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A Review on Anti Venom Activity

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A B S T R A C T
Snake bite is a serious health hazard occurs throughout the world especially in tropical countries like India. This problem is more severe in the rural parts, the use of plant based drugs throughout the world. For the last century anti-serum are the only available specific treatments. However anti-serum does not provide enough protection against venom induced haemorrhage, necrosis and nephrotoxicity and often develops hypersensitivity reactions. There are four common venomous snakes found in India. They are commonly cobra Najanaja, common krait, resell's viper and saw scaled viper. The present study aims to provide a scientific explanation for the use of this antivenom activity in various diseases & it plays a major role in now a days.

Keywords: *anti venom, Snake bite, anti venom activity*

A R T I C L E I N F O

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Contents

1. Introduction

Anti-venom is a medicine that is given to stop snake venom from binding to tissues and causing serious blood, tissue, or nervous system problems. Side effects from antivenom can include rash, itching, wheezing, rapid heart rate, fever, and body aches. The use of antivenom depends on how much poison was injected and the type and size of the snake. Large snakes tend to inject more venom than smaller snakes do. Antivenom is used for mild, moderate, and severe envenomation. The use of antivenom depends on how much poison was injected and the type and size of the snake. (*Hifumi T)*. Antivenom is used for mild, moderate, and severe envenomations and they are:

- Dry bites (no venom injected) do not need to be treated with antivenom.
- Mild envenomation bites may cause mild symptoms, such as slight bleeding, pain, and swelling at the bite.
- Moderate envenomations are more likely to cause symptoms of severe pain, swelling of the whole limb, and general feelings of illness, such as nausea, vomiting, and weakness.
- Severe envenomation symptoms include severe pain, severe swelling, difficulty breathing, moderate to severe bleeding, and signs of shock.

Snake Bite:

A snake bite is an injury caused by a snake, often resulting in puncture wounds inflicted by the animal's frangs and

sometimes resulting in envenomation. Although majority of snake species are non-venomous and typically kill their prey with constriction rather than venom, venomous snakes (15% out of 3000 known species).

2. Classification of antivenomes

Antivenomes can be classified into monovalent (when they are effective against a single species' venom) or polyvalent (when they are effective against a range of species, or several different species at the same time). The first antivenom for snakes (called an anti-ophidic serum) was developed by Albert Calmette, a French scientist of the Pasteur Institute working at its Indochine branch in 1895, against the Indian Cobra (*Najanaja*). In 1901, Vital Brazil, working at the Institute of Butantan in São Paulo, Brazil, developed the first monovalent and polyvalent antivenomes for Central and South American *Crotalus*. (Kasturiratne A)

Manufacturing & production of antivenom:

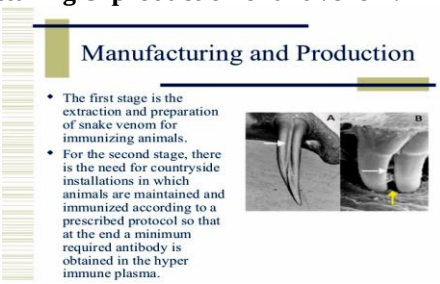

Figure 1: Manufacturing & production of antivenom

Antivenom treatment of snake envenomation & its limitation: The most common and effective method of treating snake bite victims is through antivenom, a serum made from the venom of the snake. Antivenomes, in most countries are costly and may be in limited supply. Antivenoms for therapeutic use are often preserved as freeze-dried ampoules, but some are available only in liquid form and must be kept refrigerated. The majority of snake antivenoms are administered intravenously. (Pithayanukul P). The intramuscular route has been questioned in some situations as they are not uniformly effective. Antivenom should be given as quickly as possible so that the venom's side effects can be managed. Antivenom should be given only if the range of specificity is stated which includes the species known or through to have been responsible for the bite. Liquid antivenom that turned opaque should not be used because precipitation of protein indicates loss of activity which is directly proportional to increased risk of reactions. (Mukherjee AK)

Purification of antivenomes:

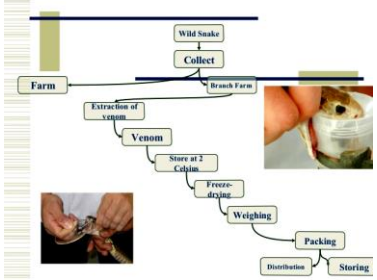

Figure 2: Purification anti venoms

Snake venom and its components:

