



Pharmacological Review on Purification of *Visha Dravyas* (Poisonous Plants) According to *Ayurveda*

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ABSTRACT: *Visha* possess properties of *Vyavayi*(Pervading or diffusing action), *Vikasi*(Dispersed through out the body causes destruction of *Ojas* and *Dhatu Kshaya* or depletion of the body tissues, *Ushna*(Heat), *Teekshna*(Penetrating), *Ruksha*(Dry), *Sukshma*(Minuteness), *Ashukar*(Quick or immediate action), *Vishada*(Clearness), *Laghu*(Light), *Avyakta Ras*(Taste sometimes palatable and sometimes not palatable or the taste is hidden) and *Apaki*(Not digestible). It distributes in the whole body immediately first and later undergoes digestion. Hence causes the vitiation of *Dosha*(*Vata-Pitta-Kapha*) and *Dhatu*(*Rasa-Rakta-Mamsa-Meda-Asthi-Majja-Shukra*) and produces the poisonous effects. The drugs which act against and subside poisonous effects on the vitiated *Dosha*(*Vata-Pitta-Kapha*) and *Dhatu* viz; *Rasa*(Plasma), *Rakta*(Blood), *Mamsa*(Muscle tissue), *Meda*(Fat), *Asthi*(Bones), *Majja*(Bone marrow), *Shukra*(Semen) are called as *Vishaghna Dravyas*. *Visha* has been defined as a substance which is destructive or life threatening and causes *Shoka*(Sadness). There are many poisonous drugs described in *Ayurvedic* classics along with their antidotes and their pharmacological actions after purification. Poisonous plants may be categorized under the chemical structure of the toxic constituents, their phylogenetic relationship viz; plants that are poisonous to eat, plants that are poisonous upon contact, plants that produce photo sensitization, and plants that produce airborne allergies conditions in the body. The phytotoxins, comprise a vast range of biologically active chemical substances, such as alkaloids, polypeptides, amines, glycosides, oxalates, resins, toxalbumins. The present review describes the different process of detoxification or purification methods (*Sodhana*) in *Ayurvedic* system of medicines. So here an attempt is made to screen the *Visha Dravyas*(Poisonous plants) and their purification methods in various media along with their *Rasa*, *Guna*, *Veerya* and *Vipaka*, *Prabhava* from the various *Ayurvedic* classical texts along with their pharmacological actions.

KEYWORDS: *Ayurveda*, Poisonous plants, Purification of drugs, Pharmacological actions, *Visha Dravyas*, *Vishaghna Dravyas*, *Shodhana*,

INTRODUCTION

Most of the *Ayurvedic* medicines are derived from the plant kingdom. Many *Ayurvedic* plant chemicals have been isolated and introduced for the treatment of various diseases. Some of the medicines have been withdrawn due to their toxicity or side-effects^[1,2,3]. Most of the plant drugs are safe, but few are toxic for human health. These poisonous or toxic plants are categorized as *Visha* (Poison) and *Upavisha* (Toxic but not lethal for human health) in *Ayurvedic* texts^[4] and also listed in the Schedule-E of Drugs and Cosmetics Act 1940^[5]. To promote and introduce their use for medicine, such plant drugs must be detoxified and purified before their use.^[6] The detoxification or purification process of poisonous plants used for medicinal purposes is termed as *Sodhana*. The *Sodhana*(Purification) process is specially designed for the plant drugs and mineral origin drugs to detox the or to inactivate the toxic chemical components. Purification is recommended for all kinds of drugs to remove their *Doshas* (Impurities or toxic content). It is mentioned in the treatises of *Ayurveda* that by the use of properly processed *Visha*(Poisonous drug) can be converted into *Amruta* (Nectar) and on other hand on adoption of inappropriate methods leads to *Visha*(Toxic) and *Pranahara*(Lethal) to the body.^[7] The *Sodhana* of poisonous plants not only covers the process of purification or detoxification of physical as well as chemical components but also minimize the side effects and also improving the potency and therapeutic efficacy of the drug^[8]. Active constituents of many plant drugs may exhibit severe toxic effect at high concentrations^[9,10,11]. *Ayurvedic* classics have emphasized various methods of *Sodhana*(Purification process) to overcome the undesired effects from poisonous and non poisons drugs^[12,13,14] and involving different specific media to the substances such as *Godugdha*(Cow's milk), *Gomutra*(Cow's urine), *Triphala Kashaya*

