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A CRITICAL REVIEW OF VATSANABHA SHODHANA FROM A MODERN PERSPECTIVE

Shehraz Pasha[1*] and Surekha S. Medikeri[2]

[1]Final Year PG Scholar, Dept. of PG and Ph.D. Studies in Rasashastra and Bhaishajya Kalpana, G.A.M.C, Bangalore.
[2]Principal and HOD, Dept. of PG and PhD Studies in Rasashastra and Bhaishajya Kalpana, G.A.M.C, Bangalore.

***Corresponding Author: Shehraz Pasha**
Final Year PG Scholar, Dept. of PG and Ph.D. Studies in Rasashastra and Bhaishajya Kalpana, G.A.M.C, Bangalore.

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ABSTRACT
Ayurveda which aims at eradication and prevention of disease, has placed Dravya at the second prime important place in Chikitsa Chatushpada. The dravya should possess properties like sampanam(richwith therapeutic values) and yogyam(suitable to include in formulation), for which it should undergo certain samskaras like shodhana etc. Visha dravyas, despite their undesirable properties also possess beneficial properties such as vyavayi(rapid spreading) and vikasi(channel opening effects) making them act faster than other herbs or medicines. Sodhana is a process that eliminates impurities from metals, minerals, poisonous herbs (vishaoushadhis), while also modifying and altering their properties to enhance their therapeutic potential. Vatsanbha(Aconitum Ferox) is a key ingredient in many Ayurvedic formulations. However, its toxic nature necessitates purification through Shodhana. This article provides a crticial review of toxic symptoms associated with vatsanabha, purificatory procedures used to reduce or neutralize its toxic principles and the transformations it undergoes during and after the sodhana process.

KEYWORDS: Sodhana; Vatsanabha; Aconite.

INTRODUCTION

As explained by charaka, Visha dravyas (poisonous medications) can be transformed into amrutha (nectar) when processed correctly. However, if used in an inappropriate way, they can become highly toxic to the body.[1] Visha dravyas are extensively used in Ayurvedic therapeutics. Vatsanabha is an essential component in formulations such as Mrityunjaya Rasa, Gajakesari rasa, Kshara vati.[2] Additionally, in various procedures like sodhana and other samskaras visha dravyas are used, such as in vishesha sodhana of Parada where Krishna Dattura is for the removal of Chapala dosha of Parada.[3] Shodhana process for Visha dravyas is performed to purify or detoxify these substances while enhancing their therapeutic properties. Aurvedic texts describe various sodhana techniques such as swedana, nimajjana, which involve purification using different medias like Gomutra, Godugdha, Triphala kashaya etc. The method of shodhana and media used plays a crucial role in either reducing the toxicity and/or potientiating the drug therapeutically which was evident after analyzing the dravya before and after shodhana procedure, from a modern scientific prespective. In Rasashastra, Vatsanabha is described as Mahavisha. Sushrutha categorized it as Kanda visha and Charaka included it under Sthavara Visha. Vatsanabha (aconitum ferox) is also known as Indian aconite, belongs to the Ranunculaceae family. Its roots contain significant amounts of alkaloids such as pseudoaconitine and aconitine ($C_{34}H_{47}NO_{11}$) which are known for their toxic effects.[4] The Sodhana process of Vatsanabha root is extensively discussed in various Rasashastra texts aiming to reduce its toxicity without compromising its pharmacological activities, thereby enhancing its medicinal value.

MATERIALS AND METHODS

A detailed study will be done from the Ayurvedic classical texts and data available from journals, researches and other resources.

