



ISSN: 2277- 7695

TPI 2015; 4(7): 11-15

© 2015 TPI

www.thepharmajournal.com

Received: 09-07-2015

Accepted: 11-08-2015

**Venkata Narasimha Kadali**

Department of Biotechnology,  
Andhra University,  
Visakhapatnam, Andhra  
Pradesh, India.

**Kameswara Rao K**

Department of Biotechnology,  
Andhra University,  
Visakhapatnam, Andhra  
Pradesh, India.

**BV Sandeep**

Department of Biotechnology,  
Andhra University,  
Visakhapatnam, Andhra  
Pradesh, India.

## Medicinal plants with anti-Snake Venom property-A review

**Venkata Narasimha Kadali, Kameswara Rao K, BV Sandeep**

### Abstract

The aim of the present study is evaluation of various Medicinal Plants used for Anti Venom activity. Snake bite has been the serious issue in India especially in rural areas of India. India has a lot of efficient medicinal Plants which are active against Snake Venoms and they have been using since years by the Traditional Healers. Lot of Medicinal Plants have been tested against various Snake Venoms and they have shown promising results. This article presents review of Medicinal Plants which are active against various Snake Venoms.

**Keywords:** Medicinal Plants, Snake bite, Anti Venom, Traditional Healers.

### Introduction

Snake bites are being considered as a serious issue in India and rest of the World especially in rural areas of India. Higher death rates in India are due to the four poisonous Snakes namely Indian Cobra (*Naja naja*), Saw scaled viper (*Echis carinatus*), Russells viper (*Daboia russelli*) and common Krait (*Bangarus caeruleus*)<sup>[1]</sup>. Due to lack of hospitals in rural areas people tend choose herbal medications from Traditional Healers. Using Anti Venom is the specific treatment available against Snake bite and was developed by Albert Calmette in 1985 against the Indian cobra<sup>[2]</sup>. There are some side effects using Anti Venom and its development is time consuming, expensive and requires ideal storage conditions<sup>[3]</sup>. So alternative approach is the finding effective inhibitors from Plant sources. Herbal Antidote may be an alternative but information on this aspect is still inadequate<sup>[4]</sup>. In Ayurvedic text a number of drugs are mentioned which show Anti venomous effects<sup>[5]</sup>. The present article is a review on Medicinal Plants which have been tested against various Snake Venoms.

### Snake venom

The venom produced by the snakes venom gland apparatus is delivered in to the target tissue from fangs by injection mechanism<sup>[6, 7]</sup>. The venom contains complex mixture of enzymatic and non-enzymatic proteins, peptides and small organic compounds such as citrate, nucleoside and acetylcholine<sup>[8]</sup>.

### Clinical Effects of Snake Venom

The clinical effects of snake bite includes neurotoxicity, cardiotoxicity, coagulant (either pro or anti), hemostatic (either activating or inhibiting), hemorrhagic, hemolytic and edema forming activities<sup>[9]</sup>.

### Medicinal Plants Used Against Snake Venoms

#### *Vitis vinifera*

It belongs to a family Vitaceae. Mahadeswaraswamy Y H *et al.* studied methalolic extract of grapes (*Vitis vinifera* L.) against the Indian Daboia/Vipera russelli venom induced local effects. The extract showed complete inhibition of proteolytic and hyaluronidase activities and also neutralized the hemorrhage, edema-inducing and myonecrotic actions of venom. In addition, the extract showed partial inhibition of pro coagulant activity of the venom and completely abolished the degradation of A $\alpha$  and B $\beta$  chains of human fibrinogen<sup>[10]</sup>.

#### *Anacardium occidentale*

It belongs to a family Anacardiaceae. Ushanandhini S *et al.* studied the ability of bark extract of *Anacardium occidentale* to neutralize enzymatic and pharmacological activities induced by the *Vipera russelli* venom. The extract neutralized the enzymes such as phospholipase, protease and hyaluronidase. It also neutralized pharmacological effects such as edema, hemorrhage and myotoxin effects<sup>[11]</sup>

### Correspondence

**Venkata Narasimha Kadali**

Department of Biotechnology,  
Andhra University,  
Visakhapatnam, Andhra  
Pradesh, India.

