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Review Article

PHARMACOLOGICAL PROFILE OF *VATSANABHA*: VISHA DRUG: *AMRITA GUNA*

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ABSTRACT

Vatsanabha (*Aconitum ferox*) belongs to a group of potential drugs called *Mahavishas*, belonging to the genus Aconitum, Family Ranunculaceae. It is widely distributed in North Eastern Himalayan region. Earlier Aconite was more understood as a poison than a medicine. The roots of *Aconitum ferox* known under the common name *Vatsanabha* is extremely poisonous but after their detoxification process the drug is useful in the treatment of diseases such as rheumatoid arthritis, fever, sciatic neuritis, hypertension and also act as immunomodulators. Aconitum alkaloid, when ingested mainly concentrates in the liver, kidney and serum and is eliminated through urine and faeces. As stated by Acharya Sushruta, *Vatsanabha* precipitates harmful effects such as yellow discoloration of stool, urine and eyes and neck stiffness. The diterpene alkaloids such as hypaconitine, aconitine, and mesaconitine are poisonous components present in the root tubers, which is converted into less toxic alkaloids such as aconine, benzoylaconine, and pyroaconine by alkaline treatment, heating or through deacetylation and oxidation reaction. The textbook 'Rasaratna Samucchaya' explains 8 stages of toxic effect of *Aconitum ferox*. *Shodhana* process can be defined as the removal of unwanted part of drug and eradication of highly toxic ingredients. In addition to its detoxification properties, the efficacy and potency of the drug can be increased by *Shodhana* process. Thin layer chromatography studies have shown that the poisonous substances like psudoaconitine and aconitine is converted into less poisonous substance like veratroyl pseudoaconine and benzoyl aconine respectively only in traditional Ayurvedic *shodhana*.

KEYWORDS: *Vatsanabha*, *Aconitum ferox,* Therapeutic potential, *Shodhana*, Toxicity.

INTRODUCTION

Vatsanabha (Aconitum ferox) belongs to a group of potential drugs called *Mahavishas*, belonging to the genus Aconitum, family Ranunculaceae. It is known worldwide for its variety of patterns of medicinal applications. It is widely distributed in the northern regions. This herbaceous perennial plant is deciduous which grows up to 40-90 cm tall having an unbranched tall erect stem with racemes of white, purple and zygomorphic flowers.[1] It is more predominant in the Northeastern Himalayan region.[2]

The plant produces new tuber each annum following the flowering of the plant after which the old tuber dies. The root is tuberous and biennial which grows from stem. *Aconitum ferox* is mainly cultivated for its root. The main pollinators of the plant are bees.[1]

The *Vatsanabha* roots are best collected between December to April after the ripening of fruits in the plant because it is more potent during the winter season.[1,2]

The plants growing in high altitude, grazing land and also plants cultivated in lawn are used for the collection of roots of Aconitum species. The roots collected from height will be most healing. Thickness of roots is also important. Young, thin and shining roots are preferred.

Aconitum is one of the important genus that have been enlisted in Red Data Book. The important species of Aconitum are Aconitum *chasmanthum, Aconitum balfourii, Aconitum dienorrhizum, Aconitum japonicum, Aconitum heterophyllum, Aconitum ferox, Aconitum violaceum, Aconitum carmichaeli, Aconitum napellus* and *Aconitum bisma.*[3]

In old Greece and in North-West Pacific the plant was used to poison the whales and also used for hunting purpose. In England during olden days the plant was used in opposition to hogs, wolves, tigers and rodents and it was also a killing material.[4]

Chemical Constituents

The Aconitum species includes poisonous compounds as its constituents, which were used in

ancient times in arrows and spears for hunting purposes. Aconite was more understood as a poison than a medicine, but upon advancement in scientific technology and knowledge, it was found out that, after treating the tubers of aconitum using scientific techniques, the toxicity of the species was reduced and it was used as a herbal medicine.[5]

