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Use Of Medicinal Plants In Management Of Hemotoxins Snakebite

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Abstract:- Snakebite is a big problem for public health worldwide, especially in Asia. The main reasons for high death rate are the lack of good healthcare, transportation difficulties, and delays in getting the right treatment. Using traditional medicinal plants could be a solution, as they are widely used by local healers. Sometimes people get entangled in exorcism which is totally superstition and in that situation many of the people loses there life. Nnumerous plants and their active compounds have undergone research for their therapeutic potential. However, there remains a plethora of botanical species awaiting exploration and investigation for their medicinal properties. This article gives an overview of the current situation with medicinal plants for snakebite treatment.

Keywords: Antivenom, Snakebite, Hemotoxins, Russel's viper, Medicinal plant

Introduction:- Snakebite poisoning has a significant impact on people and healthcare systems. It's estimated that millions of bites occur annually, resulting in thousands of deaths and limb amputations. Survivors often experience long-term physical and psychological effects. Snake venom is a complex concoction of proteins, enzymes, carbohydrates, metals, and lipids, among other components. Injected through fangs, it contains active molecules categorized as either hemotoxic or neurotoxic. Hemotoxic venoms from snakes like vipers and rattlesnakes affect blood coagulation and tissue integrity, while neurotoxic venoms from species like mambas, cobras, and corals primarily target the peripheral nervous system, particularly the neuromuscular junction. It's important to note that simplifying venom components into categories like neurotoxins, myotoxins, hemotoxins, or cardiotoxins can be misleading, as these components bind to different receptor sites and impact multiple organ systems. Initially, my investigation centered on the venom produced by Russell's viper, renowned for its ability to induce various harmful effects on the body. These effects include causing low blood pressure (hypotension), triggering a condition known as venom-induced consumption coagulopathy (VICC), directly damaging the kidneys (nephrotoxicity), initiating the breakdown of red blood cells within blood vessels (intravascular hemolysis), and leading to the breakdown of muscle tissue (rhabdomyolysis). Moreover, if a patient manages to survive the initial effects of the venom but subsequently develops gangrene, it can be attributed to the venom of Russell's viper. Snake venom contains a diverse array of components, encompassing

enzymes such as procoagulants, as well as non-enzyme proteins, peptides, carbohydrates, amines, lipids, and metal ions. The effects of Russell's viper venom are far-reaching, affecting various systems within the body including the nervous system, cells, and blood. Regrettably, despite being the sole specific treatment option, antisnake venom (ASV) has limitations in its effectiveness. [11,3]

Family	*Snake species*	Common Name
Elapidae	*Naja naja*	Indian spectacled cobra
	Bangarus caeruleus	Krait
	Ophiophagus hannah	King Cobra
	Naja kaouthia	Monocellate cobra
	Naja oxiana	Central Asian cobra
Viperidae	*Daboia russelii*	Russell's viper
	Echis carinatus	Saw- scaled viper
	Echis sochureki	Sochureki's saw- scaled viper
	Trimeresurus malabaricus	Malabar pit viper

Table 1 Venomous Snake found in India[11]

Type 1 Reactions (early anaphylactic reactions)	Urticaria, rash, itching, dry cough, abdominal colic, fever, nausea, tachycardia, hypotension, bronchospasm, angioedema
Type 2 Reactions (pyrogenic reactions)	Rigor, fever, vasodilatation, hypotension
Late (serum sickness type) reactions	Fever, nausea, vomiting, diarrhea, itching, recurrent urticaria, arthralgia, myalgia,lymphadenopathy, periarticular swellings, mononeuritis multiplex, proteinuria with immune complex nephritis, and rarely encephalopathy rare.

