A REVIEW ON SNAKE VENOM: AN UNREVEALED MEDICINE FOR HUMAN AILMENTS: GREAT SCOPE FOR PHARMACEUTICAL RESEARCH

Kadu Amol Sudhakar 1, Asutkar Rupali Dumantraj 2, Chalak Sonali 3

1 Assistant Professor, PG department of Agad tantra, Mahatma Gandhi Ayurved College, Hospital & Research Centre, Salod (H) Wardha, Maharashtra, India
2 Assistant Professor, PG department of Dryvaguna, Mahatma Gandhi Ayurved College, Hospital & Research Centre, Salod (H) Wardha, Maharashtra, India
3 Associate Professor, PG department of Agad tantra, Mahatma Gandhi Ayurved College, Hospital & Research Centre, Salod (H) Wardha, Maharashtra, India

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*Corresponding author
E-mail: dramolkaduuy@gmail.com

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ABSTRACT

Snake venom is the poisonous secretion (saliva), ejected from the poison apparatus of a poisonous snake, during the act of biting. Venoms of the different species of poisonous snakes are complex mixture of a number of proteins, toxic substances or toxins, peptides, enzymes, and non-protein inclusions in varying proportion. Snake venom is harmless if ingested in liquid or crystal form after drying through mouth and it will be excreted unchanged. It produces toxicity only if contacted with blood. This is very well understood by Ayurveda. Therapeutic use of snake venom in various diseases have been explored by Acharya Vagbhatra in 48th chapter of Uttarantra of Ashtanga Sangraha, i.e. “Vishopayogiyas Adhyaya.” Forty-seven different Formulations have been mentioned by Acharya Vigbhatra in which snake venom is pertinently used with other Ayurvedic herbal drugs. Since last two decades, various researches explore the therapeutic potential of snake venom in various diseases like diabetes, high blood pressure, stroke, Neurological diseases such as Parkinson's disease and Alzheimer's disease, Cancer (various types), aging, skin diseases, excessive bleeding condition etc. Current review sums up the therapeutic use of snake venom which is mentioned in Ayurveda as well as in contemporary science which provide new thoughts in field of pharmaceutical research where the use of snake venom is beautifully understood by our ancient Acharyas.

Keywords: Snake venom, Ayurveda, Pharmaceutical research

INTRODUCTION

Snake venom is the poisonous secretion (saliva), ejected from the poison apparatus (modified parotid gland) of a poisonous snake, during the act of biting. Venoms of the different species of poisonous snakes are complex mixture of a number of proteins, toxic substances or toxins, peptides, enzymes, and non-protein inclusions in varying proportion. It is a unique physiological product of nature having mixtures of different substances, which are highly specific and have great affinity for different crucial and essential functional organization of cells and tissues. It is over sixty years since it was first realized that the physiologically active components of snake venoms might have therapeutic potential. But therapeutic use of snake venom in various diseases has been beenutifully mentioned by our Ancient Acharyas, where they used snake venom as medicine. In Charak samhita, cobra venom has been said to be useful in Dushyodara and Jalodara (Ascities). Sushruta and Vagbhata also mentioned similar use. In the Unani system of medicine, cobra venom has been used as a tonic, aphrodisiac, hepatic stimulant and for revival in collapsed conditions. Venoms of viper, Crotalus, cobra and Lacasis are also routinely used in homeopathic medicine. Chinese physicians use snake venom products routinely to treat stroke and view them as effective and relatively safe. The dangerous effect of snake venom on humans is well known, but now a day’s new revelation has been discovered, claiming that toxins in snake venom could potentially open doors to cutting-edge drugs being able to treat severe medical conditions, such as diabetes, high blood pressure, stroke, Neurological diseases such as Parkinson's disease and Alzheimer's disease, Cancer (various types), aging, skin diseases, excessive bleeding condition etc. Snake venom is harmless if ingested in liquid or crystal form after drying through mouth and it will be excreted unchanged. It produces toxicity only if contacted with blood. This is very well understood by our ancient Acharya. So that Acharya Vagbhata used snake venom in various diseases which has been elaborated in 48th chapter of Uttarantra of Ashtanga Sangraha, i.e. “Vishopayogiyas Adhyaya.” With this background, an attempt has been made to critically review this chapter focusing on how Acharyas used snake venom as a medicine in various diseases in scientific manner in the light of contemporary science.