The diterpene alkaloids such as hypaconitine, aconitine, and mesaconitine are poisonous components present in the root tubers, which is converted into less toxic alkaloids such as aconine, benzoylaconine, and pyroaconine by alkaline treatment, heating or through deacetylation and oxidation reaction.[5]

The tuber of *Vatsanabha* contains 0.4–0.8% diterpene alkaloids and the percentage of aconite in the tubers range from 0.3% - 2.0% and 0.2% - 1.2% in the leaves. The major alkaloids are, pseudo-aconitine, bikhaconitine, aconitine, di-Ac–Y-aconitine, diacetyl pseudaconitine, picro-aconine, veratry pseudaconitine, chamaconitine, aconine and veratryl gama aconine.[6] Spectral investigation showed 4 new lipoalkaloids which have been isolated from the root tubers of *Aconitum ferox* namely mixture of C-8 stearoyl, linoleoyl and palmitoyl esters of norditerpenoid alkaloids.[7] 8-O-methylhypaconine, a new nor diterpene alkaloid was isolated along with twelve known alkaloids from the underground parts of species *Aconitum* plant cultivated in Korea. The structures were established on the basis of chemical and spectroscopic methods.[8]

Toxicity

Severe and potentially fatal toxic effect can result by the administration of aconitum plant extract.[9] Acute toxicity is characterized by hypotension and bradycardia followed by numbness of throat and burning sensation of mouth, lip and tongue. Toxicity mainly affects muscle tissue and CNS, primarily causing cardiovascular complications.[10] Ventricular and *atrial* fibrillation and ventricular tachycardia have also been reported in several reports of aconite poisoning.[10,11]

Aconitum alkaloid, when ingested mainly concentrates in the liver, kidney and serum and is eliminated through urine and faeces. Therefore, if other biological samples are not available faeces can be used to detect the presence of aconite alkaloid.[12]

As stated by Acharya Sushruta, *Vatsanabha* precipitates harmful effects such as yellow discoloration of stool, urine and eyes and neck stiffness. Ingestion of unpurified drug causes burning in entire body, senselessness, inhibition of heart rate and finally death. Based on the spreading of toxic substance in different parts of body, the textbook *Rasaratna Samucchaya* explains 8 stages of toxic effect of *Aconitum ferox;*

Stage	Symptom
1	Skin problem
2	Tremors
3	Burning sensation
4	Disturbance of sense organ
5	Mouth frothing
6	Severe pain and fatigue of shoulder
7	Stiffness
8	Death

The toxicity can be treated by first delaying absorption by using activated charcoal. Tannic acid or warm water can be used to wash the stomach. Atropine can be advocated to avoid the vagal inhibition of cardiac muscles. In case of persistent hypotension inotropic therapy can be carried out. The vital requirements such as oxygen and respiration should be maintained.[13]

Purification Methods

The roots of Aconitum ferox known under the common name *Vatsanabha* is extremely poisonous but after their detoxification process the drug is useful in the treatment of diseases such as rheumatoid arthritis, fever, sciatic neuritis, hypertension and also act as immunomodulators. The roots of Aconitum species contain alkaloids and at higher doses it produces cardio toxic and neurotoxic effects.[13] Its detoxification process involves boiling in *Dolayantra* using *Godugdha* for 3 hours daily for three consecutive days, after which it is washed with pure water and dried under sunlight. Total alkaloids content decreases after *Shodhana* process. Detoxification process convert any poisonous drug in to beneficial nonpoisonous ones.[14]

The drug *Vatsanabha* which is plant origin contain aconitine, used in Ayurvedic medicinal system before *Shodhana* process is considered as poisonous. Proper *Shodhana* treatment by various medium renders it less toxic. Cows urine, Cow's milk, goats' milk are different media used for this purpose. Toxic alkaloids are found to be extracted in the media during *Shodhana* process and the study suggest that purifying by means of cow's urine gives better results.[15]

***Shodhana* (Purification)**

Shodhana which is otherwise known as purification is an essential process in drug processing of herbo-mineral drugs. *Rasa Shastra* deals with purification steps for various substances and *Marana*

involves incineration of minerals which comes first in the *Shodhana* treatment. The *Shodhana* process can be defined as the removal of unwanted part of drug and eradication of highly toxic ingredients. In addition to its detoxification properties, the efficacy and potency of the drug can be increased by *Shodhana* process.[16]

