 tribes are found in Maharashtra state; out of which the Thakars,

Mahadevkoli, Bhills and Ramoshies are hilly tribal group of Akole taluka. Most of them celebrate Hindu festivals. They wear langoti i.e. a short waist cloth or a dhoti, bandi or a kopri and a pheta on the head. Women wear lugdi/saree and bodice. They speak dialects of the Marathi language and live in villages called as Vadis. Their houses are built of baked earth and tiled roofs, huts made of mud walls or Karvi (*Carvia callosa*) sticks and plastered with clay and cow- dung. Their major occupation is agriculture. Rice, black sesame and finger millet are some of the crops they cultivate. Tribal's food is mainly cooked rice, pulses, curry and Nagali (*Elucine coracana*) or Bajra bhakari (*Pennisetum typhoides*). They also eat meat of certain animals like rabbits, crabs, and wild pigs. Some of them drink liquor made from the flowers of *Madhuca longifolia* [25].

2.3 Survey methodology

The field work was conducted in the areas like Bari, Bhandardara, Chichondi, Deothan, Ghatghar, Guhire, Koltembbe, Murshet,

Panjaare, Ratanvadi, Sambrad Udadavane and Shendi of Akole during 2006-2008. Plant species used against Snakebite were collected with the help of tribal Vaidyas, local practitioners and elderly people. These informants were traditional healers themselves or had tradition of healing in their families and had knowledge of the medicinal use of the plants. The questionnaires were used to obtain information on medicinal plants with their local names, parts used, mode of preparation and administration. A total of 26 informants (comprising 23 males and 3 females) were identified between the ages of 37 and 75. They were selected based on their knowledge of medicinal plants, either for self-medication or for treating others. Standard method was followed with regard to collection of plant materials, drying, mounting, preparation and preservation of plant specimens [27]. The identification and nomenclature of the plants were done by using floras [28, 25]. All the preserved specimens were deposited at the Post Graduate Department of Botany, Sangamner College, Sangamner.



Fig. 1: Location of study area (Akole Taluka) Map of Ahmednagar District of Ahmednagar District

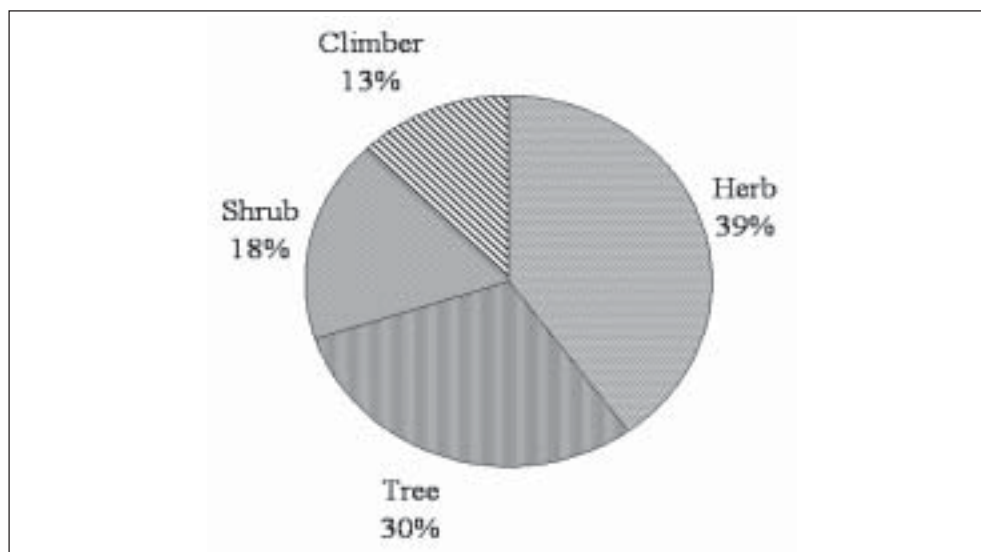


Fig. 2 : Habit of Medicinal Plants (%)