Vatsanabha Toxicity: Rasa Tarangini has explained daha(burning sensation), murcha(syncope), hrudgatirodhanam(cardiac arrest) and mrutyu(death) as the toxic effects of asodhitha Vatsanabha.[5] Susrutha has described grivasthambha(neck stiffness) and pittavinmutranetra(yellowish discolouration of eyes, stool, urine) as the toxic symptoms.[6] According to modern toxicology, roots of Vatsanabha is highly toxic and possess toxic principles like deterpene alkaloids such as aconitine, misaconitine and hypaconitine etc. Deterpene alkaloids are known neurotoxins that can

cause conduction block and paralysis through their action on voltage sensitive sodium channels in the axons, which result in initial neurological stimulation, followed by depression of myocardium, smooth and skeletal muscles, CNS and peripheral nervous system. Symptoms appear within 30 minutes after ingestion and lasts upto 30 hours. Typical features of aconitine poisoning includes symptoms like palpitation, hypertension, ventricular arrhythmias, nausea, vomiting, diarrhoea, paraesthesia, tingling and numbness in the lip, mouth, tongue followed by paralysis of extremities, difficulty in vision due to hippus (initially there is alternate dilation and constriction of pupils, followed by complete dilation).[7]

Sodhana methods of Vatsanbha[4]: 1st method: well grown Vatsanabha roots are cut into small pieces and taken into a mud pot, to this fresh gomutra is added and placed under hot sun. This is continued for 3 days with the fresh gomutra daily, on 4th day vatsanabha is taken out, external skin is removed and dried.
2nd method: Swedana of small pieces of vatsanabha roots in dolayantra with godugdha for 1yama (3 hours) or 2yama (6 hours).
3rd method: Bhavana of small pieces of vatsanabha roots with gomutra in khalwa yantra for 3 days.
4th method: swedana of small pieces of vatsanabha roots with triphala kwatha or with Ajadugdha or with Gomutra for 24 hours.

Changes after sodhana

- Suddha Vatsanabha possess katu, tikta kashaya rasa, ushna guna, yogavahi and rasayana properties.[4]

- Aconitine percent before Gomutra shodhana was 0.113% and after shodhana it reduced to 0.089%. The total microbial count of raw Vatsanabha was 18400cfu/g, it reduced to 11500cfu/g after shodhana by Gomutra.[8]

- According to TLC research, pseudoaconitine and aconitine are transformed into much less poisonous compounds such as veratroyl pseudoaconine and benzoylaconine respectively after shodhana.[2]

- After shodhana process total alkaloid content was reduced, total alkaloid content in asuddha Vatsanbha was 0.45% w/w and after sodhana it was reduced to 0.08%w/w which was 5½ times less than asuddha Vatsanabha[2] but content of less toxic substances such as aconine, hypoaconine and benzyl hypoaconine increased, possibly due to conversion of aconitine into aconine or hydrolysis of the alkaloids to their respective amino alcohol.[9]

- Study was done to compare physico-chemical parameters and HPLC analysis of 3 different samples of Tribhuvankirti Rasa (TKR) prepared using impure ingredients (Asusddha Vatsanbha, asuddha Hingula, asuddha Tankana - sample-1). Tribhuvan kirti rasa prepared with Gomutra sodhita Vatsanbha, suddha Hingula, suddha Tankana-sample 2, Godugdha sodhita Vatsabha, suddha Hingula, suddha Tankana- sample 3 and 3 market samples of 3 different companies. LOD at 105°C was less in market samples than self-prepared samples; this may be due to moisture and fat content of sodhana media in self-prepared samples. Total Ash and Acid insoluble Ash was found higher in TKR prepared with asuddha Vatsanabha indicating more inorganic content. The water and alcohol soluble extractive values indicated that all the samples of TKR were soluble in water and alcohol. All samples of Tribhuvankirti Rasa were basic. Reverse phase chromatography (RP-HPLC), revealed that all samples contains alkaloids but highest amount of same alkaloid was seen in TKR prepared with asuddha Vatsanbha. The toxic principle (aconitine) in market and self-prepared samples of TKR was reduced after shodhana. In Addition flavonoids, glycosides and antioxidants were found which are beneficial for health.[9]