The present study was aimed for compilation of the description of therapeutic uses of snake venom in various diseases mentioned in Ayurvedic classics as well as to explore researches and scientific studies regarding uses of snake venom in contemporary science.

Classical literature of Ayurveda as well as modern medical science on the subjects of toxicology and therapeutic uses of snake venom from the library of Mahatma Gandhii Ayurveda college hospital and research centre, salod (H) Wardha were explored for this study. The Internet services of the MGACH &RC, salod (H) Wardha library IT center were also used. The data
Obtained were critically analyzed and presented.

This was purely a literary study wherein Conceptual study comprises of the review of the available literature in the ancient classical texts emphasizing the therapeutic uses of snake venom. Literature in modern science concerned with this concept, scientific journals, dissertations, research paper etc. were scrutinized and analyzed to conquer this concept which has been mentioned far long time ago by Ayurveda.

CONCEPTUAL REVIEW

As per the Ayurvedic concepts, snake venom is not only used as a therapeutic agent in poisonous cases where antiposonous drugs are found to be ineffective but also used in various disease conditions. Acharya vaghbata mentioned the specific procedure to procure snake venom.

A hooded snake (cobra/viper) should be made to bite many times on a piece of meat fastened to the tip of stick. After deciding that sufficient amount of snake venom get entered into piece of meat, it should be dried up under sunlight in sufficient dry weather. Dried piece of flesh then get powdered and should administer to that poisoning patient who has not been cured by any other anti-poisonous medicines. Even in other diseases when all other methods of treatment fail, snake venom can be administered in the form of dried flesh powder. It can also be used for rejuvenation purpose. It is administered to those person who has been purified by the use of ghee and who has undergone purification therapies, who is partaking only healthy foods, who is pure in mind should be administered snake venom after sunrise and during winter and spring seasons generally, and in summer for emergency conditions only. It should not be administered during rainy season and on cloudy days, not to be administered who are in anger, suffering from diseases of pitta, to the impotent, the twin born (branchna), who is troubled very much from hunger, thirst, exertion, sun, light, long walk, or diseases, the pregnant woman, children, the aged, those who are dry, (emaciated greatly) and those suffering from diseases of vital organs. If one becomes habituated to use of counter poison, even then one should be cautious about forbidden things and avoid the use of pungent, sour, oils, salts, day sleep, sunlight fire, and dry foods especially Ajirna (Indigestion). These are special precautions has been mentioned by Aacharya Vaghbata, while using snake venom as a medicine. Later on, various yogas (formulations) containing in which dried powder of flesh containing snake venom used in various diseases has been described which are as follows. (Table 1)

Therapeutic use of snake venom in various diseases as per modern approach

Fibrinogenolytic and fibrinolytic activity of snake venom

It has been proved through various in vitro and in vivo studies that, snake venom has fibrinogenolytic and fibrinolytic activity. This therapeutic action of snake venom can widely use in treatment of stroke, Deep vein thrombosis, cerebral infarction, myocardial infarction, peripheral atrial thrombosis, priapism, sickle cell crisis.

Antiplatelet activity of snake venom

Many venoms with procoagulant properties find application in the diagnosis of clotting abnormalities, and most of the clotting pathways can be assayed by some venom component, e.g. "reptilase time" (B. atrox) assays for thrombin inhibitors, "Ecarin" (E. carinatus) and "taipan time" (Oxyuranus scutellatus) assays for prothrombin, and Russell’s viper (Daboia russelli) venom assays for factor X and for monitoring anticoagulant therapy.