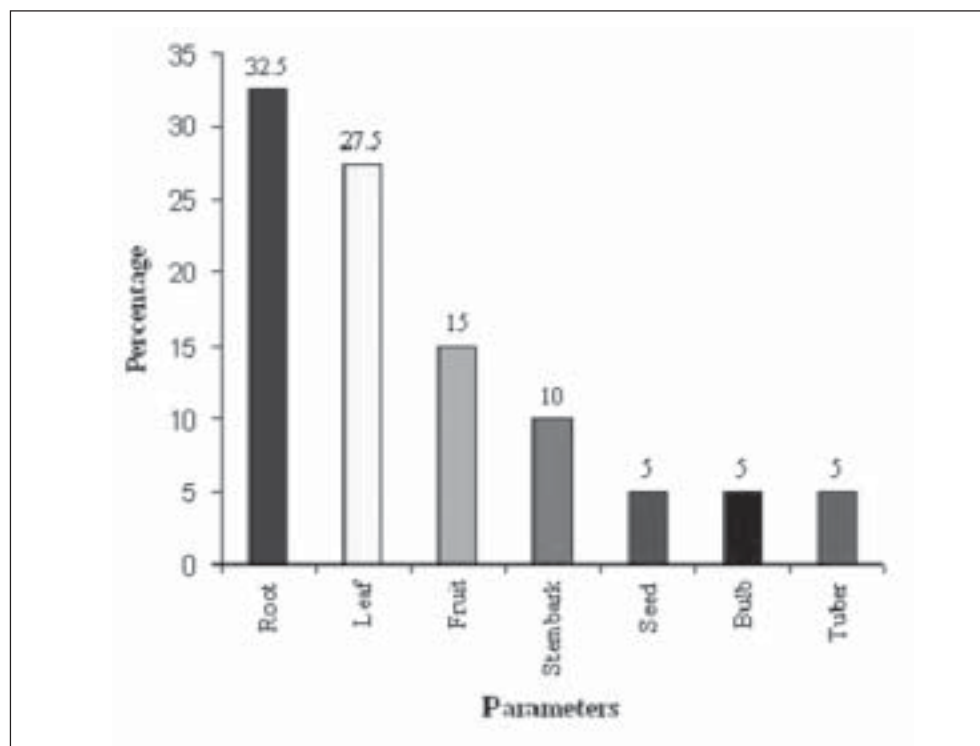


Fig. 3: Medicinal parts used

3. Results and Discussions

The present survey reports use of 40 plant species for the treatment of snakebite. Surveyed plants belong to 24 families of flowering plants of which 6 families belong to monocotyledon and remaining 18 families were dicotyledons. Among 40 plant species 16 were herbs, 12 were trees, 7 were shrubs and 5 were climbers (Fig. 2). For the treatment of snake bite various plant parts have been reported including root (13), leaf (11), fruit (6), stem bark (4), seed (2), bulb (2) and tuber (2) and in some cases more than one part of the plants are used (Fig.3). The most commonly represented families were Apocynaceae (5), Leguminaceae (4), Menispermaceae (3) and Liliaceae (3). Common modes of administration were paste, decoction, infusion, juice, powder and water extracts. Both external application and oral administration were the mode of treatment for snakebite.

The tribal healers (24 males and 2 females) between the ages of 37 to 75 in the study area were visited to collect the remedies on snakebite. These remedies can be grouped into two classes viz. curative and preventive. Curative plants used for treatment are reported in detail along with dosage and mode of administration for each plant (Table1.). The plants used as preventive are claimed to be effective to ward off snakes from human settlements and also reduce pain and symptoms of snakebite. The common species of snakes found in study area were Indian Cobra (*Naja naja*), Common krait (*Bungarus caeruleus*), Russell's viper (*Vipera russellii*), Saw scaled viper (*Echis carinatus*) and Bamboo pit viper (*Trimeresurus gramaneus*). The Common krait is a deadly poisonous which is a most common species found in study area.