- HPLC Quantification study specifies that there is presence of one common component Aconitine in the raw Vatsanbha, Gomutra sodhitha Vatsanbha, Godugdha sodhita Vatsanabha but area under curve and assay % was reduced from 0.0267% (raw Vatsanabha) to 0.00205% and 0.0192% after shodhana with Gomutra and Godugdha respectively. This provides an idea that none of the shodhana procedure completely denature the aconitine responsible for therapeutic and pharmacological action of Vatsanabha root and also Gomutra is a better extraction media than Godugdha as far as toxic alkaloid aconitine is concerned.[10]

- Experimental study was carried out to evaluate the effect of shodhana on chronic toxicity and to assess the effect of recovery period of aconite on 42 Charles Foster Strain Albino Rats by dividing them into 4 groups. Group 1 receving vehicle (1ml 3% gum acacia solution in 100ml distilled water), group 2 receving raw Vatsanabha (RV), group 3 receving Gomutra sodhitha Vatsanabha (SM), group 4 receving Godugdha sodhita Vatsanabha (SD), in 6.25mg/kg dose which was 5 times more than the therapeutic effective dose. The schedule was continued for 90 days with daily single dose of test drug and vehicle. On 91st day, 6 rats from each group were sacrified for haemotological, biochemical and histopathological studies, after recording body weight. 6 Rats from each group were kept for recovery study for 30 days without administering any drug and only on normal diet and tap water. On 31st day animals were sacrified for haemotological, biochemical and histopathological studies.[11] Body weight is increased in group SM & SD indicating normal progressive health status of animals but decrease of weight in Group RV is suggestive of toxicant induced degeneration.[11]

Table No. 1: Changes in Biochemical, Haematological and Histological observations.[11]

Parameters	Group 2 RV	Recovery group RV (R)	Group 3 SM	Recovery group SM (R)	Group 4 SD	Recovery group. SD (R)
Biochemical observations	Significant decrease in serum triglyceride level and serum alkaline phosphtase	Significant increase in blood sugar level Significant increase in Serum cholesterol and triglyceride level Serum urea and creatinine level was increased	Significant decrease in serum alkaline phosphatase	Non-significant increase in blood sugar level Significant increase in Serum cholesterol and triglyceride level Serum urea and creatinine level was increased	Significant decrease in serum cholesterol level, alkaline phosphatase level and significant increase in serum creatinine level.	Non-significant increase in blood sugar level Significant increase in Serum cholesterol and triglyceride level Serum urea and creatinine level was decreased.
Haemotological observations	Significant decrease in Hb%	Increase in Hb%. Non- significant increase in total RBC count & Haematocrit value. Non-significant increase in Total WBC count.	No Significant change in Hb%	Increase in Hb%. Non- significant increase in total RBC count & Haematocrit value. Non signiicant increase in Total WBC count.	Significant decrease in red cell distribution width, lymphocyte count and significant increase in granulocyte count.	Decrease in Hb%. Non-significant increase in total RBC count & decrease in haematocrit value. Non signiicant increase in Total WBC count.
Histopathological observation.	Peri-arteriolar cell infiltration in kidney. The prostrate was quiescent.	Normal cytoarchitecture of kidney	The prostrate was quiescent.	Mild fatty changes and haemorrhagic spots were seen in Liver. Mild fatty changes in cytoarchitecture of kidney. The prostrate was active.	Multiple haemorrhagic spots were observbed in kidney.	Normal cytoarchitecture of kidney

A study was done to study the impact of raw aconite (RV), aconite treated in Cow's urine (SM), aconite treated in Cow's milk (SD) on cardiac activity, antipyretic activity and neuro-muscular activity. Careful analysis of the results indicated that as the duration of administration of RV increased, the cardiotoxicity activity also increased but cardiotoxicity principle was removed after shodhana which was evident by evaluation of ECG parameters. A significant anti-pyretic effect was found in RV treated group which was comparable to that of paracetamol. The body temperature lowering activity was found to be less in SM and SD treated group. Muscle relaxant activity of RV in leech dorsal muscle was observed but SM and SD treated group showed myo-contraction activity.[12]