Cardiotonic and antiarrhythmic activity of snake venom

It has been observed that, Malayan pit viper has blood thinning property and could be effective in stroke patient. From a study of 500 stroke patients, 42% who were given the snake venom drug (Ancord) within 3 hour of stroke. Mayberg & Fulan reported that onset regained significant functioning compared to 34% who got placebo. Role of Ancord in patients with heparin induced thrombocytopenia thrombosis has been clearly established. Ancord has also been reported successful in cardiac catheterization coronary bypass grafting. One study proposes that, toxin from Indian king cobra possess antiarrhythmic property at microgram level.

Antineoplastic activity of snake venom

Various in vitro and in vivo studies prove the anticancer activity of snake venom which has been extracted from various varieties of snakes. Indian krait Bungurus caeruleus venom has been evaluated against Ehrlich ascites carcinoma (EAC) in Balb C mice. This venom at various dose levels inhibited tumor cell growth, both in vivo and in vitro. This cytotoxic anticancer activity of venom was also observed by MTT assay and confirmed by thymidine incorporation. Phospholipase A2 was isolated from Bothrops newweidii venom which produced cytotoxic activity on B16 F10 melanoma cell. It is observed that Indian cobra Naja naja venom was cytotoxic to Ehrlich ascites tumor cells. Cytotoxic P4 was isolated from Naja nigricollis venom, which produced cytotoxic effect on Wehi-B leukemia cell. Various researches is going on to prove the antitumor activity of various constituents of different varieties of snakes on various animal models. Malignant brain and spinal-cord tumors (gliomas) are not curable by surgery as they invade the surrounding brain tissue without clear boundaries, making removal impossible. Disintegrins, like contortrostatin from American copperhead (Agkistrodon contortrix) venom, prevent cells from sticking together, and inhibit their interaction with surrounding tissue, resulting in a blockage of cell motility and invasiveness. It has been demonstrated that fibrinogen) plays separate and distinctive roles at different stages of tumor growth and dissemination. At the primary site, fibrin deposition around the tumor could form a protective barrier, but also limit tumor progression. On the other hand, fibrin deposits formed by metastatic tumor cells may help disseminating these tumors.

Antiparalytic activity of snake venom

Notexin, a snake venom phospholipase is now considered to be effective in the treatment of ptosis, as it attacks motor nerve terminals and muscular cells. It was found that the satellite cells between the muscle cells contain mostly normal mitochondria. When skeletal muscle is damaged by bite of notexin, satellite cells divide to form replacement muscle cells and because cell regeneration is accompanied by mitochondria regeneration, the mitochondria in new muscle cell are in much better shape than in old cells. As the ptosis is a result of muscle weakness in the small easily accessible levator muscle of the eyelid, so notexin therapy is an ideal therapy for such disease entity. Mysotenia gravis (MG) is recognized as an autoimmune disorder in which antibodies to acetylcholine (Ach) receptor lead to impairment of neuromuscular transmission. The use of labeled snake venom toxin to identify AChR and their antibodies ultimately permitted both the purification and characterization of AChR and an understanding of the pathological mechanism impairing neuromuscular transmission in myasthenia gravis (MG). Anti-AChR antibodies have been demonstrated to be the principle agents in pathogenesis of MG, and their determination allowed definite diagnosis of MG.
Antarthritic activity of snake venom
Snake venom has been used to explain the pathophysiolo
ogy of several experimental model of arthritis. An animal experi
ment confirmed that the Indian monocellate cobra (Naja kaouthia) venom significantly antagonized the changes in the arthritis bio markers where arthritis was induced by Freund’s complete adjuvant. Anti-arthritis activity of cobra venom (doses selected in terms of L50 values) was confirmed through physical parameters (paw and ankle diameter), urinary markers (hydroxyl proline, glucoseamine), biochemical markers (acid & alkaline phosphatase), molecular marker (IL10), liver anti-oxidant parameters (catalase, glutathione, etc.) and histopathological observations.30 The anti-arthritis and anti-inflammatory activity of NN-32, a cytotoxic protein from Indian spectacle cobra snake (Naja naja) venom has been studied in Freund's complete adjuvant (FCA) induced arthritis and carrageenan induced anti-
inflammatory model. NN-32 treatment showed significant decrease in physical and urinary parameters, serum enzymes, serum cytokines levels as compared to arthritic control group of rats. NN-32 treatment recovered carrageenan induced inflammation as compared to control group of rats. The findings showed that the cytotoxic protein NN-32 shares anti arthritic and anti-inflammatory activity and thus NN-32 may target complex pathophysiological processes like cancer- arthritis inflammation.31