Snake venom is highly modified saliva containing zootoxins which facilitates the immobilization and digestion of prey, and defends against threats. It is injected by unique fangs after a bite, and some species are also able to spit. 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 chanelled or tubular fangs through which it is ejected. Venoms contain more than 20 different compounds, mostly proteins and polypeptides. A complex mixture of proteins, enzymes, and various other substances with toxic and lethal properties serves to immobilize the prey animal, enzymes play an important role in the digestion of prey and various other substances are responsible for important but non-lethal biological effects. (Parikh CK)

Evolution of snake venom:

The mechanism of evolution in most cases has been gene duplication in tissues unrelated to the venom, followed by expression of the new protein in the venom gland. The study of venom evolution has been a high priority for scientists in terms of scientific research. This is due to medical relevance of snake venom, in terms of making anti-venom and cancer research. The more that is known about the composition of venom and the ways it can potentially evolve is very beneficial. (Meenatchisundaram S)

3. Medical uses

The dangerous effect of snake venom on humans is well known, but there are also many medicinal uses of snake venom, this specialized saliva.

Excessive bleeding:

A blood-clotting protein in Taipan venom has been found to stop excessive bleeding during surgery or after major trauma.

Stroke:

Components of Malayan Pit Viper venom has shown potential for breaking blood clots and treating stroke victims.

Neurological diseases: Enzymes from cobra venom may be instrumental to finding cures for Parkinson's disease and Alzheimer's disease. (Ushanandini S)

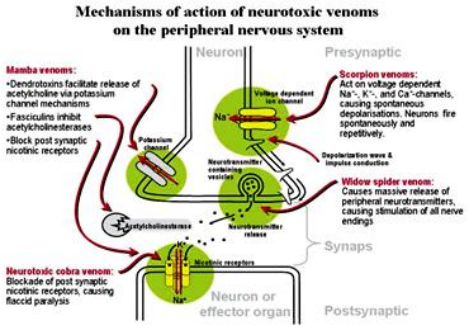

Figure 3: Mechanism action of neurotoxic venoms on the peripheral nervous system

Cancer (various types):

An enzyme derived from copperhead venom could be used to treatment for breast cancer.

Recent advancements in the role of snake venom for cancer therapy: Component of snake venom has demonstrated its ability to inhibit cancer cell migration in two different cancer models. The protein, called contortrostatin, seems to block cell migration in a novel way. Using venom to treat cancer is not as simple as injecting these proteins into a patient, which could actually be quite dangerous. A courier is needed to deliver the protein right to the cancer cells. (Zhang L)

Snake Venoms with Antiviral Properties

The bio molecules that constitute snake venoms have great therapeutic potential. Recently published studies report the existence of snake venom fractions with an antiviral effect. Replication of the measles virus was inhibited in Vero cells when the venom was added either prior to or during cell infection by the virus. The concentrations that successfully inhibited replication of the measles virus were 0.1µg/mL and 100µg/ml, respectively. Four cytotoxins isolated from *Naja nigrocollis* snake venom also showed that cells infected by the virus were ten times more susceptible to the cytotoxic action of the venom when compared to normal cells. Therefore, the study showed the clinical importance of the selective destruction of cells infected with the Sendai virus by the venom. L-amino acid oxidases (LAAO), flavoenzymes obtained from the venom of *Bothrops jararaca*, were found to show antiviral activity against the dengue virus. In a recent study, in cells infected with the dengue type 3 virus (DENV-3) and treated with LAAO isolated from the venom of *Bothrops jararaca*, there was a reduction in viral load compared to cells infected with the same virus and not treated with enzymes from the venom. (Aguiyi J C). Immunokine, an oxidized derivative of the α-toxin extracted from *Naja siamensis* snake venom has shown to inhibit the infection of lymphocytes by HIV and feline immunodeficiency virus (FIV) through the chemokine receptors CCR5 and CXCR4 (47). A group of investigators in Asia reported a remarkable similarity between the 164-174 sequence of the short segment of gp120 of HIV-1 and 30-40 amino acid residues of the long-chain neurotoxins in the venom of snakes such as *Naja siamensis* and *Bungarus multicinctus*. Therefore, both are able to compete for the same receptor or HIV binding site. Venom PLA_2 protects the primary leukocytes in human blood from the replication of HIV-1. (Pithayanukul P).

4. Conclusion

Snake venoms are the complex mixtures of several biologically active proteins, peptides, enzymes, and organic and inorganic compounds. Venom from snakes is an important agent for curing many types of cancers. It has been reviewed through many articles that snake venom acts by inhibiting cell proliferation and promoting cell death by different means. Snake venoms contain a vast array of components, the majority of which act on the peripheral nervous system for killing or immobilizing prey. We can anticipate the development of a new agent from snake venoms in the future which will be useful in cancer therapy.

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