Table 2 Adverse effects caused by Anti Venom Therapy[11]

Plant	Active principle
Mouriri pusa, Byrsonima crassa, Davilla elliptica	Myricetin,quercetin,amenthoflavone
Echinacea sps.	Echinacoside,cichoric acid,ketoalkenes,alkylamides,polysaccharides
Areca catechu, Quercus infectoria, Pentaceburminica,Pithecellobium dulce	Polyphenols
Casearia sylvestris	Ellagic acid
Harpalyce brasiliana	Edunol
Hemidesmus indicus	2-hydroxy-4-methoxy benzoic acid, lupeol acetate
Trichosanthes tricuspidata	Trichotetral,cucurbitane glycosides,cucurbitacins (Tricuspidation, 2-O-glucocucurbitacin,protease etc.)
Pluchea indica	β-sitosterol, stigmasterol
Vitis negundo, Emblica officinalis	Triterpenoids, phthalates
Delonix elata, Mollugo cerviana, Merremia tridentata, Gymnema sylvestre	Alkaloids,steroids,saponins,glycosides, triterpenoids,tannins
Enicostemma axillare, Guiera senegalensis	Tannins
Allium cepa	Sulfurous volatile oils,Quercetin
Cissus assamica	Resverotrol
Eclipta prostrata	Wedelolactone,stigmasterol,sitosterol,D-mannitol
Aristolochia sps.	Aristolochic acid
Cordia verbenacea	Rosmarinic acid
Curcuma longa	Turmerin,Ar-turmerone
Mucuna pruriens, Withania somnifera	Glycoproteins
Ehretia buxifolia	Ehretianone
Strychnos nux-vomica	Amide,caffeic acid
Piper sps.	4-nerolidylcatechol

Table 3 Bioactive compounds extracted from plants employed in the treatment of snakebites [11]

	Plant	Common name English/Hindi	Family
Whole plant	*Andrographis paniculata*	*King of bitters/Chiretta*	*Avanthaceae*
	Eclipta alba	*Trailing eclipta/Bhringaraj*	*Asteraceae*
	Gymnema sylvester	Gymnema/*Kavali*	*Asclepiadaceae*
	Leucas aspera	*Pansi-pansi/Dronapushpi*	*Lamiaceae*
	Mimosa pudica	*Touch-me-not/Lajjavanthi*	*Leguminoceae*
	Pouzolzia indica	*Pouzolz'sbush/Vishakarappan*	*Urticaceae*
	Punica granatum	*Pomegranate/Anar*	*Punicaceae*
Aerial parts	*Viscum articulatatum*	*Leafless Mistletoe/Pudu*	*Loranthaceae*
	Bombax ceba	*Red silk cotton tree/Shalmali*	*Bombacaceae*
Stem	*Ensete edule*	*Banana tree/Kelaa*	*Musaceae*
	Moringa oleifera	*Drum stick tree/Sahjan*	*Moringaceae*
Stem bark	*Alstonia scholaris*	*Dita bark/Satvin*	*Apocyanaceae*
	Bunchanania lanzan	*Chironji tree/Chironji*	*Anacardiaceae*
	Derris scandens	*Jewel vine/Gonj*	*Fabaceae*
	Holarrhena pubescens	*Easter tree/Kadva indrajao*	*Apocyanaceae*
Bark	*Butea monosperma*	*Butea gum tree/Markundi*	*Rubiaceae*
	Pavetta breviflora	*Indian Pavetta/Kankara*	*Rubiaceae*
Leaf	*Abutilon indicum*	*Country mallow/Kanghi*	*Malvaceae*
	Acalypha indica	*Indian nettle/Kuppi*	*Euphorbiaceae*
	Acacia Arabica	*Babul/Keekar*	*Miomosaceae*
	Anona senegalensis	*Wild custard apple/Ramphal*	*Annonaceae*
	Allium cepa	*Onion/Pyaaz*	*Iridaceae*
	Asparagus racemosus	*Wild asparagus/Satmuli*	*Liliaceae*
	Boerhavia diffusa	*Spreading hogwood/Snanthikari*	*Nyctaginaceae*
	Bombax ceba	*Silk cotton tree/Semai*	*Bombacaceae*
	Bryophyllum pinnatum	*Sprout leaf plant/ Zakhm-haiyat*	*Crassulaceae*
	Clitoria ternatea	*Butterfly pea/Aparajita*	*Leguminaceae*
	Erythrina indica	*Coral tree/Pangar*	*Papilionaceae*
	Evolvulus alsinoides	*Dwarfmorning glory/Shankhpushpi*	*Convoluvlaceae*
	Lobelia nicotianifolia	Lobelia/*Dhaval*	*Compunalaceae*
	Moringa oleifera	*Drumstick/Sahijan*	*Moringaceae*
	Tinospora cordifolia	*Heart leaved tinospora/Gudachi*	*Minispermaceae*
Root	*Achyranthus aspera*	*Prickly Chaff-flower/Chirchita*	*Acanthaceae*
	Amaranthus spinosus	*Prickly Amaranth/Kanta Chaulai*	*Amaranthaceae*
	Argemone mexicana	*Prickly poppy/Satyanashi*	*Papaveraceae*
	Cassia tora	*Wild senna/Charota*	*Leguminaceae*
	Cayratia trifolia	*Fox-grape/Amalbel*	*Vitaceae*
	Cissampelos pareira	*Velvet leaf/Patha*	*Menispermaceae*
	Commelina bengalensis	*Bengal day flower/ Kanchara*	*Commelinaceae*
	Emblica officinalis	*Indian gooseberry/Amla*	*Euphorbiaceae*
	Hemidesmus indicus	*Indian sarsaparilla/Anantamuli*	*Asclepiiiclaceae*
	Ophiorrhiza mungos	*Mangoose /Sarhati*	*Rubiaceae*
	Rawfolia serpentina	*Indian snakeroot/Sarpgandha*	*Apocyanaceae*
	Strychnos nux-vomica	*Nux vomica/Kuchla*	*Loganiaceae*
	Tephrosia purpurea	*Wild Indigo/Sarphonk*	*Fabaceae*
	Tabernaemontana divaricata	*East Indian rosebay/Tagar*	*Apocyanaceae*
	Withania somnifera	*Winter cherry/Asgandh*	*Solanaceae*
	Wattakaka volubilis	*Green wax flower/Haran dodi*	*Asclepiadaceae*
Rhizome	*Acorus calamus*	*Sweet flag/Bach*	*Acoraceae*
Tuber	*Allium cepa*	*Onion/Pyaaz*	*Iridaceae*
	Arisaemia tortuosum	*Whipcord cobra lily /Bagh Jandhra*	*Aracaceae*
	Sauromatum venosum	*Voodoo lily/Samp ki bhooti*	*Araceae*
Flower	*Azadirachta indica*	*Margosa tree/Neem*	*Meliaceae*
Seeds	*Vitex negundo*	*Five leaved chaste/Shivari*	*Verbenaceae*
	Nerium oleander	*Oleander/Kaner*	*Apocyanaceae*
Plant latex	*Calotropis gigantea*	*Blue madar/Aka*	*Asclepiadaceae*