Antihypertensive activity
A number of snake venom create a transient condition of depressed blood pressure in envenomed patients. Angiotensin-converting enzyme (ACE) inhibitors were developed from a bradykinin-potentiating enzyme isolated from the venom of the Brazilian pitviper (Bothrops jararaca) and approved in 1979 by the FDA to treat high-blood pressure and heart disease. They work by blocking the switch between angiotensin-I and angiotensin-II, the latter being a vasoconstrictor. These inhibitors are now prescribed worldwide and have saved the lives of millions.

DISCUSSION
Snake venoms have the highest toxicity potential that makes them an attractive option to use in various diseases. Evolution of modern high throughput screening systems has developed to recognize and extract new therapeutic substances from biotoxins such as venoms of several snakes that show promising potential in treating various diseases. Snake venoms are the complex mixture of several biologically active proteins, enzymes, peptides and organic and inorganic compounds. Venom from snakes is an important agent which can be used in the treatment of cancer, arthritis, thrombosis, multiple sclerosis, pain, neuromuscular disorders, blood and cardiovascular disorders, infections and inflammatory diseases.35

The use of snake venom as a medicine was known to man since ancient time. Various scattered references have been found in different Ayurvedic texts where snake venom has been used as a medicine. Therapeutic uses of snake venom in various diseases have been explored by Acharya Vagbhata in 48th chapter of Uttaratantara of Ashtanga Sangrahara, i.e. “Vishayapayogiya Adhyaya.” Forty-seven different Formulations have been mentioned by Acharya vagbhata in which snake venom is pertinently used with other Ayurvedic herbal drugs.40

There are different routes of administration of these formulations have been mentioned which includes oral rout, external application, oral rout followed by external application, Anjan (Collyrium), Nasya (Nasal Rout), Karnpuran, Gandush. Different forty-seven formulations have been used in various diseases which includes Jirnajwara (chronic fever), Prameha (Diabetes), Twak vikar (Skin disorders) Vicharchika, Dadru, Kitibh (Skin diseases), shwitra (Leucoderma), Pandurika (pathognomic pandarika (a type of leprosy), Rakaptittap (Bleding disorders), Shwas (dyspnoea) and Hikka (Hiccup), Chhirdi (vomiting), Duruma (piles), Gulma (Abdominal tumor), Arma (Perygium), Timira (blindness), Krimi (worm infestation), Pandu (Anaemia), Galagruha (Sore throat), Graha (Possession by evil spirits, Unmad (Insanity), Matratranchita (dysuria), Udawartri (upward movement inside the abdomen), Ashmari (Renal calculi), Pittabhrini (bile stones), Shula (colicky pain), Vatanda (Scrotal enlargement), Pleeharog (Enlargement of spleen), Nashushkara (loss of semen), Putinas (Bad smell of the nose), vachak shalhana (stammering), Vedana-Pakikyukta Vran (Ulcers with pain and pus), Kushnera –Madugbarh (Applied on the abdomen eases the obstructed foetus (possessing abnormal Presentations) to pass through the parturient canal), Timira (blindness), Kachh (Shukliarna (pterygium), shukla, pilla and kacha (Diseases of cornea, and sclera, blindness), Nukhandhata (nourishing the eye in case of chronic night blindness), Shivsha (Headache), Paliya (Gray hairs), Aroihukia (Ulcers on Scalp), Karnshula (Severe pain in ear), Mukhro (Disorders of Mouth).
Table 1: Various yogas (Formulations containing snake venom)\textsuperscript{13}