The prime aim of *Shodhana* process is to detoxify the herbo mineral drug to less toxic level which is sustainable to the body. The pioneer of *Rasa Shastra* has accepted *Shodhana* process on 8th century onwards. The concept of *Shodhana* was well defined in ancient Ayurvedic literature *Charaka Samhita*. Refinement of natural products are called *Karana*.[17]

Purification Methods

Two traditional methods for purification of *Aconitum ferox* are described in Ayurveda.

1. Purification of *Vatsanabha* using cow's urine

100gm of *Vatsanabha* tuber was cleaned and dried which was then cut into small pieces and dipped in a stone are earthen vessel containing one liter of cow urine for three consecutive days. Each day the cow's urine was replaced with the fresh one. On the fourth day, the roots were washed with water, the outer cortical layers were peeled off and the product was again washed with warm water and the sundried pieces were pulverized and kept in an air tight glass container

2. Purification of *Vatsanabha* using cow's milk

100g of *Vatsanabha* was tied in a muslin cloth into a poultice which was suspended in the center of a poultice with the help of a stick. Cow's milk was poured in the vessel to completely immerse the bundle. It was then heated on a stove for six hours at 100°C. Then the pieces of *Vatsanabha* tubers were taken out and washed with water. The outer layers of the roots were peeled off. After proper drying the *Vatsanabha* pieces were then made into powder and kept in an air tight glass container.

From the above described *Shodhana* processes, last three methods are employed for the purification of *Vatsanabha*.

When a comparison study was carried out between crude aconite root, *Ayurvedic shodhana* treated aconite root and chemical *Shodhana* treated aconite root by animal study and TLC, the modified method of *Shodhana* is found to be less efficient when compared to the traditional *Ayurvedic shodhana* process. Thin layer chromatographic studies have shown that the toxic substance like psudoaconitine and aconitine is converted in to less toxic substance like veratroyl pseudoaconine and benzoyl aconine respectively only in traditional *Ayurvedic Shodhana*.[18]

The drugs containing toxic alkaloids can be converted into a medicine, using *Shodhana* (purification) methods and used for various pharmacological purposes. Thus, upon proper processing and handling, even a poison can be converted to a powerful medicine and used for the treatment of ailments.[19]

Therapeutic potential

The tuberous roots of genus aconitum are commonly employed for various diseases and are used in herbal medicine only after processing. The cardio and neuro toxicity of this herb are potentially lethal. Some species like *Aconitum ferox* and *Aconitum spicatum* are deadly poisonous while others like *Aconitum oreochryseum* and *Aconitum bisma* are used as the antidote for aconitum poisoning. Therefore, it is a valuable drug as well as unpredictable toxic material.[20].

From the classical books of Ayurveda which includes Nighantu, Samhita; it is evident that due to the fast acting properties of *Vatsanabha* it has been used for the treatment of the following disease conditions as mentioned below: -

- *Vatavyadhi* (neuromuscular anomalies)
- *Agnimandya* (digestive impairment)
- *Jvara* (fever)
- *Kasa* (cough)
- *Rajyakshma* (tuberculosis)
- *Kustha* (disease of skin)
- *Sotha* (inflammation)
- *Ajirna* (indigestion)
- *Prameha* (diabetes)
- *Udararoga* (disease of abdomen)

It is observed that *Vatsanabha* has been used in 1557 formulations out of which *Gutika* have been used maximum for internal applications followed by *Churna* and *Taila*.[21]

The toxins of the *Aconitum ferox* are potent neuro toxins which paralyze the nervous system and thus its usage is spread widely among the *Aghori* tantric[22]. *Aconitum ferox* is a great medicine wherein the crushed roots mixed with bezoar stones is used as a universal antidote. Aconite is particularly efficient for the treatment of many febrile diseases like the sthenic fevers of children and inflammation resulting due to tonsillitis, pharyngitis etc. The roots can be used to treat malignant tumors. Studies also showed embryotoxic effects during the organo genetic period of rats.[23] The roots (ethanolic extract) possess anti arthritic properties which is due to the

presence of compounds like tannins, alkaloids and phenolic compounds.[24]