***Tamarindus indica***

It belongs to a family Leguminosae. Ushannandini S *et al.* used dried seed extract of *Tamarindus indica* to inhibit the pharmacological as well as enzymatic effects induced by *V. russelli* venom. The seed extract inhibited the PLA<sub>2</sub>, protease, hyaluronidase, L-amino acid oxidase and 5' nucleotidase enzyme activities. The extract also neutralized the degradation of the beta chain of the human fibrinogen and indirect hemolysis caused by venom [12].

***Acalypha indica***

It belongs to a family Euphorbiaceae. Shirwaikar *et al.* used ethanol leaf extract of *Acalypha indica* to inhibit the *Russells viper* venom. The leaf extract inhibited venom induced lethality, hemorrhage, necrotizing and mast cell degranulation in rats and cardiotoxic and neurotoxic effects in isolated frog tissue. The extract also inhibited venom induced-lipid peroxidation in RBC, decreased GSH and catalase levels of rat kidney tissue [13].

***Mangifera indica***

It belongs to the family Anacardiaceae. Dhananjaya B L *et al.* evaluated anti-venom potential of aqueous extract of stem bark of *Mangifera indica* against *Daboia russelli* venom. The extract inhibited phospholipase, protease, hyaluronidase, 5'-nucleotidase, ATPase and phosphomonoesterase activity. The extract significantly inhibited both metalloproteases and serine proteases activities. Further the extract significantly reduced the myotoxicity of the venom. Though the extract completely inhibited *in vitro* PLA<sub>2</sub> activity but unable to completely inhibit *in situ* hemolytic and in *in vivo* edema-inducing activities. In lethality studies, co-injection of the venom pre incubated with extract showed higher protection than the independent injection of venom, followed by the extract in the mice [14].

***Bridelia fergunia***

It belongs to a family Euphorbiaceae. Sanni Momoh *et al.* used ethanol dried leaf extract of *Bridelia fergunia* against the *Naja nigricollis* venom. The effect of extract on some selected enzymes activity in the serum/liver of albino rats induced with the snake venom was studied and the histopathology. The result showed the *Bridelia fergunia* leaf extract has little anti-snake venom activity [15].

***Pluchea indica***

It belongs to the family Asteraceae. Gomes A *et al.* isolated major compound  $\beta$  sitosterol and minor compound stigmasterol from root extract of *Pluchea indica* by silica gel column chromatography. The root compounds were found to neutralize the viper induced lethal, hemorrhagic, defribigenation, edema and PLA<sub>2</sub> activity and cobra venom induced lethality, cardiotoxicity and PLA<sub>2</sub> activity were also antagonized the two compounds [16].

***Clerodendrum viscosum***

It belongs to a family Verbenaceae. This plant traditionally used in India for the treatment of snake bite was evaluated by *in vitro* and *in vivo* studies. While *in vitro* studies were performed using human blood, *in vivo* studies were carried by using mice administered i.p doses of extract, 5 min before the administration of *Naja naja* snake venom. The results of the *in vitro* studies showed that the extract probably interacts with blood but does not stabilize membrane protein. In the *in vivo* studies the extract showed significant anti-snake venom

activity, which may be attributed to possible interaction with the acetylcholine receptor sites. Hence it justifies the traditional use of *Clerodendrum viscosum* as anti-snake venom [17].

***Parkia bigblosa***

It belongs to a family Mimosaceae. Methanol extract of stem bark of *parkia bigblosa* used to reduce the effects of two snake venoms (*Naja nigricollis*, and *Echis ocellatus*) in several experimental models. A water-methanol extract of *P. biglobosa* stem bark significantly ( $p < 0.001$ ) protected the chick biventer cervicis (cbc) muscle preparation from *N. nigricollis* venom-induced inhibition of neurally evoked twitches when it was added to the bath 3-5 min before or after the venom. The extract also reduced the loss of responses to acetylcholine (Ach), carbachol and KCl, which are normally blocked by *N. nigricollis* venom, and significantly reduced the contractures of the preparation induced by venom. *P. biglobosa* extract (75, 150 and 300  $\mu\text{g/ml}$ ) significantly ( $p < 0.05$ ) protected C2C12 murine muscle cells in culture against the cytotoxic effects of *N. nigricollis* and *E. ocellatus* venoms. The extract protected egg embryos exposed to lethal concentrations of *E. ocellatus* venom for more than 12 h and completely blocked the haemorrhagic activity of the venom at concentrations of 5 and 10 microg/1.5 microl. *P. biglobosa* extract (400 mg/kg) did not protect mice injected i.p. with 5 and 2.5 mg/kg of *E. ocellatus* and *N. nigricollis* venoms, respectively. It, however, protected 40% of the mice from death caused by *E. ocellatus* venom after the extract and venom were pre-incubated for 30 min before injecting the mixture [18].