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Yoga (formulation containing snake venom)</th>
<th>Indication with rout of administration of formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Snake venom with Lodhra (Symlocos racemosa Roxb.), Chandan (Santalum album Linn.), Vach (Acorus calamus Linn.)</td>
<td>Best to cure Jirnajwara (chronic fever) \textit{(oral)}</td>
</tr>
<tr>
<td>2</td>
<td>Snake venom with Nikunth-Trimvuttu (Opuncula turpethum Linn.), Triphala (Powder of Hartiaki (Terminalia chebula), Bibhitak (Terminalia belericia) and Asmantri (Emblica Officeinalis))</td>
<td>Cures Jirnajwara (chronic fever), Prameha (Diabetes), Twak vikar (Skin disorders) \textit{(oral)}</td>
</tr>
<tr>
<td>3</td>
<td>Snake venom mixed with the juice (decocation) of Chitrak (Plumbago zeylanica Linn.), and Karkatshrungi (Pistacia integerrima Stewart ex Brandiss)</td>
<td>Vishnajwara (intermittent fever) \textit{(oral)}</td>
</tr>
<tr>
<td>4</td>
<td>Snake venom with Yashtimadhu (Glycyrrhiza glabra Linn.), Rasna (Plucaha lanceolata C.B.Clarke),Usbra (Vetiveria zizanioides Linn), and Utpal kandaka ( Nelumbo nucifera Gaertn) consumed with Tandulodaka (rice-wash)</td>
<td>Best for Rakaputita (Bleeding disorders) \textit{(oral)}</td>
</tr>
<tr>
<td>5</td>
<td>Snake venom, Rasanja (Extract of Berberis aristata), Bharangi (Clerodendrum serratum), vrushchikali, mahasaha-Mashaparni (Phasrulas triloba)</td>
<td>Good for vedana and paki Vrana (Ulcers with pain and pus) \textit{(External application)}</td>
</tr>
<tr>
<td>6</td>
<td>Snake venom, sugar, kshirataru praval (leaves of Panchvakalika trees) macerated with honey.</td>
<td>By licking it cures Shvas (dyspnoea) and Hikka (Hiccupps). \textit{(oral)}</td>
</tr>
<tr>
<td>7</td>
<td>Snake venom, Yawukshar Usbra (Vetiveria zizanioides Linn), Yashtimadhu (Glycyrrhiza glabra Linn), Haridra (Curcuma longa Linn.), kanta bark (Holarrhena antisensenterica Linn.) mixed with honey.</td>
<td>Cures Chhardi (vomiting). \textit{(oral)}</td>
</tr>
<tr>
<td>8</td>
<td>One palu (40 gm) each of Hartiaki (Terminalia chebula Retz), Pippalimala (Root of Pippali of Piper longum Linn)), Pippali (Piper longum Linn.), Gajagippipalli (scindaps officinalis), Chitrak (Plumbago zeylanica Linn.), Pushkariumala (Inula racemosa Hook. F.), Shati (Hedychium spicatum Buch Ham), Draksha (Vitis vinifera Linn), Yuvvani (Trachyspermum ammi Linn.), and Yawani (Alkali obtained from Yawa).</td>
<td>This is administered after the food having digested cures Durnama (piles), Meha (Diabetes), Gulma (Abdominal tumor), Arma (Perygium), Timira (blindness), Krimi (worm infestation), Pandu (Anaemia), Galagruha (Sore throat), Graha (Possesation by evil spirits, Unmad (Insanity), Kusshha (Skin diseases) \textit{(oral)}</td>
</tr>
<tr>
<td>9</td>
<td>Poison mixed with Patthya (Terminalia chebula Retz), Chitrak (Plumbago zeylanica Linn.), Dani (Baliospernum montalum Muell-Arg.), Draksha (Vitis vinifera Linn), Haridra (Curcuma longa Linn.), and mixed together.</td>
<td>Cures Muttrakrichhra (dysurea) \textit{(oral)}</td>
</tr>
<tr>
<td>10</td>
<td>Snake venom with shilajatu \textit{(oral)}</td>
<td>Cures Udadwarta (upward movement inside the abdomen), Ashmari (Renal calculi) \textit{(oral)}</td>
</tr>
<tr>
<td>11</td>