The blue aconite is used to treat cholera, leprosy, and rheumatism. However, it is contra-indicated in case of valvular diseases. Aconite has also been preferred as cardiac sedative in aneurism and during the acute stages of cerebrospinal meningitis. It relieves inflammatory throat disorders. Facial neuralgia can be cured using Aconite tincture and it restores the circulatory equilibrium in case of sudden chills and stoppage of menstruation. Liquorice (1gm) and aconite (250mg) are finely powdered and put into the nostril at the dose of a mustard seed to treat all types of headache.[25] The extracts of *Aconitum ferox* shows an increase in heart contractions, the heart rate also increased and upon further increase, the heart rate lowered.[26]

Aconite root is incorporated as an important Chinese medicine. With the use of appropriate processing methods, good quality control of the preparations, the toxic activities associated with aconite could be avoided.[27] Nervous and rheumatic pains can be relieved when applied as an ointment externally when mixed with lard. The pain of scorpion bite can also be relieved when used externally. Internally it is mainly used for the treatment of intermittent chronic fevers. It stimulates the secretion of bile and in India it is highly recommended for the treatment of rheumatism, leprosy and cholera.[27]

The use of Aconite is contraindicated in chronic diseases due to the prolongation of the use of medication and its use is limited in the rainy and summer season because of their natural exacerbation of *Vata* and *Pitta*. Pregnancy as well as infants and geriatrics come under the contraindications. The application of drug at *Marma* (vital) places is also contraindicated as it may cause local irritation.[28]

REFERENCES

1. Awanish Pandey, Gyan Chand Kr.Morya, H.S. Mishra, R.B.Yadav and K.N. Yadav. A Review Study on Therapeutic Potential of Vatsanabha. International Journal of Ayurveda and Pharmaceutical Chemistry. 2017; 6(2): 271-227.
2. Amita Misra et al. AFLP Markers for Identification of Aconitum Species. Medicinal and Aromatic Plant Science and Biotechnology, Global Science Books. 2010; 4(1): 15-19.
3. MarijaPovsnaretal. Rare tradition of the folk medicinal use of Aconitum spp. is kept alive in Solčavsko, Slovenia. Journal of Ethnobiology and Ethnomedicine. 2017; 13(45): 1-14.
4. Ayhan Ulubelen, Ufakkolak. Chemical and Biological Studies with an Aconitum and a Delphinium Species. Istanbul; Innovation in chemical biology. 2009; 39-49.
5. Nidhi Srivastava, Vikas Sharma, Barkha Kamal, Vikash S. Jadon, Aconitum: Need for sustainable exploitation. International Journal of Green Pharmacy. 2010: 220-228.
6. Dr. Amala Jyothi et al, Vatsanabha: An Agada Perspective. International Ayurvedic Medical Journal. 2016; 4(7): 1235-1247.
7. Jampani Bhogi Hanuman and Alfred Katz, New Lipo Norditerpenoid Alkaloids from Root Tubers of Aconitum ferox. Journal of Natural Products. 1994; 57(1): 105-115.
8. So Young Lee et al, Norditerpenoid and Dianthramide Glucoside Alkaloids from Cultivated Aconitum Species from Korea. Archives of Pharmacal Research. 2007; 30(6): 691-694.
9. S.P.Elliott, A case of fatal poisoning with the aconite plant; quantitative analysis in biological fluid. Science & Justice. 2002; 42(2): 111-115.
10. Ashok Kumar Panda, Saroj Kumar Debnath, Overdose effect of Aconite containing Ayurvedic Medicine (Mahashankha Vati). International Journal of Ayurveda Research. 2010 Jul-Sep; 1(3): 183–186.
11. P.K.Prajapati, V.J.Shukla, and B.Ravishankar, Effect of Shodhana Treatment on Chronic Toxicity and Recovery of Aconite. International Journal of Toxicology. 2012; 19(1): 35-41.
12. Kitae Ito et al, Distribution of Aconitum Alkaloids in Body Fluids and Tissues in a Suicidal Case of Aconite Ingestion.Journal of Analytical Toxicology. 2000; 24(5): 348-353.
13. Santosh Kumar Maurya et al, An Ayurvedic process for detoxification and modification of therapeutic activities of poisonous medicinal plants. Ancient Science of Life. 2015; 34(4): 188–197.
14. Dr.Kaur Manpreet, Sharma Anita. A Toxicological Review of Vatsanabha (Aconitum Ferox). International Journal of Information Research and Review. 2017; 4(9): 4486-4490.
15. PK Sarkar, Subha, PK Prajapati, Importance of media in Shodhana of Vatsanabha (Aconite). An International Quarterly Journal of Research in Ayurvedha. 2018; 29(1): 52-55.
16. Neha Arya and Hemant Kumar, Comparative Physico-Chemical Profile of 'Vatsanabha' (Aconitum Ferox, Ranunculaceae) Mula Processed Through Cow's Urine and Cow's Milk. International Journal of Research in Ayurveda And Pharmacy. 2017; 8(5): 217-222.

