



INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK

REVIEW ON: SNAKE VENOM AS BIOMEDICAL, THERAPEUTIC POTENTIAL

ASHISH D GURNULE, RAGHUNANDAN P NIMKANDE

Institute of Pharmaceutical Education and Research, Borgaon (Meghe), Wardha.

Accepted Date: 27/02/2014 ; Published Date: 01/05/2014

Abstract: Snake venoms although, it is poisonous to animals and humans. It can be use as source of bioactive molecules which can be used for treatment of various diseases. Snake venom is composed of toxic and non-toxic proteins, peptides, lipids; amines along with it also contain serine peptides, metalloproteinase, c-type lectin and phospholipases. Venom can be used by purification to remove the toxic moiety, the present review focused on isolation, purification and composition of snake venoms with their medicinal uses in treatment of various diseases.

Keywords: Snake venom, cobra venom, medicinal use of snake venom, isolation of snake venom.



PAPER-QR CODE

Corresponding Author: MR. ASHISH D GURNULE

Access Online On:

www.ijpret.com

How to Cite This Article:

Ashish Gurnule, IJPRET, 2014; Volume 2 (9): 217-223

INTRODUCTION

In the field of biomedicine there is significant importance of reptile snake venom, venom is liquid portion secreted by salivary gland of snake. Among the various snake the some snake are poisonous as their venom shows toxicity on animal and humans. Along with thus toxic venom are also shows the therapeutic application in biomedical field. Venomous snake are found in higher altitude area about 4000 m in Himalaya and America. As snake is cold blooded reptiles they require cold temperature to live.

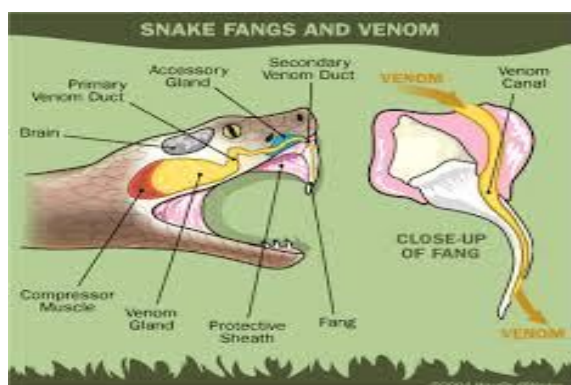
Types of snakes:³

Around 2650 species of snake are found in world. Snake family like viperidae (vipers, pitviper), Cobras, mambas, coral (Elapidae), barrowing (Atractaspid), boomslang (dispholidustypes), Twing snake(Thelotornis), Asian yamakagashi (Rhabdopis Tigrinus), Coral snake (Micrurus, Surinamensis), Rattle snake(Sis trurus catenatus), American viper (Bathzops Jararaca), Tree snake (Dipsudoboa viridis), Kingcobra (Ophiophagus), King-brown (Pseudechis rossignoli), Water cobra (Naja annulata).

COMPOSITION OF SNAKE VENOM:^{4,5,6,7}

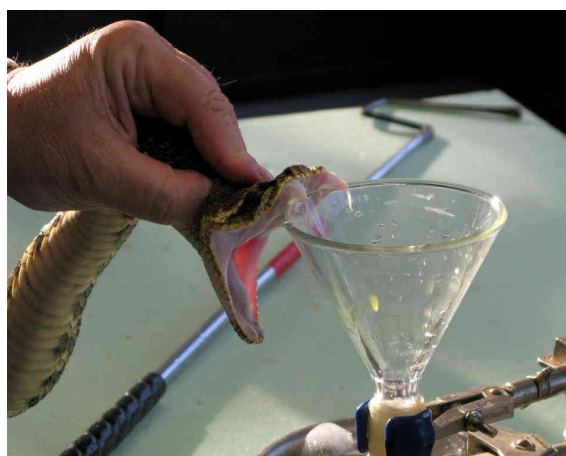
Snake venom composed of several toxic, nontoxic, biomedical components like serine protease, hepatopeptide, hyoluronidase, metaloproteinease, acetyl cholinesterase, endopeptide, myotoxin Phosphodiesterase and monoesterase,L-amino acid oxidase, phospholipase, metal ion, carbohydrate, lipid, citrate salt, calcium, magnesium, potassium etc.