<td>Gomutra (cows urine) Yawukshar (Alkali obtained from Yawa), Saindhava (Rock salt), snake venom, and Pashanbhedaka (Bereinia ligulata (Wall)) mixed together.</td>
<td>And consumed breaks up the Pittashmari (bile stones) like thunder bolt. \textit{(oral)}</td>
</tr>
<tr>
<td>12</td>
<td>Pippali (Piper longum Linn.) plant together with its root, cow’s urine, and snake venom.</td>
<td>Best to relieve Shula (colicky pain). \textit{(oral)}</td>
</tr>
<tr>
<td>13</td>
<td>Snake venom with Draunuti (Croton Tinglum Linn.), Madhuka (Glycyrrhiza glabra Linn.), Draksha (Vitis vinifera Linn), Rasna (Plucaha lanceolata C.B.Clarke), Shati (Hedychium spicatum Buch Ham), and Pippali (Piper longum Linn).</td>
<td>Best to relieve Shula (colicky pain). \textit{(oral)}</td>
</tr>
<tr>
<td>14</td>
<td>Erand taila (caster oil), Triphala, cows urine, Chitrak (Plumbago zeylanica Linn.), and snake venom added with ghee.</td>
<td>Cures Vatanda (Scrotal enlargement). \textit{(oral)}</td>
</tr>
<tr>
<td>15</td>
<td>Triphala, swarjika kshar, and snake venom (32) and mixed together with milk.</td>
<td>Cures gulma (Abdominal tumors). \textit{(oral)}</td>
</tr>
<tr>
<td>16</td>
<td>Shatavaha, krimjit, and snake venom consumed with milk</td>
<td>Cures gulma (Abdominal tumors), Pleharog (Enlargement of spleen) \textit{(oral)}</td>
</tr>
<tr>
<td>17</td>
<td>Snake poison consumed with decoction of Wayas mula.</td>
<td>Cures kushthia (skin diseases) \textit{(oral)}</td>
</tr>
<tr>
<td>18</td>
<td>Vayasi, bark of rajavruksha, Trayanti, seeds of Bakuchi, kana and visha (poison) made into decoction and consumed</td>
<td>Cures skin diseases. \textit{(oral)}</td>
</tr>
<tr>
<td>19</td>
<td>An application of the seeds of Avliaga and edagaja, two kshar, snake venom, and sandhav macerated with water on the skin. (36)</td>
<td>Cures skin diseases. \textit{(External application)}</td>
</tr>
<tr>
<td>20</td>
<td>Paste of chatrak(Plumbago zeylanica Linn.), root of arka, hastipippali, bakuchi, and snake venom macerated with cows urine.</td>
<td>Cures skin diseases. \textit{(External application)}</td>
</tr>
<tr>
<td>21</td>
<td>Paste of manoha, milk latex of snhu, snake venom, chandralekha, edagaja, seeds of karanja, sandhav, vyosha, swriska kshar, yavakshar, nishadwaya, and Aazarshama macerated with buttermilk.</td>
<td>Cures skin diseases. \textit{(External application)}</td>
</tr>
<tr>
<td>22</td>
<td>Bhallatkar, Agni, Shanyak, and snake venom macerated with cows urine.</td>
<td>Vicharchika, Dadru, Kitibh (skin diseases) \textit{(External application)}</td>
</tr>
<tr>
<td>23</td>
<td>Leaves, bark, and root of shamayk and snake venom macerated with buttermilk.</td>
<td>Cures skin diseases. \textit{(External application)}</td>
</tr>
<tr>
<td>24</td>
<td>Bhallatkar, dwpi, gunja, and mimbphala macerated with sour juice (38)</td>
<td>Cures shwitra (Lencoderma), Pundarika (pathognomic pandurika (a type of leprosy) \textit{(External application)}</td>
</tr>
</tbody>
</table>
25-I
Vakra, kushtha, rasa (sarjarasa), dwipi, sprakka, patra, elahulka, macerated in decoction of khadira mixed with visha and allowed to stay for 3 days and administered to the patient of leucoderma, with thorns the bleeds of leucoderma should be picked with the thorns and paste mentioned in kushtha chikitsa chapter is applied on them
Cures leucoderma. (oral followed by External application)