***Croton urucurana***

It belongs to a family Euphorbiaceae. Aqueous extracts of extracts *Croton urucurana* analyzed for anti-*Bothrops jararaca* venom activity. The plant extracts antagonized the hemorrhagic activity of the venom and proanthocyanidins were involved in this activity. This study demonstrates that the rich extracts of proanthocyanidins are powerful inhibitors of bothropic venom metalloproteinase [19].

***Crinum jagus***

It belongs to a family Amaryllidaceae. The metalonic extract of the bulb of *crinum jagus* plant was investigated *in vitro* and *in vivo* against three species *Echis ocellates*, *Bitis arietance* and *Naja nigricollis*. Oral administration of extract (1000 mg/kg) protected 50% of mice, whereas 30 min pre incubated mixture of venom and extract gave 100% protection against lethal effects of *Echis ocellatus* venom (10 mg/kg). *crinum jagus* extract (500 mg/kg) gave 50% protection against *B. arietans* venom (9.5 mg/kg) in mice while pre-incubation of a mixture of same dose of venom and extract (500 mg/kg) gave only 33.3% protection. The pre-incubation of 500mg/kg of *C. jagus* extract with *N. nigricollis* venom (6 mg/ kg) protected 50% of the treated mice [20].

***Argusia argentea***

It belongs to a family Boraginaceae. Aung HT *et al.* proved that the methanolic extract of *Argusia argentea* inhibited the hemorrhage induced by crude venom of *Trimeresurus flavoviridis*. Aung HT *et al.* found the Rosamarinic acid as an active principle in extract by using silica gel column chromatography and HPLC [21].

***Eclipta prostrate***

It belongs to the family Asteraceae. The butanolic extract at 2.5mg per mouse was able to completely neutralize the lethal activity of 2LD<sub>50</sub> malayan pit viper venom, but increasing the dose diminished the effect. The extract at 1.5-4.5 mg per mouse, was able to neutralize the lethality of venom at around 50-58%. Both extracts partially inhibited the hemorrhagic activity but displayed very low anti-phospholipase activity A<sub>2</sub> activity but did not inhibit the proteolytic activity of malayan pit viper venom [22].

***Morus alba***

*Morus alba* plant leaf extract studied against Indian *Vipera/Daboia russelli* venom. The extract completely abolished the *in vitro* proteolytic and hyaluronolytic activities of the venom. Edema, hemorrhage and myonecrotic activities were also neutralized efficiently and partially inhibited the pro-coagulant activity and completely abolished the degradation of A $\alpha$  chain of human fibrinogen [23].

***Vitex nigundo and Emblica officinalis***

Alam MI *et al.* used methanolic extract of *Vitex nigundo* and *Emblica officinalis* for the first time for the anti-snake venom activity. The extract neutralized the lethal activity of *Vipera russelli* and *Naja kaouthia* venom *in vitro* and *in vivo* condition. *V.russelli* venom induced-hemorrhage, coagulant, defibrinogenating and inflammatory activity was completely antagonized by both plant extracts [24].

***Strychnus nux vomica***

The Ethanol seed extract of *Strychnus nux vomica* effectively neutralized the *Daboia russelli* venom induced lethal, hemorrhage, defibrinogenating, PLA<sub>2</sub> enzyme activity and *Naja kaouthia* venom induced lethal, cardiotoxic, neurotoxic and PLA<sub>2</sub> enzyme activity. The seed extract potentiated

polyvalent snake venom antiserum action was significantly potentiated by the active compound [25].