CHARACTERISTICS OF VENOMS:⁶



Venom is yellow, green or colourless liquid. It is week acidic or neutral will become alkaline. Venom has bitter taste and contain about 50-75% of water.

VENOM COLLECTION: ⁸



The snake venom is collected by its bite to synthetic sheet covered around sterile vials by pressing venom gland. The venom is mixed with sterile water and stored at -20°C in deep freezer.

TEST FOR DETECTION OF SNAKE VENOM: ⁹

The further test has been used to detect snake venom toxins, antibodies. The method is Bioassay, immunodiffusion, immnoelectrophoresis, immunofluorescence, haemagglutination, radioimmunoassay (RIA), enzyme linked immnosorbant assay (ELISA), hybridoma and affinity chromatography technique.

MEDICINAL USES OF SNAKE VENOM: ^{4, 8, 10, 11}

Therapeutic use of snake venom is varies with variety of snakes, as the venom composition changes with snakes. In the following disease snake venom is therapeutically effective.

Disease	Type of snake	Therapeuticaly effective content of snake venom.	Mecha-nism of action
Anticancer	Vipera leben tina turnica	Integrin	Inhibit NF-KB& STAT3by inhibition p50&p65tanslocation
antimicrobial	Trimeresurus stejneri	BMCEO,F1,F2,F3	Inhibit microbial growth
anti-inflammatory	Naja naja	URCTC-310-onco	Act on alpha-subunit Nm receptor and block nerve

antihypertensive	Bothzops jaracasa	Captopril	impulse. ACE inhibitor
Coronary syndrome	Sistrus milliarus borbori	Eptifibatide	Platelets aggregation
Arterial fibrillation	Cobra	Exanta	Thrombin inhibitor
Ischemia	Echis carinatus	Tirofiban	GPII b-IIIa inhibitor
Ischemic stroke	Agkistrodon contotix	Alfimeprase	Thrombo-lytic
haemorrhage	Agkistrodon rhodostomo	Viprinex	Thrombo-lytic activity

Table no-1: Medicinal use of Snake venom

VENOM PURIFICATION:^{8, 11}

Ion exchange chromatography:

Venom of snake was dissolved in phosphate buffer PH 7.4 and applied to DEAE sephadex A-25 column and eluted same buffer with linear gradient of NaCl solution column eluted and collected in one micro liter tube using fraction collector.

Reverse phase HPLC (RP-HPLC) method:

In RP-HPLC method protein are synthesized on the basis of hydrophobic nature. The lyophilized venom dissolved and equilibrated with TFA (Tri fluoro acetic acid) solution. The proteins are eluted with gradient of acetonitrile by gradually increase percent of solution B and monitored at 215, 250 and 280 nm.

Brod ford dye binding method:

Determine the protein by using bovine immunoglobulin as standard.

SDS (sodium dodecyl sulphate) polyacrylamide gel electrophoresis:

SDS contain negative (-ve) charge it bind to solution protein make them negative charge polypeptide chain bind to SDS as molecular weight of peptide separation will be done.

DIFFERENT ENZYMES IN SNAKE VENOM:¹²

Rusell FE et.al.found to be presence of different enzymes in north American snake venom.

Name of enzymes	Types of snake venom
Proteolytic, L-amino acid oxidase	Crotalus, sistrurus, agkistrodon
Arginin ester Hydrolase, Thrombin, Collagenase, 5-nucleotidase, Phosphodiesterase	Crotalus, agkistrodon
Hyaluronidase, Phosphomonoesterase, RNase, DNase	Crotalus
NAD- nucleotidase	Agkistrodon
Phospholypase-A2	Crotalus, agkistrodon, Micrurus

Table no-2: Enzymes in Snake venom

NOVEL DERIVED SNAKE VENOM AND PROTEINS: ^{13, 14, 15}

The recent research on snake venom has come up with some novel snake venom and proteins from previously known venom of snakes.