25-II
The paste of karavira, root of arka, bakachi, poison, dwipi, the two Pippali, and Arishkhar macerated with goats urine
Cures leucoderma. (oral followed by External application)

26
Oil of sesame or katu taila (mustard oil) cooked with decoction and paste of laksha, Surahva, varahikanda, asphota, tapatha, girikarnika, roots of arka, and ashawamara, nappushpa, nata, haridra, dararhadra danti, visha, atishiva, pippali, and maricha, and used for ointment
Best to be used in leucoderma. it is sure to bring back the normal colour to the skin. (External application-Abhyangarti)

27
An application prepared with the paste of vira, langlika, danti, visha, and pashanbedaka
Applied on the abdomen eases the obstructed foetus (possessing abnormal Presentations) to pass through the parturient canal. (External application)

28
Fresh juice of bijaparak, vacha, juice of brazhni, visha, and ghee cooked together and taken orally
Bestows children even in barren woman. (Oral)

29
A drink of milk medicated with draksha, kapikaccha, visha, added with visha is to be administered in persons who
Suffers from loss of semen (Nashthashukra). (Oral)

30
Visha mixed with sugar and honey is to be applied as collyrium
Cures timria (blindness). (Anjana-collyrium)

31
Poison macerated with goats milk and subjected to the fumes of ghee later applied as collyrium
Cures timria (blindness) (Anjana-Collyrium)

32
Juice of Dhatriphala, poison along with shankh are soaked several times and prepared as collyrium and applied
Cures even severe stages of timria (blindness) (Anjana-collyrium)

33
Collyrium prepared with poison by name Indrayudha (a plant) macerated with breast milk and applied
Cures the disease Kacha (Partial blindness). (Anjana-Collyrium)

34
Collyrium prepared with poison macerated with juice of bijaparak added with sugar and applied to eyes also
Cures kacha. (Anjana-Collyrium)

35
Poison together magadhika, and haridra and dararhadra made as collyrium
Cures kacha. (Anjana-Collyrium)

36
Poison along with krushna soaked in cows urine and applied as collyrium
Cures shuklarma (Perrygun) (Anjana-Collyrium)

37
Rasakriya prepared from the drugs samadrapatha, sphatika, kuruvinda, sudha, anjana, and kurmaprasuthiha, taken each equal in quantity and all together making one part, half part of manashtla, half quantity of it maricha, and half quantity to maricha is saindhava and ayoraja (bhasma) taken half the quantity of saindhava and added visha equal to the quantity of ayoraja (iron filling) and powdered nicely, macerating by honey this is used as collyrium.
Cures diseases of cornea, and sclera, blindness (shukla, pilla and kacha respectively). (Anjana-Collyrium)

38
In the disease pilla firstly lekhana (scrapping) should be done to the eyes later instilled with juice of surasa macerated along with rasonkanda, maricha, visha, sarshapa, and saindhav later ghee is applied and ghee should be consumed.
Cures Pilla grouped of diseases. (Anjana-Collyrium)

39
Consuming ghee cooked with madhuka sara, madhuka, snake venom, milk and water
Best for nourishing the eye in case of chronic night blindness. (Nasya-Nasal drops)

40
Nasal drops prepared from Pratayakushopy, sino, and snake venom
Cures headache. (Nasal drops)

41
Ghee mixed with yashthuva, sugar and poison.
Cures headache. (Nasal drops)

42
Shunthi, pathya, snake venom, patha and dravanti instilled as nasal drops
Cures bad smell (Putnasas) of the nose. (Oral)

43
Katutaol and snake venom administered as nasal medication
Cures grey hairs, and ulcers on the scalp (Arunshika). (Nasal drops)

44
Shukta (Vinegar) mixed with svarjika kshar, saindhav and snake venom should be filled in the ear
To cure the severe pain in the ear. (Karnapuranc)

45
Gandush (holding of the fluid in the mouth) done with the oil prepared with prapaadurakita, sanjitha, snake venom, and saindhav
Cures all disorders of mouth.

