



Document heading

doi:10.12980/APJTB.4.2014C1120

© 2014 by the Asian Pacific Journal of Tropical Biomedicine. All rights reserved.

Ethnobotanical survey of folklore plants used in treatment of snakebite in Paschim Medinipur district, West Bengal

Sumana Sarkhel

Department of Human Physiology with Community Health, Vidyasagar University, Paschim Medinipur–721102, West Bengal, India

PEER REVIEW

Peer reviewer

Dr. Somenath Roy, Professor, Immunology and Microbiology Laboratory, Department of Human Physiology with Community Health, Vidyasagar University, Midnapore–721102, West Bengal, India.

Tel: (91) 03222 – 276554 Ext. 450.

Fax: (91) 03222 – 275329

E-mail: sroy.vu@hotmail.com, roysomenath@hotmail.com

Comments

This is a valuable survey work in which the author describes the applications of some folklore plants used in treatment of snakebite in Paschim Medinipur district, West Bengal. The study protocol is statically sound and may enrich the knowledge in broader sense.

Details on Page 419

ABSTRACT

Objective: To investigate and collect information from traditional health healers/tribal communities on the use of medicinal plants for treatment of snakebite.

Methods: The ethno-medicinal study was conducted in 8 villages of the Paschim Medinipur district of West Bengal in 2012–2013 through questionnaire and personal interviews. Following the method of Martin, information about medicinal plants used in snake bite, precise plant parts used, methods of treatment and administration was enquired from the tribal communities (*Santhals, Mundas, Lodhas, Bhumijis, Oraon Kherias*) of the region.

Results: The present study enumerates 20 ethnomedicinal plant species belonging to 16 families used by the tribal communities and medicinal healers of Paschim Medinipur district, West Bengal in treatment of snakebite. Each plant species has been listed alphabetically according to its botanical name, family, vernacular name, part(s) used, mode of preparation/administration.

Conclusions: The importance of traditional medicinal system among the tribal communities of Paschim Medinipur district of West Bengal has been highlighted in the present study.

KEYWORDS

Traditional medicinal system, Snakebite, Paschim Medinipur district

1. Introduction

Traditional human populations have a broad natural pharmacopoeia consisting of wild plants and animal species. Ingredients sourced from plants and animals are not only used in traditional medicines, but also increasingly valued as raw materials in the preparation of modern medicines and herbal preparations. The

World Health Organization defines traditional medicines as practices, knowledge, and belief system which uses minerals, plants and animal based remedies, spiritual therapies and exercises to prevent, treat and maintain well being^[1]. A great number of the natural products have come to us from the scientific study of remedies traditionally employed by various cultures. Traditional ecological knowledge is of significance from

*Corresponding author: Dr. Sumana Sarkhel, Assistant Professor, Department of Human Physiology with Community Health, Vidyasagar University, Paschim Medinipur–721102, West India.

Tel: 9051486015

E-mail : sumana.sarkhel@yahoo.co.in

Foundation Project: Supported by UGC in the form of UGC–BSR Start Up grant (S.No: 20–4[17]/2012[BSR] dt 08/03/2013).

Article history:

Received 25 Feb 2014

Received in revised form 2 Mar, 2nd revised form 10 Mar, 3rd revised form 15 Mar 2014

Accepted 21 May 2014

Available online 28 May 2014

Table 1Plants used in treatment of snakebite in *Paschim Medinipur* district, West Bengal

