

Medicinal Plants used for the Treatment of Snake Bite

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ABSTRACT

Snake bites are a serious health risk that results in a high death rate and significant pain for those affected. The treatments are highly intriguing because they can have noticeable healing or harmful effects and are rooted in cultural beliefs that often clash with standard medical practices. Studying how plants and people interact is extremely important for uncovering new herbal remedies and medications derived from plants. The primary goal of this study was to preserve and share the extensive knowledge of herbal remedies used as antivenom in society, with a focus on making this information accessible to the scientific community.

Introduction:

Snake bites were seen as immediate dangers to human life. Maybe, venomous bites present as two fang puncture wounds instead of the typical single bite mark. Snake venom is a remarkable and one-of-a-kind adaptation found in snakes on the animal planet. Venoms are primarily poisonous altered saliva containing a complicated combination of enzymes, which are present in the poisons of snakes worldwide and are known to humans. Generally, there are two categories of toxins: neurotoxins, which affect the central nervous system, and haemotoxins, which impact the circulatory system. Some of the snakes that possess neurotoxic venom are cobras, mambas, sea snakes, kraits, and coral snakes. Some examples of snakes with haemotoxic venom are rattlesnakes, copperheads, and cottonmouths. Many people believe that all snakes are venomous, but out of the 2,700 species of snakes, only around 300 actually possess venom.

Symptoms of poisonous snake bites

The typical signs of venomous snake bites include bleeding from the wound, visible fang punctures on the skin, swelling at the bite area, intense localized pain, diarrhea, burning sensation, seizures, loss of consciousness, lightheadedness, weakness, blurry vision, profuse sweating, fever, heightened thirst, nausea, vomiting, numbness, tingling, and a rapid heartbeat. The venom is primarily produced in unique glands located on the animal's head and is transferred to the prey through a delivery method.

Worldwide people die annually by snake bites

Every year, approximately 30,000 to 40,000 individuals lose their lives to snake bites globally. The majority of these fatalities occur in India, with around 25,000 deaths in rural areas, while 10,000 deaths occur in the United States, and the remainder in other countries. The Wildlife Protection Act of 1972 safeguards snakes and has banned the sale of their skins since 1976. The creation of life-saving anti-venom relies on the critical gathering of snake venom, which is necessary for treating potentially fatal snake bites [1].

Plant medicines used for treatment of snakebites

Having a thorough knowledge of herbal remedies for snakebites is crucial because in many cases, traditional medicine is the only option for treating or easing the symptoms of snakebites. Understanding the scientific basis for utilizing plants in traditional medicine for snakebite treatment is essential, even though it is challenging to research the precise effects of these plants within a traditional framework. In order to determine the scientific rationale behind the use of specific plants as remedies for snakebites, a range of pharmacological studies must be conducted. The research should encompass investigations into the direct anti-venom properties of the plants and their capacity to relieve symptoms, along with understanding the snake species and the impact of its venom. Instead of using plants directly to treat snakebites with topical or oral applications, they can be strategically placed around houses to discourage snakes.



Figure 1: Treatment of snake bite through medicinal plants Plant constituents used to neutralize the effects of snake venoms

Researchers have identified the specific components of the plant that can counteract the harmful effects of snake venom. The management of snake bites with herbal remedies involves using single herbs or combinations to prevent infection, alleviate pain, improve symptoms, restore balance, regulate the immune system, and increase energy for improved health and well-being. The glycoprotein completely blocked the phospholipase A (2) activity of NN-XIa-PLA (2) from cobra venom at a 1:2 ratio, but did not neutralize its toxicity. Nevertheless, it decreased the poison's harmfulness and also extended the lifespan of the test mice by about 10 times in comparison to the venom by itself. The WSG's interaction with the PLA (2) is validated through fluorescence quenching and gel-permeation chromatography [2].

Table No: 1. Medicinal plants traditionally used for the treatment of snakebites

Sr.No	Name of plants	Family of plants	Geographical Source of plants	Part used of plants
1	Aristolochia odoratissima	Aristolochiaceae	Mexico, South America	Leaves
2	Hemidesmus indicus	Asclepiadaceae	Southern India, Srilanka	Roots
3	Echinacea angustifolia and E. Purpurea	Asteraceae	Western USA	Roots, Rhizomes
4	Guiera senegalensis	Combretaceae	West and Central Africa	Leaves
5	Cissus assamica	Vitaceae	India, China, Thailand, Pakistan	Leaves
6	Withania somnifera	Solanaceae	India, Pakistan	Roots
7	Parkia biglobosa	Leguminosae	Nigeria	Stem Bark
8	Thea sinensis	Theaceae	India, Pakistan	Leaves
9	Securidaca longipedunculata	Polypodaceae	Nigeria, Asia	Roots
10	Trianosperma tayuya	Cucurbitaceae	Brazil, Pakistan, India	Roots
11	Tamarindus indica	Papilionaceae	India, Africa, Sudan	Unripe fruits, Ripe pods
12	Tinospora cordifolia	Menispermaceae	Indian subcontinent, Southeast Asia, Pakistan	Stem and Roots

13	Curcuma longa	Zingiberaceae	South Asia, Southeast Asia	Rhizomes
14	Azadirachta indica	Meliaceae	Indian, Pakistan, subcontinent, Southeast Asia	Leaves, Oil
15	Aloe vera	Xanthorrhoeaceae	Native to Arabian Peninsula, widely cultivated	Gel from Leaves
16	Eclipta alba	Asteraceae	Indian, Pakistan, subcontinent, Southeast Asia	Leaves

If someone is bitten by a venomous snake, the most important steps are to:

After being bitten by a snake, it is essential to prioritize seeking immediate medical help, as professional medical treatment is crucial for managing the effects of snake venom. Nevertheless, there are some basic principles to adhere to in order to safeguard the victim's body while waiting for medical assistance.