46
A C Kashyapa, devadana, snake venom, cow’s urine and kantakari.
Cures vachah skhalnata (stammering). (Oral)

Table 2: Number of yogas according to routes of administration in various diseases

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>No of Yoga</th>
<th>Route of administration</th>
<th>Disease condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21</td>
<td>oral</td>
<td>Jirnjivatra (chronic fever), Frameha (Diabetes), Twak vikar (Skin disorders), Raktipitta (Bleeding disorders), Shwas (dyspnoea) and Hikka (Hiccups), Chhardi (vomiting), Duruma (piles), Galma (Abdominal tumor), Arma (Perrygun), Timira (blindness), Krimi (worm infection), Pandu (Anaemia), Galagruha (Sore throat), Graha (Possession by evil spirits, Unmad (Insanity), Mutrasichhra (dysuria), Udawarta (upward movement inside the abdomen), Ashmari (Renal calculus), Pittashmari (bile stones), Shula (colicky pain), Vatanda (Scrotal enlargement), Pleecharog (Enlargement of spleen), Nashthashukra (loss of semen), Putinasas (Bad smell of the nose), vachah skhalnata (stammering)</td>
</tr>
<tr>
<td>2</td>
<td>09</td>
<td>External Application</td>
<td>Vedana-Pakyasakti Vran (Ulcers with pain and pus), Kashtha –Vicharihva, Dadra, Kushta (Skin diseases), shwitra (Leucoderma), Pundarika (pathognomic pundarika (a type of leprosy), Mudhgarb (Applied on the abdomen cases the obstructed foetus (possessing abnormal Presentations) to pass through the parturient canal)</td>
</tr>
<tr>
<td>3</td>
<td>02</td>
<td>Oral followed by External application</td>
<td>shwitra (Leucoderma)</td>
</tr>
</tbody>
</table>
It has been reviewed through many research articles that, snake venom toxins contributed significantly to the treatment of many medical conditions. There are many published studies proposes that, venom constituents of different species of snakes have different therapeutic actions such as Fibrinogenolytic and fibrinolytic activity describing and elucidating its used in various diseases which includes deep vein thrombosis, myocardial infarction, pulmonary embolus, and many others. A number of snake venoms have Cardiotonic and anti-arrhythmic activity. There is great deal of research currently being done into the anticancer properties of venoms which show anti-tumor activity. Anti-paralytic activity of snake venom can be used in the treatment of Ptosis and Myasthenia gravis. Various researches demonstrated that, snake venom has potent anti-inflammatory, analgesic and anti-arthritis action which can be used in inflammatory joint diseases such as rheumatoid, rheumatic arthritis. Many varieties of snake venom have antibacterial and antiviral activity which can be used as a potent antibiotic agent in various infectious diseases which are caused by bacteria and viruses.

In this way, various published studies describing and elucidating the medicinal use of snake venom in various diseases. These researches are only a few examples of the many areas in which snake venom is being investigated as a treatment method. Ayurveda described the use of snake venom as a therapeutic agent in various diseases since ancient time. It is need of time to develop various research modules to study the efficacy of various Ayurvedic formulations in which snake venom has been used skillfully. Therapeutic use of snake venom in various diseases in different form reflects in depth research of Ayurveda towards snake venom toxins.

**CONCLUSION**

Since last five decades, various researchers are looking towards snake venom as therapeutic agent. Ayurveda has described the use of snake venom as therapeutic agent in different diseases since so many years. Various modern researches defiantly proved the use of snake venom. Further researches will carried out to establish the efficacy of Ayurvedic formulations in which snake venom has been used for various diseases.

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