



ANTIVENOM ACTIVITY OF TRADITIONAL HERBAL DRUGS: AN UPDATE

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ABSTRACT

This article contains the review of snake venom which is highly found in Southeast Asia. There are inadequate services, difficult transportation facilities and delay in medical treatment which are the main reasons for the high mortality. There are number of medical plants available locally and used widely by the traditional healers, therefore must give special attention. A wide range of pharmacological properties of herbal drugs and their active principles are evaluated. However, more needs to be studied to get more results.

Keywords: Snake venom, mortality, Treatment, herbal drugs

INTRODUCTION

The mortality rate associated with snake bite is quite high in certain regions of the world. The poisonous group of snakes includes. Ophiophagus Hannah (king cobra), Naja naja (spectacled cobra), Daboia russelli (russell's viper), Bungarus caeruleus (common krait) and Echiscarinatus (saw-scaled viper).¹ The present article is a review on snake venom, snake bite management, anti venom types, side effects of serum therapy and herbal antidote.

Snake venom

Snake venom is highly modified saliva containing zootoxins used by snakes to immobilize and digest prey or to serve as a defence mechanism against a potential predator or other threat. The venom produced by the snakes's venom gland apparatus is delivered by an injection system of modified fangs that enable the venom to penetrate into the target.^{2,3} The glands that secrete the zootoxins are a modification of the parotid salivary gland found in other vertebrates and are usually situated on each side of the head, below and behind the eye and encapsulated in a muscular sheath. The glands have large alveoli in which the synthesized venom is stored before being conveyed by a duct to the base of channelled or tubular fangs through which it is ejected.^{4,5}

Snake Bite Treatment

Two important aspects in snake bite management

1. Proper first aid,
2. Anti venom serum therapy

Proper first aid using herbal formula can effectively reduce the fatalities due to snake bites.

Anti venom Types

Anti venoms basically classified as

- Monovalent type (when they are effective against a given species' venom)
- Polyvalent type (when they are effective against a range of species or several different species at the same time)¹

Side Effects of Antivenom Therapy

- anaphylactic reaction (difficulty in breathing and swallowing; itching; redness of skin; swelling of eyes and face; unusual tiredness or weakness),
- serum sickness (enlargement of lymph glands; fever; inflammation of joints),
- pyrogen reaction-due to increased concentration of non-immunoglobulin proteins available as hyper-immune antivenom.⁶

Anti venom for different species of snake Herbal Antidote

Anti venom activity in herbal plants

Turmeric

Scientific name: *Curcuma longa*

Family: Zingiberaceae

Common name: curcuma, ukon, kunir

English name: Turmeric

Parts used: Root, Rhiz

Uses: skin cancer, Rheumatoid arthritis, Hepatitis

Antivenom Activity

Ferreira conducted a research on a potent antivenom against snake bite. The fraction consisting of ar-turmerone, isolated from *C. longa* L., has the ability to neutralise both the hemorrhagic activity and lethal effect of venom in mice. The result of the study shows ar-turmerone was capable of abolishing the hemorrhagic activity of Bothrops venom and about 70% of the lethal effect of Crotalus venom. Ar-turmerone can act as an enzymatic inhibitor in case of venom enzymes, with proteolytic and hemorrhagic activities.⁷



Figure 1: Turmeric

ANACARDIUM OCCIDENTALE

Scientific name: *Anacardium occidentale*
Family: Anacardiaceae
Common name: cashew apple
English name: cashew-nut
Parts used: nut
Uses: anti-diarrhoeal, anti-fungal activity

Antivenom Activity

Sampath Ushanandini research shows the ability of bark extract of *Anacardium occidentale* to neutralize enzymatic as well as pharmacological effects induced by *Vipera russelii* venom. The bark extract neutralizes the viper venom by hydrolytic enzymes such as phospholipase, protease and hyaluronidase in a dose dependent manner. These enzymes are responsible for both local effects of envenomation. It can be used as an alternative to serum therapy.⁸



Figure 2: *Anacardium occidentale*

HEMIDESMUS INDICUS

Scientific name: *Hemidesmus indicus*
Family: Apocyanaceae
Common name: Hemidesmus, Indian sarsaparilla, East Indian, sarsaparilla.
Parts used: Root
Uses: In autoimmune disease, rheumatoid arthritis, asthma, bronchitis, ulcers