Scientific Name/habit/Voucher Number	Family	Local name	Parts used	Mode of Preparation and administration
<i>Achyranthes aspera</i> L/Herb/SS102	Amaranthaceae	Apang	Roots	The roots are ground and the filtrate is taken with 2–3 black pepper.
<i>Acorus calamus</i> L/Herb/SS101	Acoraceae	Bach	Rhizome	Rhizomes are crushed to paste and given with warm water.
<i>Allium sativum</i> L/Herb/SS103	Amoryllidaceae	Rosun	Bulbs	Bulb is made into paste and given orally.
<i>Andrographis paniculata</i> (Burm f)Wall. Ex. Nees/ Herb/SS106	Acantheceae	Kalmegh	Leaf	Dried leaf is powdered and taken in snakebite.
<i>Aristolochia indica</i> L/climber/SS107	Aristolochiaceae	Ishwarmul	Root	Root is crushed and juice given orally in snake bite.
<i>Azadirachta indica</i> A.Juss/Tree/SS108	Meliaceae	Nim	Leaf	The leaf ash or crushed leaves rubbed into scarifications around the snake bite as antidote and leaf juice is given as decoction.
<i>Calotropis gigantea</i> (L)W. T.Aiton/Shrub/SS111	Apocynaceae	Akanda	Roots,Latex	Root bark is ground into paste and made into pills. Plant latex is applied over the bitten area..
<i>Datura metel</i> L/ Shrub/ SS120	Solanaceae	Dhutura	Root	Extract of roots are taken with garlic in snake bite.
<i>Emblia officinalis</i> Linn/tree/SS122	Phyllanthaceae	Amla	Roots	Root extract is given orally along with black pepper.
<i>Euphorbia nerifolia</i> L/Shrub/SS123	Euphorbiaceae	Manasa	Latex	Latex is applied locally on the wound in snakebite.
<i>Gymnema sylvestre</i> R.Br. /Herb/SS125	Asclepiadaceae	Gurmar	Leaf	Leaf juice is applied on the bitten area soon after bite.
<i>Hemidesmus indicus</i> L. R.Br. /shrub/SS126	Apocynaceae	Anantmula	Roots	Root are ground with bulbs of <i>Allium sativum</i> (1:1). Paste is applied on the bitten areas.
<i>Kalanchoe pinnata</i> (Lam.)Pers/herb/SS129	Crassulaceae	Pathar kuchi	Leaf	1–2 spoons of leaf decoction is given every one hour after snakebite.
<i>Mimosa pudica</i> L/herb/SS132	Fabaceae	Lajjabati lata	Leaf	Leaves are ground and made into paste and applied over affected area.
<i>Moringa oleifera</i> Lam/tree/SS133	Moringaceae	Sajna	Root	Root are made to paste and given orally.
<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz/shrub SS141	Sarpagandha	Root	Apocynaceae	Root paste along with that of <i>Azadirachta indica</i> and black pepper seeds are made into paste and the extract is administered orally soon after bite.
<i>Tamarindus indicus</i> L/Tree/SS142	Fabaceae	Tetul	Seed	The extract of the seed is given in snake bite.
<i>Tinospora cordifolia</i> (Thunb.) Miers /Shrub/SS145	Menispermaceae	Guduchi, Gulanchi	Root	Roots are ground along with that of <i>Rauvolfia serpentina</i> (1:1) and made into pills and administered with warm water.
<i>Vitex negundo</i> L/shrub/SS148	Verbenaceae	Nishindi	Root,Leaf	Leaf paste applied over the bitten area. Root extract is given with warm water.
<i>Winthania somnifera</i> (L)Dunal/Shrub/SS150	Solanaceae	Ashwagandha	Root	Root decoction is administered to snakebite victims.

a conservation perspective and an attribute of societies with a continuity in resource use practice.

Snake bite is a neglected health hazard worldwide[2]. Snakebite data based on diverse methodologies show that global incidence of snakebite is around 5 400 000 bites per year leading to over 2 500 000 envenoming and around 125 000 fatal cases annually[3]. Agricultural and tropical regions report more snake bites than anywhere else. In India alone more than 200 000 cases are reported and it is estimated 35 000 to 50 000 people die each year. Antiserum is the only therapeutic agent available throughout the world. Antiserum contains purified, enzyme-refined and concentrated heterologous immunoglobins. In India, particularly in the rural areas snake bite victims turn to traditional medicine men and healers, due to lack of availability of antiserum. A review of past literature on ethnobotany indicates that ample research work has been done in various parts of the world on herbal antagonists of snake venom[4–9]. In India, medicinal plants have been used to cure specific ailments since ancient times. Plants are primarily used due to their safety, effectiveness, cultural preferences, inexpensiveness and abundant availability. 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[10]. Several medicinal plants with accepted therapeutic values in snake bite treatment are now attracting attention. Recently due to unplanned developmental programs, increasing modern healthcare facilities and impact of modern civilization, natural resources as well as traditional knowledge and tribal cultures are depleting rapidly at an alarming rate. Therefore, it is imperative to explore and document this unique and indigenous, traditional knowledge of the tribal community, before it diminishes with the knowledgeable persons.

Paschim Medinipur is one of the eleven districts of West Bengal (Figuer 1).