***Andrographis paniculata***

Shade dried stem and leaf parts of the *Andrographis paniculata* were extracted with different solvents on the basis of polarity nature such as petroleum ether (polarity 0), ethyl acetate (4.4), methanol (5.1) and water (9.0). All the four extracts were tested for their anti-venom activity through *in vivo* experiments. Among those methanol extract of *Andrographis paniculata* has shown significant inhibition on neurotoxic symptoms caused by the venom (450  $\mu$ g/kg b.w) and prolonged survival time of mice (22 $\pm$ 2 g) maximum up to 14.44 $\pm$ 0.55h compared to other extracts. This *in vivo* screened active methanol extract was further tested for direct inhibitory on *Naja naja* snake venom major enzymes like; acetyl cholinesterase, hyaluronodase, ATPase, protease and hemolytic activities *in vitro*. In these experiments, the venom was preincubated with different concentrations of *Andrographis paniculata* methanol extract 37 °C for 1 hour before adding to the reaction mixture *in vitro*. The results confirmed that, methanol extract of *Andrographis paniculata* possess potent snake venom inhibitors [26].

***Balanites aegyptiaca***

It belongs to the family Balanitaceae. The stem bark of *Balanites aegyptiaca* was sequentially extracted with hexane, toluene, chloroform, acetone and methanol at room temperature. The effectiveness of acetone and methanol extracts was tested against the *Echis carinatus* venom. Both the extracts were found to be effective at 75 mg/ml and 100 mg/ml concentrations. Phytochemical screening of acetone and methanol extracts revealed the presence of saponins, tannins and volatile oils [27].

**Table 1:** shows the Plants having Anti-Snake Venom activity

S. No	Plant	Family	Part used	Reference
1	<i>Dichorostachys cinerea</i>	Mimosaceae	Root	28
2	<i>Poujolzia indica</i>	Utricaceae	Aerial parts	29
3	<i>Securidaca longipedunculata</i>	Polygalaceae	Root	30
4	<i>Mucuna pruriens</i>	Fabaceae	Seed	31
5	<i>Parinari curatellifolia</i>	Chrysobalanaceae	Root bark	32
6	<i>Sapindus saponaria</i>	Sapindaceae	Callus	33
7	<i>Curcuma longa</i>	Zingiberaceae	Rhizome	34
8	<i>Hemidesmus indicus</i>	Apocynaceae	Root	35
9	<i>Piper longum</i>	Piperaceae	Fruits	36
10	<i>Parkia diglandulosa</i>	Minosaceae	Stem bark	37
11	<i>Guiera senegalensis</i>	Combretaceae	Leaves	38
12	<i>Dipteryx alata</i>	Fabaceae	Bark	39
13	<i>Cordia verbenacea</i>	Boraginaceae	-	40
14	<i>Boswellia dalzielii</i>	Burceraceae	Stem bark	41

**Conclusion**

Now a days the focus has been shifted to the Medicinal plants for the effective drugs against snake bites. It is the responsibility of the scientific community to do much greater work for the effective herbal medications. Traditional healers have been using herbal medications since years to treat snake bites and several other diseases. Lot of information from the traditional healers still to be known and has to be gathered and necessarily formulated [42]. The Pharmaceutical companies should come forward to find a plant based drugs which could inhibit snake venom efficiently.

**Acknowledgement**

Authors wish to thank Professor. B V Sandeep Head of the Department of Biotechnology Andhra University and Dr. Sudhakara Rao Pola, Dr. P. Bindiya for their continuous support.

**References**

- Chatterjee I, Chakravarty AK, Gomes A. *Daboia russellii* and *Naja kaouthia* venom neutralization by lupeol acetate isolated from the root extract of Indian sarsaparilla *Hemidesmus indicus*. Journal of Ethnopharmacology. 2006; 106:38-43.

