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Review Article

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"UPAVISHA DRAVYA AND SHODHANA: A CRITICAL REVIEW OF EXPERIMENTAL EVIDENCE THAT CLASSICAL PURIFICATION REDUCES THE TOXICITY OF VATSANABHA, KUPILU, BHALLATAKA AND LANGALI"

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ABSTRACT
Upavisha are plant drugs classified in Rasashastra as semi-poisonous but therapeutically useful, and classical texts prescribe that they be processed by shodhana before use. Shodhana uses media such as cow's urine, cow's milk, ginger juice and sour gruel. Whether these procedures reduce toxicity, and how, can now be tested with analytical chemistry and pharmacology. This review appraises the experimental evidence for four upavisha: Vatsanabha (*Aconitum* spp.), Kupilu (*Strychnos nux-vomica*), Bhallataka (*Semecarpus anacardium*) and Langali (*Gloriosa superba*). For aconite, shodhana in cow's milk or urine converted toxic diester diterpenoid alkaloids into less toxic monoesters. Depending on species and medium, aconitine fell by 23–91%, with milk more effective than urine. In rats, shodhana-treated aconite lost the cardiac and neuromuscular toxicity of the raw root while largely retaining antipyretic activity. For Kupilu, shodhana in ginger juice reduced strychnine by about 68% and brucine by 40–48%, and sour gruel by about 39% and 18%. For Bhallataka, shodhana reduced oil and phenolic content and changed chemical fingerprints, but quantitative data on urushiol-type toxins are scarce. For Langali, colchicine fell by 30–76% with Thai traditional pretreatments, while Indian shodhana data are limited. The evidence supports the principle that shodhana reduces key toxic constituents, but reductions are partial and variable, and no study links shodhana to clinical outcomes. We recommend marker-based acceptance limits for processed upavisha, standardised procedures, and pharmacovigilance.

KEYWORDS: Upavisha, shodhana, Vatsanabha, aconitine, Kupilu, strychnine, Bhallataka, Langali, colchicine, Rasashastra

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INTRODUCTION

Ayurveda has always used potent and even poisonous substances as medicines, on the principle that a poison correctly prepared and used can become an excellent drug.[1] Rasashastra texts distinguish visha (major poisons) from upavisha (lesser poisons), a group of plant drugs that are toxic in their raw state but therapeutically valuable after proper processing. Rasa Tarangini lists among the upavisha Vatsanabha, Kupilu, Bhallataka, Langali, Dhattura, Arka, Snuhi, Karavira and Gunja, and gives specific shodhana procedures for each.[2] These procedures typically involve soaking, boiling or steaming the drug in media such as cow's urine (gomutra), cow's milk (godugdha), ginger juice (ardraka svarasa) or sour gruel (kanji), sometimes for several days.

Poisoning with incompletely processed upavisha remains a clinical reality. Aconite poisoning from herbal preparations, for example, causes life-threatening arrhythmias and neurological effects.[3] Shodhana is therefore not merely a ritual but a safety-critical step in manufacturing. This review appraises experimental evidence on whether shodhana reduces the toxic constituents and toxicity of four upavisha for which analytical and pharmacological studies exist, and considers what the evidence means for quality standards.

METHODS

This is a critical narrative review. We searched PubMed, AYU and other Indian journals, publisher websites and repositories for studies that measured toxic constituents or toxicity of upavisha before and after shodhana. We focused on four drugs with well-defined toxic markers: aconitine-type alkaloids in Vatsanabha, strychnine and brucine in Kupilu, urushiol-type phenolics in Bhallataka, and colchicine in Langali.

EVIDENCE BY DRUG

Table 1 summarises the key findings.

Table 1. Experimental evidence on the effect of shodhana on toxic constituents and toxicity of selected upavisha.

Drug	Toxic marker	Shodhana medium	Main finding
Vatsanabha (*Aconitum* spp.)	Aconitine, mesaconitine, hypaconitine	Cow's milk; cow's urine	Aconitine reduced by 73–91% with milk and 23–66% with urine across three species; diesters converted to monoesters[4]
Vatsanabha	Pharmacological toxicity	Cow's urine; cow's milk	Raw root caused tachycardia and QRS prolongation in rats; processed root did not; antipyretic effect retained[5]
Kupilu (*Strychnos nux-vomica*)	Strychnine, brucine	Ardraka svarasa; kanji	Strychnine reduced by about 68% (ginger juice) and 39% (kanji); brucine by about 40–48% and 18%[6]
Kupilu	Strychnine, brucine	Water; cow's milk (Persian methods)	Boiling in water reduced both by about half; milk methods by about a quarter[7]
Bhallataka (*Semecarpus anacardium*)	Phenolics (urushiol-type)	Brick powder and others	Lower oil, phenolic and flavonoid content; altered HPTLC, NMR and GC-MS profiles[8,9]
Langali (*Gloriosa superba*)	Colchicine	Gomutra (Indian); Thai heat methods	Thai pretreatments reduced colchicine by 30–76%;[10] Indian sodhana study reported a change[11]