DISCUSSION

Vatsanabha is the only Mahavisha which is still identified and available. The formulations containing aconitum roots are highly effective in treating diseases like swasa, kasa, vatarakta, jwara, kustha, pandu, amavata, agnimandhya, grahani, gulma[13] etc. It is considered as cardiac poison in contemporary science due to the presence of toxic principles like aconitine, pseudoaconitine etc. Asodhitha Vatsanbha if administered in any form will cause symptoms such as daha, moha, hrudgatirodhana and mrutyu.[14] Hence in ayurveda various medias like Gomutra, Godugdha and Triphala kwatha are advised for Vatsanbha Shodhana with the intention of reducing its toxicity and modifying its pharmacological actions.

Gomutra and Godugdha are used for shodhana probably due to their vishaghna property and their gunas are contrast to visha. After sodhana with these medias, toxic alkaloid content in Vatsanbha was reduced, which may be due to the presence of some enzymes in media which reduced the toxic alkaloid and toxic constituents of Vatsanabha was converted into less toxic substance.[15]

The HPLC graphs of Tribhuvankirti rasa prepared with Godugdha shoditha Vatsanbha are nearly similar to HPLC graphs of the market samples of TKR, hence it can be said that market samples might be prepared from Godugdha shodhitha Vatsanabha. HPLC revealed that some constituents were decreased and some were added with the effect of shodhana and shodhana media. The toxic principle aconitine was reduced after shodhana and addition of flavonoids, glycosides and anti-oxidants were found which are beneficial for health.[9]

The effect of chronic toxicity and recovery period after chronic toxicity of raw Vatsanbha, Gomutra sodhitha Vatsanabha and Godugdha shoditha Vatsanabha revealed

that raw Vatsanabha was highly toxic in chronic exposure, Gomutra sodhitha Vatsanabha had no apparent toxicity and Godugdha sodhitha Vatsanabha had mild toxicity in kidney. The changes in parameters after shodhana may be due to conversion of alkaloid aconitine to aconine. Sudden withdrawal of Gomutra shodhitha vatsanabha could cause adverse effects, suggestive of tapering withdrawal. The toxicity of aconite is reversable after certain period of withdrawal.[11]

Raw aconite showed cardiac depressant property but cardiac stimulant property was observed with Gomutra shoditha Vatsanabha. Sodhana by both Gomutra and Godughda makes aconite devoid of cardiac and neuro muscular toxicity.[7] Aconitine group of alkaloids has the body temperature lowering effect. After shodhana total alkaloids content was reduced which may be considered as the cause of low antipyretic activity exhibited by SM and SD than RV.Myo-relaxant activity of raw Vatsanabha was reversed after shodhana treatment and myo-contraction activity was observed.[12]

CONCLUSION

Vatsanabha (Aconitum ferox) constitute a major ingredient in many Ayurvedic formulations. Vatsanabha tuber contains 0.3% to 2.0% of aconite which causes cardio toxicity, GI toxicity and neurotoxicity. Sodhana is employed to eliminate toxic constituent thus minimizing the side effects and improving the potency of drug. After shodhana the total alkaloid content was reduced and transformation of constituents into much less poisonous compounds was observed. Shodhana media has an important role in reducing toxicity, as it was observed in In-Vitro studies where Gomutra shodhitha Vatsanabha showed no apparent toxicity than Godugdha shoditha Vatsanabha and raw vatsanabha. Shodhana process is capable of removing cardiac and neuromuscular toxic aconitine related alkaloids and though it leads to some loss of antipyretic activity but do not remove the benefit in a drastic manner. Vatsanabha purified with traditional methods improves potency and reduces toxicity, thus making it suitable for internal administration and curing the disease.

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