In present communication, the data is compared with the available data of Indian literature. The use of *Acorus calamus* [17,18,29-31],

Aegle marmelos [32], *Allium cepa* [33,34], *Allium sativum* [29,35], *Bauhinia variegata* [29,36], *Argemone mexicana* [17,18,29,36], *Calotropis procera* [18,37], *Clitoria ternatea* [17,29], *Gloriosa superba*, [17,18,29,30,38,39,36], *Hemidesmus indicus* [17,29,40], *Holarrhena pubescence* [29], *Luffa acutangula* var. *amara* [29,41], *Mimordica dioica* [29], *Mimosa pudica* [29,42], *Moringa oleifera* [29,43,44], *Nicotiana tobaccum* [18,30,38,35], *Nyctanthes arborescens* [18,29], *Piper betle* [17,18,29,30], *Piper longum* [17,29], *Pogostemon benghalensis* [17,18,29,40], *Rauwolfia serpentina* [18,40,45,46], *Rubia cordifolia* [17,18,29,18], *Solanum virginianum* [29], *Syzigium cumini* [41,36] and *Tinospora cordifolia* [29], *Wrightia tinctoria* [47] have been previously reported for the treatment of snakebite that confirms our ethnobotanical reports. Also the pharmacological activities of *Hemidesmus indicus*, [48-50], *Mimosa pudica* [51], *Tamarindus indicus* [52] used against snake bite are also similar with that of the ethnobotanical reports in our study. The use of *Arisaema murrayi*, *Cassine glauca*, *Cocculus villosus*, *Curculigo orchoides*, *Diplocyclos palmatus*, *Enicostema littorale*, *Murraya paniculata*, *Nerium indicum*, *Sapindus emarginatus*, and *Woodfordia fruticosa* are found to be new for snake bite.

In present study we found that adult informants have elaborate knowledge about the treatment of snake bite. Our findings further indicate that these therapies are administered by specialists after primary treatment in the field. Snake attacks are reportedly sure, quick, sometimes unnoticed, and results can be seen as scratches and fang entry wounds. All interviewees described observations matching the wide spectrum of local and systemic manifestations that result from snake venom poisoning.

Table.1: Medicinal plants used as an antidote against snakebite in Akole taluka

Botanical name	Family	Local name	Habit	Parts used	Preparations (administrations)
<i>Acorus calamus</i> L.	Araceae	Yakand	Herb	Root, Leaves	Juice of fresh root and leaves are given orally.
<i>Aegle marmelos</i> (L.) Corr.	Rutaecae	Bel	Tree	Stem bark	Levigation liquefied in water of fresh material is given orally.
<i>Allium cepa</i> L.	Liliaceae	Kanda	Herb	Bulb	Juice extracted from crushed bulb along with the equal quantity of mustard oil is added. This infusion is given orally. Also the crushed bulb is rubbed over bite site.
<i>Allium sativum</i> L.	Liliaceae	Lasun	Herb	Bulb	1-2 teaspoon mixture of crushed bulb with cow fat is given orally.
<i>Argemone maxicana</i> L.	Papavaraceae	Pivla Dhotra	Herb	Root	5-10 gm dried powder is given with water for internal consumption. Also juice extracted from fresh root given for internal consumption.
<i>Arisaema murrayi</i> Hook.	Araceae	Badadha	Herb	Tuber	1-2 teaspoonful of levigated liquid is given orally in case of common krait (<i>Bungarus caeruleus</i>) bite.
<i>Bauhinia purpurea</i> L.	Caesalpinaceae	Kanchan	Tree	Leaves	Half cup of extract from fresh leaves with water is given orally.
<i>Calatropis procera</i> (Ait.)R.Br.	Asclepidaceae	Rui	Shrub	Root	Juice extracted from fresh root is given orally.
<i>Cassine glauca</i> (Rottb.) O.Ktze.	Celastraceae	Buscut	Tree	Leaves, root	Extract of 3-4 leaves in 200 ml water is given orally. Also the infusion of its root with the root of <i>Wrightia tinctoria</i> is given orally.
<i>Clitoria ternatea</i> L.	Papillionaceae	Gokern	Herb	Root	3-4 teaspoon of levigated liquid in water is given for internal consumption.
<i>Cocculus villosus</i> (Lam.) DC.	Menispermaceae	Vasansadi	Climber	Leaves	2-4 leaves are given for chewing to identify the poisonous nature of snakes. If the snake is poisonous, the leaves indicates sweetness, if not indicates bitter taste.
<i>Curculigo orchioides</i> Gaertn.	Amarylidaceae	Kali musali	Herb	Root	Extract of fresh roots in water is given orally.
<i>Diplocyclos palmatus</i> L.	Cucurbitaceae	Shiraliingi	Climber	Root, flower	5-10 g root powder is given with water orally and also the fresh juice extracted from flower is poured in nostrils.