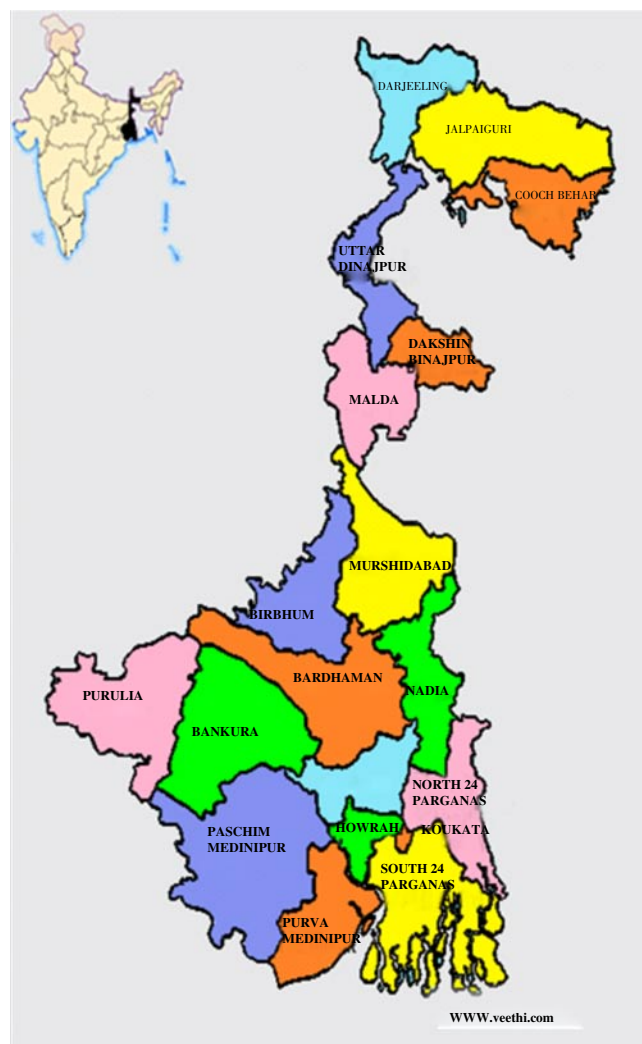


Figure 1. Map of West Bengal.

Geographically located in 21°36'N to 22°57'N and 86°33'E to 88°11'E, it covers an area of 9 345 square kilometres

(Figure 2). North and Northwest of this district is a part of Chotanagpur plateau. The area has a gentle slope from east to west. The flora of this region is constituted predominantly with *sal* of coppice origin and covers 60% of the average area. The usual associates of *sal* in this region are *Pterocarpus marsupium*, *Terminalia arjuna*, *Madhuca latifolia*, *Bombax ceiba*, *Terminalia belerica*. Plantation mainly includes *Eucalyptus*, *Akashmoni*, *Bamboo* and *Kaju*. The tribal communities residing in this region are the *Santhals*, *Mundas*, *Lodhas*, *Bhumijis*, *Oraon* and *Kherias*. This region is characterized by sandy loam or loamy soil of reddish or reddish brown colour. The maximum temperature recorded in April is 45–46 °C and minimum temperature in winter is 6 °C. The average annual rainfall is about 1500 mm. The present work makes an attempt to provide a comprehensive account of some of the Indian medicinal plants used in the treatment of snake bite in Paschim Medinipur district of West Bengal by the tribal communities and traditional healers.



Figure 2. Paschim Medinipur district.

2. Materials and methods

Field investigations were conducted during April 2012

to March 2013 in 8 different villages of Paschim Medinipur district, West Bengal. Ethnobotanical data was collected through individual and Focus Group Discussion interviews using semistructured open-ended questionnaires as proposed in standard literature^[11]. Subjects were selected on the basis of their knowledge pertaining to the use of medicinal plants in tradition. A total of 88 individuals (30–70 years) were interviewed during the survey including medicine men (*ojha*), elder villagers, plant collectors and forest dwellers belonging to four different communities—*Santhal*, *Munda*, *Lodha* and *Oraon*. Interview based field study and guided field work was done, in which the taxonomic diversity, distribution, local names, parts of plants used in treatment of snake bite, preparatory methods and mode of administration of these plants were recorded^[12]. Group discussion were made with the healers and local people to know their perception about the use of traditional folk medicines, awareness about the conservation of phytodiversity and indigenous knowledge. Plant collection was carried out by standard method^[13]. Herbaria were prepared according to conventional herbaria technique^[14]. All the voucher specimens were identified using relevant floras and standard literature^[15] and deposited in the herbarium of the Department of Botany and Forestry, Vidyasagar University, Paschim Medinipur, West Bengal. The collected plants were crosschecked by neighbouring herbalists and traditional medicinal healers. For each species the proportion of informants who independently reported its use in snake bite was assessed following^[16]. Each medicinal practice was cross checked with at least 3 to 4 informants.