- 1) The protein transcriptome proteome obtained from Drysdalia coronoides, Veficolins obtained from cereberus rynchops shows platelet aggregation which is separated by HPLC and mass spectroscopic method.
- 2) Serine proteinase from Trimeresurus stejnejeri interferes with Haemostatic mechanism.
- 3) New toxins include Calciseptine is a Hypotensive peptide, acanthin; Hannalgisin is an analgesic peptide, trocarin show anticonvulsant activity.
- 4) Three finger toxin- Condoxin Bucandin, Bulangin, Colubritoxin, Hemextins, b-carditoxin, Boigatoxin.
- 5) Ohanin from King cobra produces hypolocomotion and hyperalgesia.
- 6) Cotrostatin from southern copperhead which inhibited complex signal transduction pathway.

CONCLUSION:

Different species of snake are found on earth their venom is evaluated that a potential approach in treatment of various diseases, at venom is sources of enzymes their biomedical application in future will be used in treatment of diseases.

REFERENCES:

1. Jain D and Kumar S. Snake venom: Potent anticancer agent. *Asian Pac J Can Prev*, 2012; 13(10): 4855.
2. Warrell DA. Snakebite Nuffield Department of clinical medicine university of Oxford, John Radcliff Hospital Oxford, UK, *lancet*. 2010;375:77-88.
3. Vonk FJ, Jackson K, Doley R Madaras F, Mirtschin PJ and Vidal N. chapter 2: Snake venom: from fieldwork to the clinic, 2011; 33:269-79.
4. Omar H. The biological and medical significance of poisonous animal. *J Biol Earth Sci*, 2013; 3(1) M25-M41
5. Kaushik A, Ambesahir A, Kaushik J, Girmay B. et al. Snake venom Neutralization effect African medicinal plants and their impact on snakebite: A review, *Asian J Biomed Pharm Sci*. 2013;3(24):01-06.
6. Joseph B, Raj S, Edwin B, Sankarganesh P et al. pharmacognotic snake venom, *Asian J Bio Sci*, 2011, DOI: 10.3923/ajbs, 2011.
7. Ashurst J and Cannon R. Gila monster Envenomation: A review for the Emergency medicine physician *JMED Research*.2013.DOI-10.5171/2013.
8. Chellapaudi P and Jebakumar S. Purification and Antibacterial of Indian cobra viper venoms, *Electronic J Biol*, 2008; 4(1):11-16.
9. Makhija I, Khamar D. Anti-snake venom properties of medicinal plants, *Der Pharmacia Lett*, 2010, 2(5):399-411.
10. Soares A, Use of snake venom for biomedical researches and drug development, *Biochemistry and Biotechnology*, 2012, vol.2
11. Ruan Y, Yao L, Zhang B, Zhang S and Gau J et al. Anti-inflammatory effects of neurotoxin-Nna, a peptide separated from the venom of *Naja naja atra*, *BMC Complementary & Alternative Medicine*, 2013, 13:86
12. Gold B, Barish R, Dart R. North American snake Envenomation: diagnosis, treatment and management, *Emerg med Clin N Am*, 2004, 22:423-443

13. University Southern California (USC) Keck School of medicine (Loss Angeles). Bioresearch online, 2000; Dec 13. Available from; (<http://prodimages.vertmarkets.com/image/c97256d1/c97256d1-d115-11d4-8c88-009027de0829/original/snake.jpg>).

14. Kini RM Novel toxins from snake venoms, Department of Biological Sciences faculty of Science, National University of Singapore.

15. Pung YF, Kumar PP, Wong P, Hodgson WC, Kini RM et.al Ohanian a Novel Protein from King cobra venom, induces Hypolocomotion and Hyperalgesia in mice, J B chem, Jan 2005;280:13137-13147.