

RESEARCH ARTICLE

## Ethnomedicinal Knowledge for Management of Leeches in Assam

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### ABSTRACT

Leech infestation is a common health problem in Assam that affects people of all ages, sexes and even livestock. Ethnomedicinal practice for management of leech infestations among ethnic groups in Assam is discussed. Data collection included ethnobotanical methods of group discussions and semi-structured interview. A total of 13 medicinal plants and 08 non-plant products are used by ethnic groups for management of leech infestation. Plants like *Mikania scandens* and *Chromolaena odorata* while among non-plant sources common salt and kerosene are the most extensively used ethnomedicines against leech infestation. In rare cases of intraperitoneal leech bites, *Cucumis sativus* or raw duck blood is taken to expel the leech. Ethnobotanical studies followed by chemical evaluation of locally used anti-leech plants can provide valuable clues about the bioactive compounds and prioritise species for further pharmacological investigation.

**Keywords:** Ethnomedicine, leech management, leech infestation, ethnic groups, anti-leech plants

### 1. INTRODUCTION

Leech infestation is a common health problem in Assam, Northeast India that affects people of all ages and even livestock. Diverse habitats such as swamps, water bodies, marshes, agricultural fields and forests support luxuriant growth of leeches among other biota. *Hirudinia* is dominant aquatic species while terrestrial forms are represented by species of *Haemadipsa*. Leeches mostly gets attached to the exterior or exposed parts of the body but leech infestation has also been reported frequently from body cavities<sup>1</sup>. Primary complications associated with leech infestation include bites, haemoptysis and haematemeses leading to anemia. Secondary infections of the bites cause swelling and itching in the infected area and high fever. Very often bleeding becomes uncontrollable due to anti-coagulant hirudin released by these sanguivores and worst when they are endoparasitic. Often people gather fear psychosis for these blood sucking annelids while working in agricultural fields, walking along forest paths and collection of forest resources. Tribal groups in Assam use plants and other products to manage leech infestations, either to repel or kill the annelids or to cure the secondary infection that arises due to leech bites. Management of leech infestations sometimes involves magico-religious practices in which the healer uses charms and incantations. Herbal approach to manage leech infestation could be a viable option as it is non-toxic to environment. In the present communication, ethnomedicinal knowledge of different ethnic groups of Assam for management of leech infestations is discussed.

Leech infestation is a global problem with a number of complications in animals and human<sup>2-3</sup>. These annelids with specially adapted mouth to attach and suck blood from host<sup>4</sup> secrete hirudin causing wound and serious blood loss<sup>5-6</sup>. Various studies have reported anti-leech activities of *Nicotiana tabacum*, *Juglans regia*, *Nerium oleander* and *Peganum harmala* against *Limnatis nilotica*<sup>7-9</sup>. Despite having large body of ethnobotanical reports<sup>10</sup> medicinal plants of Northeast India scarcely evaluated for its anti-leech activity. Among the few reports, Nath and co-workers evaluated the efficacy of Cinnamon, spearmint, pine, citronella, eucalyptus and orange<sup>11</sup>. One study assessed repellence of oils obtained from *Callistemon rigidus*, *Zanthoxylum armatum* and *Azadirachta indica* against land leeches and found that *C. rigidus* provided highest repellency under field condition<sup>5</sup>. The present report will contribute towards global ethnobotanical knowledge database of indigenous communities and identification of new plant resources. Result of this study can be useful to military personal posted in the leech-infested hill areas of Northeast India.

### 2. MATERIALS AND METHODS

#### 2.1 Study Area

Assam state (24°44'-27°45'N to 89°41'-96°02'E; area: 79,000 sq km) in Northeast India is considered as the meeting ground of diverse cultures including Karbi, Dimas, Bodo, Chakma, Rengma (Naga), Deori, Mising, Rabha, Koch rajbongshi, Kuki, Hmar, etc. It is bounded by six of the other seven sister states of the region (Fig. 1). Forest type varies from semi-evergreen to evergreen forest with mixed crop