2. Gomes A, Das R, Sarkhel S, Mishra R, Mukherjee S, Bhattacharya S. Herbs and Herbal constituent active against snake bite. *Indian journal of experimental biology*. 2010; 48:865-878.
3. Meenatchisundaram S, Parameswari G, Subbaraj T, Michael A. Anti-venom activity of medicinal plants-A mini review. *Ethnobotanical Leaflets* 2008; 12:1218-1220.
4. Datta K, Animesh. Snake bite, Snake venom, Anti-venom and Hebal Antidote-A Review. *IJRAP* 2011; 2(4):1060-1067.
5. Kanoja Anitha, Chaudhari Kishor Shivaji, Gothecha Vinod Kumar. Medicinal Plants active against snake envenomation. *IJRAP*, 2012, 3(3).
6. Reptile Venom Research. Australian Reptile Park. Retrieved, 2010.
7. Snakes: A Natural History. New York, NY, USA: Sterling Publishing Co., Inc, 194-209.
8. Arid SD. *Toxicon*, 2002; 40:335-393.
9. Shashidhara murthy R, Jagadeesha DK, Girish KS, Kemparaju K. *Mol Cell Biochem*, 2002-2009, 93-101.
10. Mahadeswaraswamy YH, Devaraja S, Kumar MS, Goutham YN, Kemparaju K. Inhibition of local effects of Indian *Daboia/Vipera russelli* venom by the methanolic extract grape(*Vitis vinifera* L.) seeds. *Indian J Biochem Biophys*. 2009; 46(2):154-160.
11. Ushanandini S, Nagaraju S, Nayaka SC, Kumar KH, Kemparaju K, Girish KS. The anti-ophidian properties of *Anacardium occidentale* bark extract. *Immunopharmacol Immunotoxicol* 2009; 31(4):607-615.
12. Ushanandini S, Nagaraju S, Harish KK, Vedavathi M, Machiah DK, Kemparaju K *et al*. The anti- snake venom properties of *Tamarindus indica* (Leguminosae) seed extract. *Phytother Res* 2006; 20(10):851-858.
13. Shirwaikar A, Rajendran K, Bodla R, Kumar CD. Neutralization potential of *Viper russelli* (Russells viper) venom by ethanolic leaf extract of *Acalypha indica*. *J Ethano pharmacol*. 2004; 94(2-3):267-273.
14. Dhananjaya BS *et al*. Anti-venom potential of stem bark of *Mangifera indica* L against *Daboia russelli* (russells viper) venom. *Ind J Biochem Biophys*. 2011; 48:175-83.
15. Momoh S. Anti-venom activity of ethanolic extract of *Bridelia ferruginea* leaves against najanigricoliis venom. *J Med Res*. 2012; 1(5):69-73.
16. Gomes A. Viper and cobra venom neutralization by  $\beta$ -sitosterol and stigmasterol isolated from the root extract of *Pluchea indica* Less (Asteraceae). *Phytomed* 2007; 14(9):637-43.
17. Lobo R, Punitha ISR, Rajendran K, Shirwaikar A. Shirwaikar Annie. Preliminary study on the anti-snake venom activity of alcoholic root extract of *Clerodendrum viscosum* (vent.) in *Naja naja* venom. *Nat prod Sci* 2006; 12(3):153-156.
18. Asuzu IU, Harvey AL. The antisnake venom activities *Parkia bigblosa* (Mimosaceae) stem bark extract. *Toxicon* 2003; 42(7):763-768.
19. Esmeraldino LE, Souza AM, Sampaio SV. Evaluation of the effect of aqueous extract of *Croton urucurana* Baillon (Euphorbiaceae) on the hemorrhagic activity induced by the venom of *Bothrops jararaca*, new techniques to quantify hemorrhagic activity in rat skin. *Phytomedicine* 2005; 12(8):570-576.
20. Ode OJ, Asuzu IU. The anti nsnake venom activities of the methanolic extract of the bulb of *Crinum jagus* (Amaryllidaceae). *Toxicon* 2006; 48(3):331-342.
21. Aung HT, Toshiaki N, Masatake N, Yoshiaki T. Rosamarinic acid in *Argusia argentea* inhibits snake venom-induced hemorrhage. *J Nat Med*. 2010; 64:482-486.
22. Pithayanukul P, Sasitorn L, Rapepol B, Narumol P, Rutt S. Anti-venom potential of butanolic extract of *Eclipta prostrata* against Malayan pit viper venom, *Journal of Ethnopharmacology* (cited 2003 December 9). 2003; 90:347-352.