Botanical name	Family	Local name	Habit	Parts used	Preparations (administrations)
<i>Enicostemma littorale</i> Blume.	Gentianaceae	Nai	Herb	Leaves	1-2 teaspoonful dried powder is given with water for internal consumption.
<i>Gloriosa superba</i> L.	Liliaceae	Kallavi	Herb	Tuber, leaves	5-10 g of the tuber crushed in water consumed orally. Also the fresh leaves juice is given for internal consumption.
<i>Hemidesmus indicus</i> (L.)	Periplocaceae	Anantmul	Shrub	Root	Fresh roots are crushed to juice extract. The juice Suhult. extracted is consumed orally. Also 2-3 drops of pure filtered juice prepared with sterile water is dropped on the eye ball.
<i>Holarrhena pubescence</i> (Buch-Ham.) D. Wall.	Apocynaceae	Pandhara kuda	Tree	Fruit	Dried powder mixed in water is given orally. Also fruit grinded into liquid paste with sprinkling of water, applied over bite site to reduce swelling.
<i>Luffa acututagula</i> var. amara (L.) Roxb.	Cucurbitaceae	Kadu dodka	Climber	Fruit	1-2 teaspoonful pulp with water is given orally.
<i>Lobelia nicotianaefolia</i> Roth.	Lobeliaceae	Dhota	Herb	Root	Fresh root kept on the eye for relief from headache.
<i>Mimosa pudica</i> L.	Mimosaceae	Lajalu	Herb	Root	Juice extracted in rice milk is given internally in case of high poisoning.
<i>Momordica dioica</i> Roxb.	Cucurbitaceae	Kortoli	Climber	Root	Fresh root made into paste is applied on the bite site.
<i>Moringa oleifera</i> (Lam.) Enagil.	Moringaceae	Shevga	Tree	Stem bark	Infusion of the stem bark along with the fruit of <i>Luffa acutangula</i> and <i>Sapindus amarginatus</i> is given orally.
<i>Murraya paniculata</i> L.	Rutaceae	Pandhari	Tree	Leaves,stem	Fresh leaves juice is given internally. Also its stem branches are kept in houses to ward off snakes.
<i>Nerium indicum</i> Mill.	Apocynaceae	Kaner	Shrub	Leaves	1-2 teaspoonful juice prepared from the fresh leaves given for internal consumption. Also the leaf paste is applied on bite site.
<i>Nicotiana tabacum</i> L.	Solanaceae	Tambakhu	Herb	Seed	Powdered mixture of 1-2 seeds along with equal quantity of shells of snail is given orally with water in case of common krait (<i>Bungarus caeruleus</i>) bite.
<i>Nyctanthes arbotristis</i> L.	Oleaceae	Parijit	Tree	Leaves	Leaves juice is given orally.
<i>Piper betle</i> L.	Piperaceae	Paan	Herb	Leaves	3-4 crushed leaves are rubbed over bite site. Also leaf juice is given internally.