Table 4. Botanical remedies utilized in the management of snakebite incidents[11]

Medicinal herbs possessing properties that counteract toxins

Traditional healing practices frequently incorporate the utilization of therapeutic botanicals to address a range of health issues, including the treatment of snakebites. Many traditional healing practices have identified and utilized a vast array of plants with reported antisnake venom activity. In other words, these medicinal plants are believed to have properties that can counteract or mitigate the effects of snake venom.

For avoiding inflammation

Vitis vinifera

The methanolic extract derived from Vitis vinifera L. seeds, commonly known as grapevine, shows promise in alleviating the local effects caused by viperine snake bites. Notably, the extract has exhibited efficacy in counteracting the venom's ability to induce swelling (edema).[12]

Bixa orellana

The ethanolic extract derived from Bixa orellana, also known as annatto and belonging to the annatto tree family, has demonstrated effectiveness in preventing edema induced by Bothrops asper venom.

Strychnos nux-vomica

The plant Strychnos nux-vomica, part of the Loganiaceae family, is employed by tribal groups due to its anti-inflammatory effects against snakebites.[9,15,17]

For coagulation inhibitions

Schizolobium parahyba

Schizolobium parahyba commonly known as the Brazilian fern tree or the pau-ferro, is the biological source of the plant genus Schizolobium, which belongs to the family Fabaceae. Extract from the leaves of Schizolobium parahyba demonstrated significant efficacy in neutralizing the blood clotting, hemorrhagic, and fibrinogen-degrading effects induced by the venoms of Bothrops pauloensis and Crotalus durissus terrificus. [5]

Tamarindus indica

The seeds of Tamarindus indica, commonly known as tamarind and belonging to the Fabaceae family, yield an extract that has exhibited promising results in counteracting viper venom effects in laboratory animals. The extract exhibits properties that effectively counteract venom-induced bleeding, breakdown of red blood cells, and degradation of the Beta chain in human fibrinogen.