23. Chandra shekara KT. Neutralization of local and systemic toxicity of *Daboia russelli* venom by *Morus alba* plant leaf extract, *phytoteherapy Research*. 2009; 23(8):1082-1087.
24. Alum MI, Gomes A. Snake venom neutralization by Indian medicinal plants *Vitex negundo* and *Embllica officinalis* root extracts, *Journal of Ethnopharmacology*. 2003; 86:75-80.
25. Chatterjee I, Chakravarthy AK, Gomes A. Anti-snake venom activity of ethanolic seed extract of *Strychnos nux vomica* linn, *Indian J Exp Biol*. 2004; 42(5):468-475.
26. Kadiyala G. The neutralization effect methanol extract of *Andrographis paniculata* on Indian cobra *Naja naja* snake venom, *Journal of Pharmacy Research*. 2011; 4(4):1010-1012. Available online from [www.jpronline.info](http://www.jpronline.info).
27. Wufem BM, Adamu HM, Cham YA, Kela SL. Preliminary studies on the anti-venin potential and phytochemical analysis of the crude extracts of *Balanites aegyptiaca* (Linn.) Delile on albino rats. *Nat Prod Radiance* 2007; 6(1):18-21.
28. Mishal HB. Screening of anti-snake venom activity of *Dichrostachys cinerea* W. & A. *J Nat Remedies*. 2002; 2(1):92-95.
29. Ahmad A. Anti-snake venom activity of different extracts of *Pouzolzia indica*. *Int J Chem Tech Res*. 2010; 2(1):744-51.
30. Wannang NN. Evaluation of anti-snake venom activity of the aqueous root extract of *Securidaca longipedunculata* in rats. *J Pharm Bioresour*. 2005; 2(2):80-83.
31. Tan NH. The protective effect of *Mucuna pruriens* seeds against snake venom poisoning. *J Ethnopharmacol*. 2009; 123(2):356-58.
32. Amagon K. Anti-snake venom activity of flavonoids from the root barks extract of *Parinari curatellifolia* in mice. *Int J Pharm Res*. 2012; 4(2):55-58.
33. Da-silva ML. Anti-snake venom activities of extracts and fractions from callus cultures of *Sapindus saponaria*. *Pharm Biol* 2012; 50(3):366-75.
34. Ferreira LAF. Antivenom and biological effects of ar-turmerone isolated from *Curcuma longa* (Zingiberaceae). *Toxicon* 1992; 30(10):1211-18.
35. Alam A. Isolation, purification and partial characterization of viper venom inhibiting factor from the root extract of the Indian medicinal plant sarsaparilla (*Hemidesmus indicus* R.Br.) *Toxicon* 1994; 32(12):1551-57.
36. Shenoy PA, Nipate SS. Anti-snake venom activities of ethanolic extract of fruits of *Piper longum* L. (Piperaceae) against Russell's viper venom: characterization of piperine as active principle. *J Ethnopharmacol*. 2013; 147(2):373-82.
37. Asuzu IU, Harvey AL. The antisnake venom activities of *Parkia biglandulosa* (Mimosaceae) stem bark extract. *Toxicon* 2003; 42(7):763-8.
38. Abubakar AS. In vitro snake venom detoxifying action of the leaf extract of *Guiera senegalensis*. *J Ethnopharmacol*.

- 2000; 69(3):253-57.
39. Najato VS, Rubem ML, Vieira NA, Rocha DS, Silva MG, Lopes PS *et al.* In vitro anti-ophidian properties of *Dipteryx alata* Vogel bark extracts. *Molecules* 2010; 15(9):5956-5970.
  40. Ticli FK, Hage LI, Cambraria RS, Pereira PS, Margo AJ, Fontes MR *et al.* Rosamarinic acid, a new snake venom phospholipase A2 inhibitor from *cordia verbenacea* (Boraginaceae): antiserum action potentiation and molecular interaction. *Toxicon* 2005; 46(3):318-327.
  41. Genwa EI, Yero H. The anti-venom potential of stem bark of *Boswelli dalzielli* on saw scaled viper venom. *Chess class J.* 2004; 1:19-23.
  42. Kadali VN, Kindangi KR. Ethno-medicinal plants used by the Traditional healer of West Godavari District, Andhra Pradesh, India. *Journal of pharamacognosy and Phytochemistry.* 2015; 3(6):117-118.