(Decoction of combination of three fruits, *Terminalia chebula*, *Terminalia bellarica* and *Emblica officinalis*) and lemon juice, ginger juice etc.^[15,16]

AIMS AND OBJECTIVES

- Highlighted the pharmacological actions of *Visha Dravyas*(Indian poisonous plants).
- To review poisons, their signs and symptoms of toxicity, purification methods according to digital data and *Ayurvedic* literature.
- Therapeutic applications of *Shodhita*(Purified) poisonous drugs

MATERIAL AND METHODS

- The poisonous plants were highlighted on the basis of classical *Ayurvedic* texts and explored their potency with the pharmacological actions.
- The poisonous drugs were screened with help of digital data and *Ayurvedic* classical texts and enumerated according to their *Rasa*(Tastes), *Guna*(Qualities), *Veerya*(Potency), *Vipaka*(Taste after end of the digestion), *Prabhava*(Special effects) with their references.

DISCUSSION

The poisonous plants viz; Vatsanabha, Gunja, Kupilu, Dhatura, Bhallataka, Karavira, Guggulu, Vacha, Langali, Chitraka, Kumbhini, Ahiphena, Bhanga. The Rasapanchaka are tabulated as follows;

Sl. No	Dravya-Drug Name	Rasa-Taste	Guna-Properties	Virya-Potency	Vipaka-Post digestive effect
1.	Vatsanabha	Madhura	Ruksha, Tikshna, Laghu, Vyavayi, Vikasi	Ushna	Madhura
2.	Gunja	Tikta, Kashaya	Laghu, Ruksha, Teekshna	Ushna	Katu
3.	Kupilu	Tikta, Katu	Ruksha, Laghu, Teekshna	Ushna	Katu
4.	Dhatura	Tikta, Katu	Ruksha, Laghu, Vyavayi, Vikasi	Ushna	Katu and Madaka
5.	Bhallataka	Katu, Tikta, Kashaya	Laghu, Snigdha, Teekshna	Ushna	Madhura
6.	Karavira	Katu, Tikta	Laghu, Ruksha, Teekshna	Ushna	Katu
7.	Guggulu	Tikta, Katu	Laghu, Ruksha, Teekshna, Vishada, Sookshma, Sara, Sugandhi	Ushna	Katu- Tridosahara
8.	Vacha	Katu, Tikta	Laghu, Ruksha,	Ushna	Katu- Medhya
9.	Langali	Katu, Tikta	Laghu, Tikshna	Ushna	Katu- Garbhapatana
10.	Chitraka	Katu	Laghu, Ruksha, Teekshna	Ushna	Katu
11.	Kumbhini	Katu	Guru, Ruksha, Teekshna	Ushna	Katu
12.	Ahiphena	Tikta, Kashaya	Laghu, Ruksha, Sukshma, Vyavayi, Vikasi	Ushna	Katu- Madaka
13.	Bhanga	Tikta	Laghu, Tikshna	Ushna	Katu- Madaka

VATSANABHA- Many species of the genus *Aconitum* viz., *Aconitum ferox* Wall., *Aconitum napellus* Linn., and *Aconitum chasmanthum* Holmes ex. Stapf. are known under the common name “*Vatsanābha*” in Sanskrit. The roots of all the three plants are extremely poisonous but useful in the treatment of various diseases such as fever, rheumatoid arthritis, sciatica, hypertension and acts as “*Rasayana*” (Immunomodulators) after their detoxification^[17,18,19]. Most of the alkaloids present in the root of *Aconitum* species are to have cardiotoxic and neurotoxic effects. Its purification process includes *Swedana* (boiling) in *Dola*



Yantra using *Godugdha* for 3 hours daily for three continuous days, followed by washing with water thrice and drying under sun light^[17,18]. After *Sodhana* process, the total alkaloid content decreases^[11] but the contents of less toxic substances such as aconine, hypoaconine, and benzylhypoaconine increases^[19,20] possibly due to conversion of the toxic aconitine into aconine or hydrolysis of the alkaloids to their respective amino alcohols after *Sodhana* process^[21,22].