Vatsanabha

Aconite roots owe their toxicity mainly to diester diterpenoid alkaloids such as aconitine, mesaconitine and hypaconitine, which act on voltage-gated sodium channels in heart and nerve.[3] A comparative study of three *Aconitum* species found that shodhana in cow's milk reduced aconitine by about 73–91% and shodhana in cow's urine by about 23–66%, while the Chinese method of boiling in water reduced it by about 83–93%.[4] All three methods converted diesters into monoester alkaloids, which are considerably less toxic, and the authors ranked their efficiency as water processing, then milk, then urine.[4] In a pharmacological study, raw aconite increased heart rate and prolonged the QRS complex and repolarisation in rats and acted as a muscle relaxant, whereas aconite processed in cow's urine or milk showed none of these cardiac effects,

and the antipyretic activity was largely retained.[5]

These findings support the classical rationale. They also show that the reduction depends on the species and the medium, and that cow's urine, the medium most often prescribed for Vatsanabha, was the least efficient in the comparative study.[4] A batch processed by the classical method may therefore still contain appreciable aconitine.

Kupilu

Kupilu seeds contain strychnine and brucine, which are convulsant alkaloids. In a study at Jamnagar, shodhana in ginger juice reduced strychnine content by about 68% and brucine by 40–48%, while shodhana in kanji reduced them by about 39% and 18%.[6] A study of three traditional Persian methods found that boiling in water reduced both alkaloids by about half, whereas methods based on soaking or boiling in milk reduced them by about a quarter, and the authors argued that each method suited a different indication requiring a different alkaloid dose.[7] Classical texts similarly link the choice of shodhana method to the intended use.[2]

Bhallataka

Bhallataka fruit contains a vesicant oil rich in urushiol-type phenolic compounds (bhilawanols) that cause severe contact dermatitis. Classical shodhana includes rubbing with brick powder and washing, among other procedures.[2] Studies have shown that shodhana reduces oil, phenolic and flavonoid content and changes the chromatographic and NMR fingerprints of the fruit,[8] and GC-MS analysis suggested conversion of a urushiol derivative to an anacardol derivative.[9] Quantitative data on specific toxic phenolics before and after shodhana are scarce, so the extent of detoxification cannot yet be stated.

Langali

The tuber of *Gloriosa superba* contains colchicine, whose toxicity is well known. An Indian study examined the change in colchicine during sodhana with cow's urine,[11] but its full results were not accessible to us. A Thai study of five traditional heat-based pretreatments found reductions in colchicine of 30–76%, with stewing the most effective.[10] These methods are not identical to Ayurvedic shodhana, but they confirm that processing can substantially reduce colchicine content.

APPRAISAL

Taken together, the studies support the principle that shodhana reduces the key toxic constituents of upavisha. Three qualifications are important. First, the reductions are partial and variable: no method removed the toxic marker entirely, and efficiency differed with species, medium and duration.[4,6] Second, the mechanisms differ: some media appear to leach alkaloids, others to convert them chemically into less toxic derivatives, and in several studies the derivatives were inferred rather than measured.[4,6] Third, almost all evidence is analytical or from animal experiments. No study has linked shodhana to a lower rate of poisoning in patients, and the safety margin of a processed batch depends on how much toxin remains relative to the dose used.

Studies also vary in how they describe the starting material and the process. Species, plant part, source, duration, temperature and ratio of drug to medium are not always reported, which makes results hard to compare or reproduce.[12]

A DRAVYAGUNA AND RASASHASTRA PERSPECTIVE

The evidence is consistent with the classical view that shodhana transforms a poison into a medicine rather than simply removing it. In aconite, the conversion of diesters into monoesters reduced cardiotoxicity while largely preserving antipyretic activity,[5] which matches the classical aim of reducing harmful effects without losing therapeutic action. The Persian Kupilu study offers a parallel: different processing methods, each suited to a different use, left different amounts of alkaloid.[7] The classical association of particular shodhana methods with particular indications may therefore reflect deliberate control of the residual dose.

RECOMMENDATIONS

- Specify maximum limits for toxic markers in processed upavisha (for example, aconitine in shodhita Vatsanabha and strychnine in shodhita Kupilu) in pharmacopoeial monographs.
- Standardise shodhana procedures, including species, ratio, duration and temperature, and validate each against marker reduction.
- Quantify both the parent toxins and their less toxic derivatives, so that conversion as well as removal is measured.
- Report full process details and characterise starting and processed material in all studies.[12]
- Strengthen pharmacovigilance for

formulations containing upavisha, particularly aconite, given the severity of poisoning.[3]

LIMITATIONS

This review covers four upavisha only and draws on a small number of studies, several from single laboratories. Some key studies could be summarised only from their abstracts or secondary sources, and non-Indian processing methods were included where Indian data were lacking.

CONCLUSION

Experimental studies support the classical claim that shodhana reduces the toxic constituents of upavisha, most clearly for aconite and nux vomica, and in aconite this is accompanied by loss of cardiotoxicity with retained therapeutic activity. Reductions are partial and depend on the medium and the species, and evidence for Bhallataka and Langali is limited. Shodhana should be treated as a validated manufacturing step with measurable endpoints, so that each processed batch meets a defined limit for its toxic markers.

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