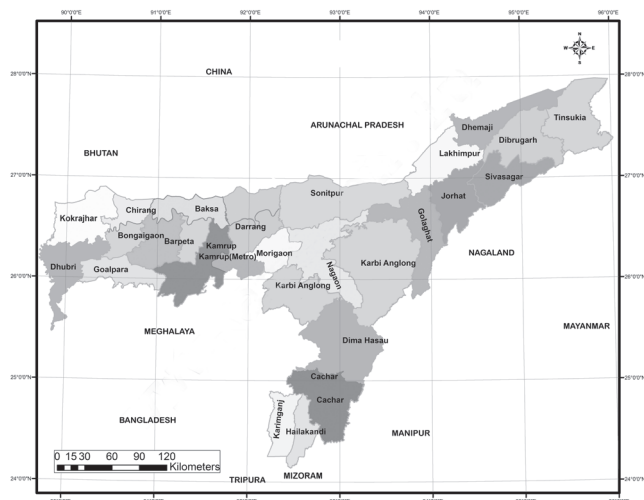


Figure 1. Map of Assam.

composition including bamboo, canes and orchids. The people are mainly agriculturists with farmers practicing wet cultivation in plains and jhum in the hills.

## 2.2 Data Collection and Analysis

Ethnobotanical field work was conducted during 2012–2014 among the ethnic groups of Assam. Consent of informants was obtained and information was collected following ethnobotanical methods of group discussion and semi-structured interview<sup>12-13</sup>. Checklist of anti-leech plants was prepared after conducting group discussion. Semi-structured interview was conducted with 148 informants (Karbi: 31; Rengma: 5; Garo: 9; Nepali: 5; Kuki: 35; Koch Rajbongshi: 3; Bodo: 27; Mising: 3; Mizo: 7; Hmar: 1; Meitei: 3 and Dimasa: 19). The questionnaires included key issues like

- (i) complaints of leech infestation in an area,
- (ii) potential habitats of leeches,
- (iv) complications caused by leech infestation,
- (v) ethnomedicines for managing leech infestation, and
- (vi) precaution measures to avoid leeches.

The local names of plants, parts used, application and mode of action disclosed by informants were recorded in the field diary. We accompanied informants into leech-infested habitats and personally observed the leeches and responses to the application of ethnomedicines. Medicinal plants were collected with the help of key informants and identified with local floras<sup>14-16</sup>.

## 3. RESULT AND DISCUSSION

Leech infestation is a common health problem in both the plains and hill areas of Assam. Two different approaches for management of leeches have been observed. *First*, removal of leeches from the body of the victim and *second*, management of wounds, which in most cases, is seen to be associated with different types of secondary infections. The removal of leeches is generally seen to be carried out either by mechanical means or by the application of various substances with known anti-leech properties. The second approach is accomplished by further medicinal examination

and application of biomedicines. The most common complication of leech infestation is non-coagulation of blood (Fig. 2) and proper management of the wound is key to prevention of secondary infections. A total of thirteen anti-leech plants have been recorded among different ethnic groups of Assam (Table 1) while as many as eight non-plant products are also used for management of leeches (Table 2). Besides, wood ash and charcoal of almost all plants are used as source of remedy for management of leech infestation. Study on anti-leech medicinal plants has received comparatively less attention from researchers and therefore there is a need to enhance ethnobotanical studies among unexplored cultures before it is too late.



Figure 2. Wound caused by leech bite.

### 3.1 Anti-leech Ethnomedicinal Plants

Thirteen anti-leech plants have been recorded and grouped into three use categories namely repellent, killing agent and management of wounds. Nine plants are used to repel leeches, three species are used to kill leeches and five plants are used in management of wounds and secondary infections (Table 1). Two plants are reported to be effective (repellent and killing agent) against aquatic leeches, three species are effective (repellent and killing agent) against terrestrial leeches while eight are effective against both aquatic (Fig. 3) and terrestrial leeches (Fig. 4). Traditional uses of plant ethnomedicines against leeches is briefly

Figure 3. Aquatic leech (*Hirudinia* sp.)