GUNJA- The *Abrus precatorius* Linn. roots, seeds, and leaves have been used traditionally for their *Rechaka*(Purgative), *Vami*(Emetic), *Balya*(Tonic), *Vrishya*(Aphrodisiac), and *Keshya*(Hair growth promoting properties) after being processed through *Sodhana*^[24,25] The *Abrus* seeds contain a toxic lectin, abrin (an albumotoxin), a fat-splitting enzyme, a glucoside (abruccic acid), urease, abarnin, trigonelline, choline, hypaphorine, and steroidal oil that have abortive effects^[26,27,28]. In *Sodhana* of *Gunja* seeds, they are subjected to the *Swedana*(Boiled) in *Dola Yantra* with *Godugdha*(Cow's milk) or *Kanji*(One of the fermented liquid media) for 3–6 h. The *Sodhita Gunja* is then subjected to washing with hot water and drying under shade^[23]. The efficacy studies on hair growth and antibacterial effect of the *Sodhita Gunja* show significant result^[29,30].

KUPILU- The *Strychnos nux-vomica* Linn. is extensively used in various health conditions like nervous debility, paralysis, weakness of limbs, sexual weakness, dyspepsia, dysentery, and rheumatism after proper *Sodhana*^[31,32] The *Kupilu* has been reported to contain active alkaloids like strychnine and brucine, which are highly poisonous^[33,34]. Classical method of purification includes, soaking of *Kupilu* seeds in liquid media one after another for 3 to 20 days. The liquid media include soaking the *Kupilu* seeds for 3 days in *Kanji*, boiling for 3 hours in *Godugdha*(Cow's milk), soaking in *Gomutra*(Cow's urine) for 7 days and *Goghṛta* (Fried till brownish red in color and swollen) whereas traditional practitioners use *Eranda Taila*(Castor oil) instead of *Ghṛta*(Cow's ghee) to fry^[35] or immerse the seeds in the juice of *Kumari*(*Aloe vera*) for 15 days, followed by *Ardraka Swarasa*(Ginger juice) for 7 days^[36] for purification. After *Sodhana* process, the seeds are washed with lukewarm water where the outer seed coat and embryo are removed from the cotyledons^[37]

DHATTURA- The *Datura metel* Linn. The toxic effects are dryness of the mouth, excessive thirst, cramps, unconsciousness, and giddiness due to anticholinergic property of the alkaloids present in this plant. In the purification process of *Dhattura* seeds are soaked in freshly collected *Gomutra*(Cow's urine) and kept aside for 12 hours. After washing, the seeds are transferred to the *Dola Yantra* for *Swedana*(Boiling) process for 3 hours. The seeds are again washed with lukewarm water and allowed to dry and the seeds testa are removed^[12]. Complete removal of scopolamine and partial removal of hyosciamine reflects the importance of *Sodhana* of *Dhattura* by means of which the toxins are removed^[10]

BHALLATAKA- The fruit of *Semecarpus anacardium* Linn., is a potent drug for nervous debility, rheumatism, epilepsy, sciatica, asthma, and many more diseases^[38]. Bhillawanol and anacardic acids are the phyto constituents responsible for the irritation, blisters, toxicity and contact dermatitis^[39,40,41]. The *Shodhana* procedure of *Bhallataka* includes soaking the fruits in *Gomutra*(Cow's urine), *Godugdha*(Cow's milk) and rubbing it on brick powder. After removing the thalamus portions, the fruits are kept either in *Gomutra*(Cow's urine) for 7 days or *Godugdha*(Cow's milk) for 7 days, followed by washing with water. The seeds are then shifted to a bag containing *Isthika Choorna*(Brick powder) for 3 days, then rubbed thoroughly and dried^[16]. Brick powder has adsorbent property because of which it absorbs irritant oils in the fruit. An Antioxidant activity of *Bhallataka* decreases but the safety profile of the drug increases as the toxic phenolic oil is removed during *Sodhana*^[42]. In addition, after *Sodhana*, the plant showed normal anti-arthritic activity.^[43]

KARAVIRA- The *Nerium indicum* has anti-stress, anti-inflammatory, antifungal, cardiotoxic, neuroprotective and anticancer activities^[44]. This plant contains a mixture of toxic cardiac glycosides, the cardenolides^[45,46] particularly oleandrin and neriine^[47] Roots of *Karavira* are purified by *Swedana*(Boiling) process in *Dola Yantra* using *Godugdha*(Cow's milk) for 3 hours. After *Sodhana*, the roots are washed with water and dried^[12]. It was also observed that *Sodhita*(Purified) *Karavira* showed no reported toxicity in animal models^[48].