3. Results

The present study reports 20 ethnomedicinal plants belonging to 16 families traditionally used for treatment of snakebite by the tribal population of Paschim Medinipur district, West Bengal (Table 1). The plants have been enumerated alphabetically according to their scientific name, habit, local name, family, parts used, mode of preparation and medicinal uses. A high degree of informant consensus for each species was observed.

4. Discussion

The focus of the present study is to provide a comprehensive picture of the medicinal plants with anti snake venom activity that are used by the tribal population of Paschim Medinipur district, West Bengal. Paschim

Medinipur is a repository of floral and faunal resources. It is inhabited by a number of tribal communities like *Santhals*, *Mundas*, *Lodhas*, *Bhumijis*, *Oraon* and *Kherias*. The use of medicinal plants was a chosen practice in this district throughout history, the knowledge of which was gathered through the experience of many generations. The present study documents 20 species of ethnomedicinal plants from 16 families used by the tribal healers and practitioners of the district. Among the plants reported, there are 4 species of trees, 8 species of shrubs, 7 species of herbs and one species of climber. The reported plants are used by more than one ethnic group. The local tribes mainly use leaf, root, bark, rhizome, stem, fruit, seed and latex of these plants as antidote against snakebite. The reported plants are mostly administered as decoction, extracts, paste, juice and poultice. Some of these plants like *Emblica officinalis* Linn^[17], *Azadirachta indica* A. Juss^[18], *Rauwolfia serpentina* (L.) Benth. ex Kurz have been earlier reported to have anti snake venom activity in various ethnomedicinal studies^[19]. In Indian tradition, some plants are supplemented with pepper and garlic for snakebite treatment^[20]. Thus the reported data validates the claims of traditional healers and tribal communities of Paschim Medinipur district regarding the herbal antagonists of snakebite. The consensus among users indicates that plants have protective activity when administered for snake bite. Particularly plants like *Rauwolfia serpentina* (L.) Benth. ex Kurz, *Emblica officinalis* Linn and *Moringa oleifera* Lam have a high consensus agreement regarding their use in snakebite. Thus the present investigation can provide leads for specific venom inhibitory compounds from the reported medicinal plants that could be used in combined therapy with antiserum in the near future.

Snakebite till date remains a public health hazard in tropical countries especially in India. The first antivenom was developed by Albert Calmette, a French scientist of Pasteur Institute in 1895. Due to lack of availability, cost and hypersensitivity, alternative therapy for snakebite has received much attention. Snake bite remedies are of interest since they may have recognizable therapeutic or toxic effects and are steeped in cultural beliefs that invariably conflict with formal health care practices. 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. The present study investigates the ethnomedicinal resources of Paschim Medinipur district of West Bengal to identify the therapeutic potential of some herbal remedies against snake bite. The high degree of consensus among the informants suggests that the current use and knowledge about the plants used in snakebite treatment are still strong. Thus studies exploring pharmacopoeia of unrelated cultures for plants treating specific medical conditions (like snake bites in this study) present one way of validating anecdotal field reports, corroborating and selecting promising lead plants and conservation of potentially threatened species.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgements

Author is grateful to the Head, Department of Human Physiology with Community Health, Vidyasagar University for his encouragement and support. Author is indebted to UGC for financial support received in the form of UGC–BSR Start Up grant(S.No:20–4[17]/2012[BSR] dt 08/03/2013). Author is thankful to all the tribal informants who have participated in this survey and provided their valuable knowledge relevant to this work.

Comments

Background

Use of plant materials for treating human health related complications starts from the very beginning of human civilization. But sometimes particularly in urgent cases like snake bite, systemic toxicity *etc.*, a very quick and specific treatment is necessary. Considering the high death rate of snake bite victims due to lack of scientific knowledge, the present study may give sufficient impact to its concerned field.

Research frontiers

The present study was conducted to investigate and collect information from traditional health healers/tribal communities on the use of medicinal plants for treatment of snake bite. An ethno–medicinal survey was conducted

in 8 villages of the Paschim Medinipur district of West Bengal.

Related reports

The folklore medicine has evidence of treating snake bite victims. It can be understood from the paper that some plants are supplemented with pepper and garlic for snakebite treatment.

Innovations and breakthroughs

The present investigation can provide leads for specific venom inhibitory compounds from the reported medicinal plants that could be used in combined therapy with antiserum in the near future.

Applications

The present study provides a valuable information regarding the future area of research. Particularly plants like *Rauwolfia serpentina* (L.) Benth. ex Kurz, *Embllica officinalis* Linn and *Moringa oleifera* Lam have a high consensus agreement regarding their use in snakebite.

Peer review

This is a valuable survey work in which the author describes the applications of some folklore plants used in treatment of snakebite in Paschim Medinipur district, West Bengal. The study protocol is statically sound and may enrich the knowledge in broader sense.