Table 1. Medicinal plants used for management of leeches by ethnic groups of Assam

Plants [Family]	Cultural groups	Parts used	Mode of action
<i>Nicotiana tabacum</i> L. [Solanaceae]	Bodo, Karbi, Dimasa, Manipuri and Mizo	Leaves	Repellant and killing agent
<i>Nicotiana plumbaginifolia</i> Viv. [Solanaceae]	Karbi	Leaves	Repellant and killing agent
<i>Citrus</i> sp. [Rutaceae]	Karbi	Rinds	Repellant
<i>Cucumis sativus</i> L. [Cucurbitaceae]	Karbi	Fruits and Peels	Repellant and killing agent (intraperitoneal leeches)
<i>Scoparia dulcis</i> L. [Plantaginaceae]	Mizo	Leaves	Wound management
<i>Alternanthera brasiliana</i> (L.) Kuntze [Amaranthaceae]	Garo	Leaves	Wound management
<i>Gossypium arboreum</i> L. [Malvaceae]	Kuki	Ash	Repellant
<i>Chromolaena odorata</i> (L.) R.M. King & H. Rob. [Compositae]	Kuki, Karbi, Hmar, Garo, Dimasa and Bodo	Leaves	Wound management
<i>Mikania scandens</i> (L.) Willd. [Compositae]	Karbi, Kuki, Hmar, Bodo, Dimasa, Mizo and Garo	Leaves	Wound management
<i>Zingiber officinale</i> Rosc. [Zingiberaceae]	Rengma Naga	Rhizomes	Repellant
<i>Colocasia esculenta</i> (L.) Schott [Araceae]	Ahom, Mising, Bodo and Koch Rajbongshi	Petiole	Repellant and wound management
<i>Areca catechu</i> L. [Arecaceae]	Karbi, Mising and Bodo	Masticated betel quid	Repellant
<i>Piper betel</i> L. [Piperaceae]	Karbi, Mising and Bodo	Masticated betel quid	Repellant

Figure 4. Terrestrial leech (*Haemadipsa* sp.)

enumerated as follows.

*Colocasia esculenta* (L.) Schott : Petioles are crushed and the sap is applied on the wound. This application heals the wound and repels leeches from further infestation.

*Chromolaena odorata* (L.) R.M. King & H. Rob. : Leaves are pounded and the paste is applied dermally on the wound for quick healing. However, further infection would require medical treatment.

*Mikania scandens* (L.) Willd. : Application is similar with that of *Chromolaena odorata*.

*Gossypium arboreum* L. : Cotton ashes are applied on the wound. This results in quick healing and prevents from further secondary infection.

*Areca catechu* L. : The masticatory extract of betel quid is applied dermally on the wound for quick healing.

*Piper betel* L. : Similar with that of *Areca catechu* L.

*Nicotiana tabacum* L. : Dried leaves are powdered and sprinkled where the leech has attached itself strongly on the skin. This detaches the leech from the body and paralyses it. This application, although, does not help in healing the wound yet, it kills the leech with further application. During field study, our informants removed the terrestrial leech attached to his feet and placed on his palm; he then added some crushed dried tobacco leaves. We observed the leech struggled due to the effect of tobacco and became paralysed in about a minute. *N. tabacum* L. is the most commonly used anti-leech plant among the cultural groups studied.

*Nicotiana plumbaginifolia* Viv. (Fig. 5) : Similar with *Nicotiana tabacum* L. Use of this plant is restricted to the Karbi ethnic group only.

*Cucumis sativus* L. : It is used in cases of endoparasitic leech infestation. Either tender leaves or the whole fruit is

Figure 5. Plant of *N. plumbaginifolia*.



consumed which kills and discharges the leech out of the body.

*Citrus* sp. : Rinds of *Citrus* fruits are scattered in the surroundings as repellants, particularly for terrestrial leeches. The rind extract helps in detaching the leech from the body.

*Alternanthera brasiliensis* (L.) Kuntze : Leaves are crushed and the extract is applied on the wound caused by leech bites. This clogs blood and helps in wound healing.

*Scoparia dulcis* L. : Similar with that of *Alternanthera brasiliensis*. It further controls any secondary infection.

*Zingiber officinale* Rosc. : The extract of the rhizomes work as repellent for the leeches.

### 3.2 Anti-leech Ethnomedicines from other

#### Sources

Eight products other than plants (Table 2) are also used to manage leech infestation- repellent (six), killing agent (one) and for management of wounds (two). Common salt is the most extensively used non-plant ethnomedicine for killing and repelling both aquatic and terrestrial leeches.