GUGGULU- The *Commiphora mukul* Hook. Ex. Stocks. is an oleo-gum resin. Its purification process involves *Swedana*(Boiling) of *Guggulu Pottali*(Preparing ball like structure with the help of cotton cloth) in *Dola Yantra* by using various media such as *Triphala Kwatha*(Fruits decoction of *Terminalia bellerica*, *Terminalia chebula*, *Emblca officinalis*), *Godugdha*(Cow's milk) and *Gomutra*(Cow's urine). When all the *Guggula* dissolves in media, *Pottali* is to be removed and the liquid is evaporated to collect *Shodhita*(Purified) *Guggulu*. It is mentioned in literature that *Shodhana* of *Guggulu* may



increase the specific action such as increasing mobile property, body tonic property, and bio availability^[49,50] *Shodhita Guggulu*(Purified Guggulu) shows considerable antispasmodic activity against spasms induced by acetylcholine, histamine and barium chloride on ileum of guinea pigs and Wistar rats, which are absent in *Ashodhita Guggulu*^[15]

VACHA- The rhizome of *Acorus calamus* Linn. used as brain tonic, appetizer, emetic, and antiepileptic^[51]. It is also tranquilizing, antimicrobial, antidiarrheal, antidyslipidemic, neuroprotective, antioxidant, anticholinesterase, spasmolytic, antiulcer, anthelmintic, anti-inflammatory, and analgesic activities^[52,53,54,55]. Though *Vacha* does not come under poisonous drug category, yet some *Ayurvedic* texts like *Ayurvedic Pharmacopoeia of India* have been recommended *Shodhana*(Purification) process for *Vacha* rhizome^[56]. The major active principles present in the *Vacha* are α and β -asarone, calamene, calamenol, calameone, α -pinene, camphene, and eugenol^[57,58]. Most of the pharmacological actions of *Vacha* are due to aromatic oils and β -asarone^[59]. The *Shodhana*(Purification) procedure involves boiling of *Vacha* successively by *Gomutra*, *Mundi Kwatha* (Decoction prepared from whole plant of *Sphaeranthus indicus*) and *Pancha Pallava Kwatha*(Decoction made of five leaves viz; *Amra*(Mango), *Vata*(Banyan), *Ashwattha*(Fucus), *Bakul*(*Mimosops elengi*), *Panasa*(Jack fruit) for 3 hours. After that it is treated with *Gandhodaka*(Aromatic water) for 1 hour. After *Shodhana*(Purification) process, the rhizomes are shade dried for 12 days. Multiple processes of heating with different media lead to the decrease in the content of β -asarone due to its volatilization^[60]. As per the study conducted by Bhat et al.,^[61] pre treatment of rats with both raw and *Shodhita Vacha* exhibit significant anticonvulsant activity by decreasing the duration of tonic extensor phase.

LANGALI- The *Gloriosa superba* Linn., is a semi-woody herbaceous climber which is used in inflammations, gout, rheumatoid arthritis, gonorrhea, fever and in promoting labor pains. The colchicine present in this plant is reported for its toxic effects, particular cardiotoxicity^[62,63,64,65,66]. The species also contains another toxic alkaloid, gloriosine^[67,68]. The *Shodhana* (Purification) process involve the soaking of roots and seeds in *Gomutra*(Cow's urine) for 24 hours and then washed with warm water^[11]. After the *Shodhana*(Purification) process the level of colchicine significantly reduces as colchicine is polar in nature and therefore soluble in *Gomutra*(Cow's urine) and water^[69]