Hemidesmus indicus

Extracted organic acid from the roots of Hemidesmus indicus, commonly referred to as Indian sarsaparilla or Anantmool, belonging to the Apocynaceae family, demonstrated significant efficacy in counteracting the detrimental effects induced by viper venom in experimental rodents.. Specifically, when administered to rodents exposed to viper venom, this organic acid effectively countered the venom's actions related to bleeding, blood clotting, and anticoagulation.[4,6,13,16]

Eclipta prostrate

The water-based extract and wedelolactone, a potent 5-lipoxygenase inhibitor derived from Eclipta prostrata, commonly known as False Daisy or Bhringraj and belonging to the Asteraceae family, have displayed anti-hemorrhagic properties. These effects were observed against the venoms of Bothrops jararaca and Bothrops jararacussu, as well as the myotoxins bothropstoxin and crotoxin.[3]

Azadirachta indica

Azadirachta indica, commonly referred to as neem, is a tree that falls under the Meliaceae family. The methanolic leaf extract obtained from Azadirachta indica has demonstrated substantial inhibitory effects on the

phospholipase A2 (PLA2) enzymes found in the venoms of Cobra and Russell's Viper. This suggests that the extract has the capability to effectively hinder the activity of PLA2 enzymes, which are enzymes known for their involvement in the toxic effects of snake venoms.[1,9,19]

Withania somnifera

Withania somnifera, commonly known as Ashwagandha and belonging to the Solanaceae family, is a medicinal plant. A glycoprotein inhibitor isolated from Withania somnifera has been identified and proven effective in cases of cobra and viper bites. This compound exhibits the capability to inhibit the phospholipase A2 (PLA2) activity present in the venom of Naja naja, the Indian cobra.[2,10]

Tamarindus indica

Extracts from Tamarindus indica seeds, commonly referred to as tamarind and belonging to the Fabaceae family, have exhibited robust abilities to counteract snake venom. Specifically, these extracts have demonstrated effective inhibition of the hydrolytic enzymes responsible for the initial effects of Russell's Viper envenomation, including inflammation, local tissue damage, and low blood pressure. Furthermore, they have shown significant efficacy in neutralizing the myotoxic effects induced by Russell's Viper venom.[10]

Curcuma longa

Turmeric, scientifically labeled as Curcuma longa and part of the Zingiberaceae family, has long been utilized traditionally as a remedy for snake bites.[4,5,7,14]

Emblica officinalis

Extract derived from the roots of Emblica officinalis, known as Indian gooseberry or Amla from the Phyllanthaceae family, along with triterpenoids isolated from the same plant, have been observed to effectively counteract the effects induced by the venom of Vipera russelii (Russell's Viper) and Naja kaouthia (Indian Cobra). This neutralizing capability has been validated through both laboratory studies and experiments conducted on living organisms. It is believed that the triterpenoids present in the root extract of Emblica officinalis are instrumental in alleviating the harmful effects caused by these snake species' venom. [6]

Conclusion

In conclusion, snakebite poisoning remains a significant health concern, with millions of incidents occurring annually, resulting in numerous fatalities and long-term complications. Snake venom, comprising a complex mixture of various components, poses challenges for effective treatment. While antisnake venom (ASV) is the primary treatment available, its effectiveness is limited, highlighting the need for alternative therapeutic approaches. Traditional healing practices often utilize medicinal plants with reported antisnake venom activity, showcasing the potential of botanical remedies in mitigating the effects of snake venom. Research has identified several plant extracts with promising anti-inflammatory, anticoagulant, and hemostatic properties, offering potential avenues for the development of adjunct therapies for snakebite management. Further exploration and validation of these botanical remedies are crucial for enhancing snakebite treatment strategies and improving patient outcomes.

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