**Kerosene:** When people happen to visit leech infested habitats, they rub kerosene oil over the exposed parts of fore and hind limbs; the odor is said to repel the leeches. It further restricts the hold of the leeches onto the person's body.

**Salt:** Use of common salt is the most widespread practice observed in almost all the tribal communities. Salt is applied to remove both (a) aquatic and (b) terrestrial leeches from the body and very effective in killing these annelids (Fig. 6). People working in agricultural fields often carry salt container where they put leeches that have been removed from the body. Leeches die within a few seconds (approx. one minute).

**Saliva:** This forms the handiest resource to remove aquatic leech from the body. The application of saliva helps

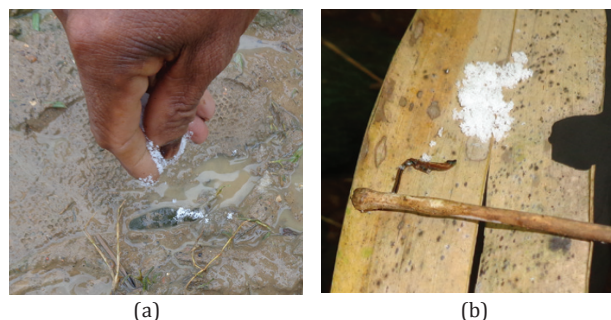


Figure 6. Salt application on (a) aquatic leech and (b) terrestrial leech.

in detaching the leech with ease. During the study, we applied our own saliva on the leech that got attached to our feet and observed the organism retracted its proboscis and searched for new location to bite. Probably the lubricating nature of saliva releases hold of the leech but bioassay study will be able to identify the bioactive component responsible for this effect.

**Lime:** Application and effect are similar with that of *Areca catechu*.

**Alkali solution:** People working in area infested with aquatic leech often carry locally prepared alkali solution in a vessel. When a leech gets attached to a person, the solution is sprinkled which releases hold of the leech and then removed with ease. It is placed in the vessel so that the leech does not escape back to the environment. This practice has been observed among the Karbis during paddy plantation.

**Duck blood:** Though rare, in cases of intraperitoneal leech infestation (through rectum or the vagina) fresh duck blood is given orally and within moments the leech gets discharged through urine. The victim is then taken to a nearby hospital for further medication. Such practice has been reported among the Karbi ethnic group only.

**Wood ash:** Wood ash of any plant is applied on the wound caused by leech bites. It is said to enhance blood clotting and heals the wound. Though this material does not kill the leech yet it helps as a repellent.

**Charcoal:** Burnt wood charcoal is applied to heal the wound caused by leech bites.

Table 2. Other anti-leech ethnomedicines used by ethnic groups of Assam

Resources	Local name	Mode of action
Salt (NaCl)	Karbi, Dimasa, Mizo, Hmar, Rengma Naga, Koch Rajbongshi, Garo and Mising	Repellent and killing agent
Kerosene	Bodo, Karbi, Garo, Deori and Rajbongshi	Repellent
Saliva	Karbi, Kuki, Mising, Garo and Bodo	Repellent
Lime	Naga and Garo	Wound management
Alkali solution	Karbi	Repellent (aquatic leech)
Wood Ash	Kuki and Nepali	Wound management
Charcoal	Kuki	Repellent
Blood of Duck ( <i>Anas platyrhynchos</i> )	Karbi	Repellent (intraperitoneal leech)
[Anatidae]		

## 4. CONCLUSION

Though leech therapy has been used for various ailments like circulatory disorders and cardiovascular diseases, leech infestation is the source of health problems for both human and livestock. Many anti-helminthic and anti-parasitic drugs have been used against various types of leech infestation but these compounds can have obvious adverse effects on environment. Ethnobotanical based studies can provide a sustainable remedy for management of leech infestation. Chemical evaluation of locally used medicinal plants can provide valuable clues about the bioactive compounds for further pharmacological investigation. However, agricultural expansion and urbanisation are destructing potential habitats of both

terrestrial and aquatic leeches and this trend may result in decline of local pharmacopoeia of indigenous people. This calls for urgent documentation of ethnomedicinal knowledge of different cultures around the world.

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**Conflict of Interest :** None

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