CHITRAKA- The *Plumbago zeylanica* Linn., is commonly used as appetizer, digestive, in irritable bowel disease, pain and piles. Plumbagin at higher doses has been reported to be highly cytotoxic.^[70] *Chitraka* in higher dose may causes paralysis due to presence of plumbagin. For purification process, *Chitraka* is soaked in lime mixed with water for 24 hours. The same procedure is repeated for another 24 hours^[18]. It has been reported that *Shodhana*(Purification) of *Chitraka*, removed 50% of plumbagin^[71]. In another comparative study has been reported that after the *Shodhana*(Purification), plumbagin content is comparatively reduced in the roots of *Chitraka* significantly as compared to roots of *Plumbago indica*^[72]

KUMBHINI- The *Croton tiglium* is widely used for constipation, dyspepsia, dysentery, intestinal inflammation, and other gastrointestinal disorders. The seeds contain an irritating oil, a toxic protein constituent, croton which is composed of a crotonglobulin and a crotonalbumin^[73] and also strong purgative principles such as phorbol esters and crotonic acid^[74,75]. *Kumbhini* seeds are purified by *Swedana* (Boiling)with *Godugdha*(Cow,s milk)in a *Dola Yantra* for 3 hours, after removing its covering which are later triturated with lemon juice.^[12] The phorbol content and toxicity of the croton oil has been reported to significantly reduced after the *Shodhana*(Purification) process^[76]. Significant changes were observed in the physicochemical parameters of seeds after *Shodhana*^[77]. The quantity of major purgative principles phorbol ester and crotonic acid in non purified *Kumbhini*. The Crotonic acid content was found to be absent in the purified seed extract of *Croton. tiglium*^[78]

AHIPHENA- The opium obtained from the fruits of *Papaver somniferum* Linn. is bitter, astringent, sweet, constipating, aphrodisiac, sedative, narcotic, myotic, and antispasmodic. It is used for the treatment of cough, fever, inflammatory affections of eye, proctalgia(Pain due to spasm of pelvic floor muscles, muscles of anal sphincters or the muscles of the rectum) and low back pain due to diarrhea and dysentery, migraine, malaria, dysmenorrhea, cystitis, menorrhagia, and other painful conditions^[79]. Major constituents of opium are morphine and papavarine. Large dose of opium exhibited toxic effects of central nervous system, induces sleep, relieves pain and develops euphoria. Toxic effects of opium can be reduced by steeping in cold water for 5 to 6 hours. After this process, the insoluble brown latex obtained is used in the *Ayurvedic* medicine^[80]. Severe toxicity of opium can also be reduced by triturating with *Ardraka Swarasa*(Ginger juice) this process is repeated for 21 times^[6,12].



BHANGA- Leaves of *Cannabis sativa* Linn. are bitter, astringent, tonic, aphrodisiac, alterative, intoxicating, stomachic, analgesic, and abortifacient actions. It is used for the treatment of convulsions, otalgia, abdominal disorders, malarial fever, dysentery, diarrhea, skin diseases, hysteria, insomnia, gonorrhoea, colic, tetanus, and hydrophobia. Its excessive use causes dyspepsia, cough, impotence, melancholy (Feeling of sadness), dropsy, restlessness, and insanity^[31]. In order to reduce these toxic effects, *Bhanga* is boiled with *Babbula Twak Kwatha* (Decoction of Acacia bark) for 3 hours and the powder obtained is triturated with *Godugdha* (Cow's milk)^[6,12]. The toxic effects of *Bhanga* can also be reduced by triturating with *Babbula Twak Kwatha* and frying the powder obtained in *Goghrita* (Cow Ghee)^[18]

CONCLUSION

According to *Ayurveda* classics, even a strong poison can be converted to an excellent medicine if processed and administered properly. On the other hand, even the most useful medicine may become a poison if handled incorrectly. *Ayurvedic Acharyas* tried to develop a number of traditional methods to convert toxic medicinal plants to therapeutic medicinal plants under the influence of various purification methods. The traditional system of *Shodhana* (Purification or detoxification procedures) can influence the phytochemical, pharmacological, and toxicological changes in the drug and thereby useful in increasing safety profile and efficacy of the drugs. Specific media has definitely shown an important role in making a drug to act without causing side-effects or adverse effects. All these drugs possessed with *Katu Rasa* (Pungent taste), *Katu Vipaka* (Pungent in post digestive effect), *Ushna Vira* (Hot in potency), *Laghu* (Light), *Ruksha* (Dry), *Vyavayi*, *Vikasi* Gunas.

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