References

- [1] World Health Organization. Traditional Medicine. Geneva: World Health Organization; 2003. [Online] Available from: <http://www.who.int/mediacentre/factsheets/2003/fs134/en/>. [Accessed on 18th December, 2013].
- [2] Alirol E, Sharma SK, Bawaskar HS, Kuch U, Chappuis F. Snakebite in South Asia: a review. *PLoS Negl Trop Dis* 2010; **4**: e603.
- [3] Kasturiratne A, Wickremasinghe AR, de Silva N, Gunawardena NK, Pathmeswaran A, Premaratna R, et al. The global burden of snakebite: a literature analysis and modeling based on regional estimates of envenoming and deaths. *PLoS Med* 2008; **5**: e218.
- [4] Meenatchisundaram S, Parameswari G, Subbraj T, Michael A. Antivenom activity of medicinal plants—a mini review. *Ethnobot Leaflets* 2008; **12**: 1218–1220.
- [5] Gomes A, Bhattacharya S, Mukherjee S, Tsai IH, Gomes A. Inhibition of toxic actions of phospholipase A2 isolated & characterized from the Indian banded krait (*Bungarus fasciatus*) venom by synthetic herbal compounds. *Indian J Med Res* 2012; **136**: 40–45.
- [6] Pithayanukul P, Leanpolchareanchai J, Bavovada R. Inhibitory effect of tea polyphenols on local tissue damage induced by snake venoms. *Phytother Res* 2010; **Suppl 1**: S56–S62.
- [7] Gomes A, Das R, Sarkhel S, Mishra R, Mukherjee S, Bhattacharyya S, et al. Herbs and herbal constituents active against snakebite. *Indian J Exp Biol* 2010; **48**: 865–878.
- [8] Basha SK, Sudarsanam G. Traditional use of plants against snakebite in Sugali tribes of Yerramalais of Kurnool district, Andhra Pradesh, India. *Asian Pac J Trop Biomed* 2012; **2**(2): S575–S579.
- [9] Kumarappan C, Jaswanth A, Kumarasundari K. Antihaemolytic and snake venom neutralizing effect of some Indian medicinal plants. *Asian Pac J Trop Med* 2011; **4**(9): 743–747.
- [10] Samy RP, Thwin MM, Gopalkrishnakone P, Ignacimuthu S. Ethnobotanical survey of folk plants for treatment of snakebites in southern part of Tamilnadu, India. *J Ethnopharmacol* 2008; **115**(2): 302–312.
- [11] Cotton CM. *Ethnobotany: principles and applications*. New York: John Wiley & Sons; 1996.
- [12] Martin GJ. *Ethnobotany: a methods manual. People and plants international conservation*. Abingdon: Routledge; 1995.
- [13] Jain SK, Rao RR. *A handbook of herbarium methods*. New Delhi: Today and Tomorrow's Printers and Publishers; 1977.
- [14] Mitra JN. *An introduction to systemic botany and ecology*. Kolkata: The World Press Private Limited; 1974, p. 52.
- [15] Kirtikar KR, Basu BD. *Indian medicinal plants*. Allahabad, India: Lalit Mohan Basu Publishers; 1935, p. 1–4.
- [16] Trotter R, Logan M. Informant consensus: a new approach for identifying potentially effective medicinal plants. In: Etkin NL, editor. *Plants in indigenous medicine and diet: biobehavioural approaches*. Abingdon: Routledge; 1986, p. 91–112.
- [17] Sarkhel S, Chakravarthy AK, Das R, Gomes A, Gomes A. A snake venom neutralizing factor from the root extract of *Embllica officinalis* Linn. *Orient Pharm Exp Med* 2011; **11**(1): 25–33.
- [18] Mukherjee AK, Doley R, Saikia D. Isolation of a snake venom phospholipase A2 (PLA2) inhibitor (AIPLAI) from leaves of *Azadirachta indica* (Neem): mechanism of PLA2 inhibition by AIPLAI *in vitro* condition. *Toxicon* 2008; **51**: 1548–1553.
- [19] Dey A, De JN. Ethnobotanical aspects of *Rauwolfia serpentina* (L.) Benth. ex Kurz. in India, Nepal and Bangladesh. *J Med Plants Res* 2011; **5**(2): 144–150.
- [20] Reddy CS, Reddy KN, Murthy EN, Raju VS. Traditional medicinal plants in Seshachalam hills, Andhra Pradesh, India. *J Med Plants Res* 2009; **3**: 408–412.