17. Raman S. Belge, Archana R. Belge, Ayurvedic Shodhana Treatments and Their Applied Aspect with Special Reference to Loha. IOSR Journal of Pharmacy and Biological Sciences. 2012; 2(1): 45-49.
18. S.L Deore et al, Evaluation of toxicity of Vatsanabha (Aconitum ferox) before and after Sodhana. Journal of young pharmaceutics. 2013; 5(1): 3-6.
19. Parvesh Kumar, Rajeev Ranjan, Rudramani Deepak, Naresh Kumar, Shodhana Procedure Of Various Visha & Upvisha In Ayurveda. World Journal of Pharmaceutical Research. 2018; 7(4): 472-479.
20. Sajan L Shyaula, Phytochemicals, Traditional Uses and Processing of Aconitum Species in Nepal. Nepal Journal of Science and Technology. 2011; (12): 171-178.
21. Mital Buha, Niral Sojitra, Rabinarayan Acharya, Internal applications of Vatsanabha (Aconitum ferox wall.): A comprehensive Ayurvedic review. Ayurpharm - International Journal of Ayurveda and Allied Sciences. 2018; 7(2): 15-38.
22. Dr.Teena Agrawal, Ethnobotany of The Aconitum Ferox, World Journal of Pharmaceutical Research. 2018; 7(5): 214-217.
23. Xiao K, Wang L, Liu Y, et al. Study of aconitine toxicity in rat embryos in vitro. Birth Defects Research Part B Developmental and Reproductive Toxicology. June 2007; 80 (3): 208–212.
24. Mohd Asif Khan et al, Anti-Arthritic Potential of Aconitum Ferox Roots in Complete Freund's Adjuvant Induced Arthritic Rats. International Journal of Innovative Pharmaceutical Sciences and Research.2018; 6(4): 80-96.
25. Anjali Sheokand, Anita Sharma, V.K. Gothecha, Vatsanabha (Aconitum Ferox): From Visha To Amrita. International Journal of Ayurvedic And Herbal Medicine. 2012; 2(3): 423-426.
26. Santilata Sahoo et al, Study on the Pharmacological Profile of Purified Aconitum Ferox Extracts in Frog. International Journal of Research in Pharmaceutical and Biomedical Sciences. 2013 Sept ;4(3): 746-753.
27. Judith Singhuber et al, Aconitum in Traditional Chinese Medicine—A valuable drug or an unpredictable risk. Journal of Ethnopharmacology. 2009; 126(1): 18-30.
28. Sanjeev Rastogi, A review of Aconite (Vatsanabha) usage in Ayurvedic formulations: traditional views and their inferences. Spatula DD. 2011; 1(4): 233-244.

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