Antivenom Activity

Chatterjee et al conducted a research on methanolic extract of *Hemidesmus indicus* shows significant neutralization by viper-venom induced lethality and hemorrhage activity in albino rat and mouse. Maximum neutralization was achieved as a result of isolated and purified Lupeol acetate from the methanolic extract of *Hemidesmus indicus* which was found to neutralize venom induced action of *Daboia russellii* and *Naja kaouthia* on experimental animals. It neutralizes lethality, hemorrhage, defibrinogention, edema, PLA(2) activity induced by *D. russellii* venom. It also neutralized *N. kaouthia* venom induced lethality, cardiotoxicity, neurotoxicity and respiratory changes in experimental animals.⁹



Figure 3 : *Hemidesmus indicus*

AZADIRACHTA INDICA

Scientific name: *Azadirachta indica*
Family: Meliaceae
Common name: lilac, neem, neem chal
English name: Margosa tree
Parts used: Leaves, Flowers, Seed
Uses: anti-diabetic, anti-bacterial-anti-viral activity, It has blood purifying property..

Antivenom Activity

Mukherjee AK did a research on mentholic leaf extract of *Azadirachta indica* the findings had shown significant inhibition of PLA2 enzymes of cobra and Russell's viper venoms.¹⁰



Figure 4: *Azadirachta indica*

ECHINACEAE PURPUREA

Scientific name: *Echinaceae purpurea*
Family: Asteraceae
Common name: Eastern purple coneflower, purple coneflower, Echinaceae, snake root
Parts used: Roots, Seeds, Flowers
Uses: anti-microbial, anti-fungal, anti-viral, anti-inflammatory action

Antivenom Activity

Rucavado.A conducted research on aqueous extract of *Echinaceae purpurea* when treated with aqueous extract of root act as an adjuvant during immunisation. During first immunisation, the venom injected sub cutaneously(sc) (20^{ug} in 100^{ul} PBS) emulsified in an equal volume of Freund's complete adjuvant(FCA). Following the first immunisation, at two weeks intervals, sc injections of increased amounts of venom (20,40 and 60^{ug} each diluted in 100^{ul} PBS) using as adjuvants either an equal amount of sodium alginate or Echinaceae root extract. From the first immunisation until the first bleeding, it was injected with 100^{ug} of *Echinaceae* extract. Later, Echinaceae dose was increased to 200^{ug} of extract.¹¹



Figure 5: *Echinacea purpurea*

PHYLLANTHUS EMBLICA

Scientific name: *Phyllanthus emblica*

Family: Euphorbiaceae

Common name: amla, emblic, gooseberry, malacca tree

Parts used: fruit

Uses: In diabetes, lowering cholesterol, joint pain, obesity

Antivenom Activity

Mors research on antivenom activity showed the pentacyclic triterpenes (free of glycosides) are found in *Aegle marmelos* which provides nearly 20 % protection against snake venom.¹² Alam MI research proves that the plant extract neutralize the defibrinogenating and inflammatory activity of *Viper russellii* snake venom.¹³



Figure 6: *Phyllanthus Emblica*

MIMOSA PUDICA

Scientific name: *Mimosa pudica*

Family: Mimosoideae

Common name: sensitive plant, shameful plant, humble plant

English name: Touch-me-not plant

Parts used: Roots, Leaves, Flowers

Uses: In leprosy, uterine complaints, dysentery

Antivenom Activity

Mahanta M conducted research on dried root extracts of *Mimosa pudica* to show the antivenom property. The result shows that it has the ability to inhibit the myotoxicity due to *Naja kaouthia* venom.



Figure 7: *Mimosa pudica*

The aqueous root extract of *Mimosa pudica* dose dependently inhibited the hyaluronidase and protease activities of Indian

snakes (*Naja naja*, *Vipera russelii*, and *Echis carinatus*) venom. Aqueous and alcoholic extracts of dried roots of *Mimosa pudica* were tested for their inhibitory activity on lethality, myotoxicity, and toxic enzymes of *Naja kaouthia* venom. The aqueous extract, particularly the normal water extract, shows a significant inhibitory effect on the lethality, myotoxicity, and tested enzyme activities of venom compared with alcoholic extracts. The present findings suggest that an aqueous extract of *Mimosa pudica* root possesses compound(s), which inhibit the activity of cobra venom.¹⁴

CONCLUSION

The Herbal plants have antivenom activity which has minimal side effects than the serum therapy and can be considered as an effective alternative to mammalian antibody production for the treatment of snakebite envenomation. The proper first aid with these plants decreases the mortality rate against snake bite.

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