Botanical name	Family	Local name	Habit	Parts used	Preparations (administrations)
<i>Piper longum</i> L.	Piperaceae	Pimpli	Shrub	Fruit	Powdered mixture of its fruit along with the fruit of <i>Ficus amplissima</i> is rubbed on bite site. Also the infusion of above mixture is given orally.
<i>Plumeria alba</i> L.	Apocynaceae	Chapha	Tree	Fruit	Dried fruits are crushed and boiled in water to prepare a decoction. The decoction obtained is consumed orally.
<i>Pogostemon benghalensis</i> (Brume.)	Oktze.	Lamiaceae	Phangala	Herb	Root Juice extracted from 5-10 gm root boiled at low temperature in water is given orally. Also the root paste applied on bite site.
<i>Rauwolfia serpentina</i> (L.) Bth.ex.Kurtz.	Apocynaceae	Sarpagandha	Shrub	Root	Juice extracted from root with water is given orally.
<i>Rubia cordifolia</i> (Wild.)Mier.	Rubiaceae	Manjistha	Shrub	Stem bark	5-10 g of fresh stem bark is made into juice with water for consumed orally.
<i>Sapindus emarginatus</i> Vahl.	Sapindaceae	Ritha	Tree	Fruit	1-2 teaspoonful of powder prepared from the dried fruit is given orally.
<i>Solanum verginianum</i> L.	Solanaceae	Bhui ringni	Herb	Fruit	Powder prepared from dried part of fruit is inhaled.
<i>Syzygium cuminii</i> L.	Mrytaceae	Jambhal	Tree	Leaves	Leaf juice is taken with equal quantity of water.
<i>Tamarindus indicus</i> L.	Caesalpinaceae	Chineh	Tree	Seed	5-10 g of seeds is grinded into paste with sprinkls of water. This paste applied over bit site.
<i>Tephrosia purpurea</i> L.	Papilionaceae	Unhali	Herb	Root	Juice of root with water is frequently given for internal consumption.
<i>Tinospora cordifolia</i> Meris.	Menispermaceas	Gulvel	Climber	Stem bark	Juice of stem bark with water is given for internal (Wild.) consumption.
<i>Woodfordia fruticosa</i> (L.) Kura.	Lythraceae	Shayti	Shrub	Leaves	Juice extracted in water is given internally.

Informants reported that the effects of snakebites including swelling or skin discoloration, shock, weakness, convulsions, shortness of breath, nausea, severe pain, paralysis, unconsciousness, and even death. The local people seek help through traditional herbal medicines.

Virtually all households engage in outdoor activities, especially subsistence agriculture. Nonetheless, as reported by 26 informants, the vulnerable members to snakebite are farmers, firewood collectors, hunters, and herders between the ages of 12 and 65 years. We could not ascertain snakebite frequency because of insufficient records, but the general view in the study area was that frequency of snakebite incidents is medium to high. Traditional treatment for snakebites begins in the field immediately after the victim is bitten. Fresh medicinal plant preparations are prepared and administered within a half hour. Bands are tied above and below the bitten area to slow the spread of venom. Incisions are then made across the main wound area using a razor blade or a pointed knife. The bitten area is then sucked with the mouth until blood flows freely. This practice is believed to drain the poisoned blood. The greater the consensus among herbalists and laypersons about the efficacy of particular plants in the treatment of snakebite, will lead to remedies which will prove to have bioactive chemicals.

4. Conclusion

Traditional medicine continues to be used by the tribal people of Akole taluka. During the survey we have found that poor hospital infrastructure, high medical fees, shortage of antiserum and a deep-rooted confidence in local healers is based on traditional knowledge and conceptions responsible for continued medicinal plant usage for treatment among tribal people. The success of local practitioners lies in their traditional knowledge and selection of the modes of treatment. Local healers have become the symbol of hope for tribals in recovery from such dire situation. *Hemidesmus indicus*, *Holarrhena pubescens*, *Nicotiana tobaccum*, *Woodfordia fruticosa* and *Wrightia tinctoria* are found to be leading species used as remedies against snakebite. The chemical and pharmacological properties of their therapies remain uninvestigated. So further studies on chemical and pharmacological actions are suggested to validate the claims.

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