1. Seek immediate medical attention.
2. Keep the bitten limb immobilized to slow the spread of venom.
3. Do not try to suck out the venom or cut the wound.
4. Do not apply a tourniquet.
5. Do not use ice or apply a cold compress.
6. Do not consume alcohol, as it can exacerbate the effects of venom.
7. Record the time of the bite, if possible, and take note of any symptoms.
8. Transport to Medical Facility [3].

Table No: 2. Venomous snakes found in Pakistan

Sr. No	Snake Name	Family	Geographical Source	Poison Name(s)	Signs and Symptoms
1	Indian Cobra (Naja naja)	Elapidae	Throughout Pakistan, but more common in the southern regions	Neurotoxic venom	Local pain, swelling, paralysis, respiratory distress, blurred vision, drooping eyelids.
2	Russell's Viper (Daboia russelii)	Viperidae	Common in the northern, western, and southern regions of Pakistan	Hemotoxic venom, some neurotoxic components	Local pain, swelling, bleeding, coagulopathy, kidney damage, hypotension.
3	Saw-scaled Viper (Echis spp.)	Viperidae	Southern and western regions of Pakistan	Hemotoxic venom	Local pain, swelling, bleeding, coagulopathy, renal failure.
4	Levant Viper (Macrovipera lebetina)	Viperidae	Northwestern and northern regions of Pakistan	Hemotoxic venom	Local pain, swelling, bleeding, coagulopathy, kidney damage.
5	Indian Krait (Bungarus spp.)	Elapidae	Widespread in Pakistan, especially in the northern and eastern regions	Neurotoxic venom	Paralysis, respiratory distress, blurred vision, drowsiness, drooping eyelids.
6	Saw-scaled Viper (Echis spp.)	Viperidae	Southern and western regions of Pakistan	Hemotoxic venom	Local pain, swelling, bleeding, coagulopathy, renal failure.

Mechanisms by which snake venoms affect the body

Bite and Venom Injection

The amount of venom a snake releases varies depending on its species, size, and biting technique. The toxin often causes quick and specific reactions in the area where the bite took place. These symptoms may include feelings of pain, swelling, frustration, and harm to the tissue. The severity of the symptoms at the bite location varies depending on the type and quantity of venom that is delivered. The speed at which this occurs depends on factors like the person's blood circulation and the properties of the toxin. The venom interacts specifically with certain tissues and bodily systems. The various snake venoms have varying effects on the nervous system, blood circulation, and cells and tissues. The harmful effects of the venom can cause interference with nerve signal transmission, leading to neurotoxic envenomation. This could lead to decreased muscle strength, impaired motor skills, and breathing difficulties. Hemotoxins may disrupt the body's blood clotting process, leading to potential coagulation complications. This has the capability to result in both internal and external hemorrhaging. Cytotoxins cause harm to

the surrounding tissue at the site of the bite, leading to pain, swelling, and tissue decay. Systemic responses can occur when the venom spreads throughout the body. Myotoxins can lead to muscle pain, weakness, and deterioration of muscle tissue. The existence of myoglobin in the blood can pose a risk to kidney health. Cardiotoxins have the ability to affect the heart by causing irregular heartbeats or possibly precipitating cardiac arrest in some cases. Toxins that impact the kidneys can lead to damage, resulting in either abrupt kidney damage or total kidney dysfunction. The signs of snake bite may not become apparent until several hours or even days following the incident. For example, it might not be immediately apparent that there is kidney damage due to the release of myoglobin, and it could take some time for the damage to show up. The most effective treatment for snakebite poisoning is antivenom therapy. Antivenom is administered to neutralize the impact of venom by binding to the venom toxins and assisting in their removal from the body [4].

Table No: 5. Vaccination against venomous snakes

Sr. No	Snake Name	Venom Type	Vaccination
1	Indian Cobra (Naja naja)	Neurotoxic venom	Polyvalent
2	Russell's Viper (Daboia russelii)	Hemotoxic venom	Polyvalent
3	Saw-scaled Viper (Echis)	Hemotoxic venom	Polyvalent
4	King Cobra (Ophiophagus hannah)	Neurotoxic venom	Monovalent
5	Black Mamba (Dendroaspis polylepis)	Neurotoxic venom	Polyvalent
6	Taipan (Oxyuranus)	Highly neurotoxic venom	Monovalent

Conclusion

This review showcases the gathering of a limited selection of plants from their natural habitats spanning millennia, proving their effectiveness in treating snake bites. I am wholeheartedly dedicated to producing a comprehensive report that honors the contributions of all the scientists involved in the exploration of this subject. The review shows that the physiological impact of treating snake bites is significantly greater when using a combination of plant extracts compared to using individual extracts alone. The wide variety of medicinal plants with antivenom properties in the herbal world is a strong example of the importance of herbal medicine.

References

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