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), *Raksha* (Dry), *Sukshma* (Minuteness), *Ashukart* (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-Kaphha*) 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-Kaphha*) 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 *Sodhanata* (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 *Vishad* (Poisonous drug) can be converted into *Anruta* (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 bellara* 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, Dhattura, Bhallataka, Karavira, Guggulu, Vacha, Langali, Chitraka, Kumbhini, Ahiphena, Bhanga. The Rasapanchaka are tabulated as follows;

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Dravya-Drug Name</th>
<th>Rasa-Taste</th>
<th>Guna-Properties</th>
<th>Virya-Potency</th>
<th>Vipaka-Post digestive effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vatsanabha</td>
<td>Madhura</td>
<td>Ruksha, Tikshna, Laghu, Vyavayi, Vikasi</td>
<td>Ushna</td>
<td>Madhura</td>
</tr>
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<td>2.</td>
<td>Gunja</td>
<td>Tikta, Kashaya</td>
<td>Laghu, Ruksha, Teekshna</td>
<td>Ushna</td>
<td>Katu</td>
</tr>
<tr>
<td>3.</td>
<td>Kupilu</td>
<td>Tikta, Katu</td>
<td>Ruksha, Laghu, Teekshna</td>
<td>Ushna</td>
<td>Katu</td>
</tr>
<tr>
<td>4.</td>
<td>Dhattura</td>
<td>Tikta, Katu</td>
<td>Ruksha, Laghu, Vyavayi, Vikasi</td>
<td>Ushna</td>
<td>Katu and Madaka</td>
</tr>
<tr>
<td>5.</td>
<td>Bhallataka</td>
<td>Katu, Tikta, Kashaya</td>
<td>Laghu, Snigdha, Teekshna</td>
<td>Ushna</td>
<td>Madhura</td>
</tr>
<tr>
<td>6.</td>
<td>Karavira</td>
<td>Katu, Tikta</td>
<td>Laghu, Ruksha, Teekshna</td>
<td>Ushna</td>
<td>Katu</td>
</tr>
<tr>
<td>7.</td>
<td>Guggulu</td>
<td>Tikta, Katu</td>
<td>Laghu, Ruksha, Teekshna, Vishada, Sookshma, Sara, Sugandhi</td>
<td>Ushna</td>
<td>Katu-Tridosshahara</td>
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<tr>
<td>8.</td>
<td>Vacha</td>
<td>Katu, Tikta</td>
<td>Laghu, Ruksha,</td>
<td>Ushna</td>
<td>Katu- Medhya</td>
</tr>
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<td>9.</td>
<td>Langali</td>
<td>Katu, Tikta</td>
<td>Laghu, Tikshna</td>
<td>Ushna</td>
<td>Katu-Garbhapatana</td>
</tr>
<tr>
<td>10.</td>
<td>Chitraka</td>
<td>Katu</td>
<td>Laghu, Ruksha, Teekshna</td>
<td>Ushna</td>
<td>Katu</td>
</tr>
<tr>
<td>11.</td>
<td>Kumbhini</td>
<td>Katu</td>
<td>Guru, Ruksha, Teekshna</td>
<td>Ushna</td>
<td>Katu</td>
</tr>
<tr>
<td>13.</td>
<td>Bhanga</td>
<td>Tikta</td>
<td>Laghu, Tikshna,</td>
<td>Ushna</td>
<td>Katu-Madaka</td>
</tr>
</tbody>
</table>

**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 *Svedana* (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[19] but the contents of less toxic substances such as aconine, hypoacrine, and benzylhypoacrine 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, abarin, 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[29]. The efficacy studies on hair growth and antibacterial effect of the Sodhita Gunja show significant result[19,29].

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 Goghrta(Fried till brownish red in color and swollen) whereas traditional practitioners use Eranda Taila(Castor oil) instead of Ghrita(Cow’s ghee) to fry[35] or immerse the seeds in the juice of Kumari(Aloe vera) for 15 days, followed by Ardraka Swarasas(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 Dhatura 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 scopoline and partial removal of hyosciamine reflects the importance of Sodhana of Dhatura by means of which the toxins are removed[10].

BHALLATKA- The fruit of Semecarpus anacardium Linn., is a potent drug for nervous debility, rheumatism, epilepsy, sciatica, asthma, and many more diseases[38]. Bilawanol 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-arharit activity[43].

KARAVIRA- The Nerium indicum has anti-stress, anti-inflammatory, anti fungal, cardiotoxic, neuroprotective and anticaner 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, Emblica 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) Guggula. It is mentioned in literature that Shodhana of Guggula may...
increase the specific action such as increasing mobile property, body tonic property, and bio availability\[^{49,50}\] Shodhita Guggula\(^{(Purified Guggulu)}\) 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, antidysepidemic, neuroprotective, antioxidant, anticholinesterase, spasmylolytic, antiulcer, anhelminitic, anti-inflammatory, and algasonic 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 \(\alpha\) and \(\beta\)-asarone, calamene, calamenenol, calameone, \(\alpha\)-pinene, camphene, and eugenol\[^{57,58}\]. Most of the pharmacological actions of Vacha are due to aromatic oils and \(\beta\)-asarone\[^{59}\]. The Shodhana\(^{(Purification)}\) procedure involves boiling of Vacha successively by Gomutra, Mundi Kwatha (Decoction prepared from whole plant of \(\textit{Sphaeranthus indicus}\) and \(\textit{Pancha Pallava Kwatha}\) (Decoction made of five leaves viz: \(\textit{Amra}\) (Mango), \(\text{Vata}\) (Banyan), \(\text{Ashwatha}\) (Fucus), \(\text{Bakul}\) (\(\textit{Mimosops elengi}\)), \(\text{Panasa}\) (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 \(\beta\)-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 \(\textit{Gloriosa superba}\) 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\[^{\text{67,68}}\]. 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\[^{\text{69}}\]. 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\[^{\text{69}}\]. 

CHITRAKA- The \(\textit{Plumbago zeylanica}\) 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\[^{\text{18}}\]. It has been reported that Shodhana \(^{(Purification)}\) of Chitraka, removed 50% of plumbagin\[^{\text{71}}\]. 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 \(\textit{Plumbago indicum}\)\[^{\text{72}}\]. 

KUMBHINI- The \(\textit{Croton tiglium}\) 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 crotonolubalin and a crotonalibumin\[^{73}\] and also strong purgative principles such as phorbol esters and crotonic acid\[^{74,75}\]. Kumbhini seeds are purified by Svedana (Boiling)\(\textit{with Godugdha(Cow,s milk)}\) in a Dola Yantra for 3 hours, after removing its covering which are later triturated with lemon juice\[^{\text{12}}\] \(\text{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\[^{\text{77}}\]. 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 \(\textit{Croton. tiglium}\)\[^{\text{78}}\].

AIHYPHEN - The opium obtained from the fruits of \(\textit{Papaver somniferum}\) 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\(\text{Due to spasms of pelvic floor muscles, muscles of anal sphincters or the muscles of the rectum} \) 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 \(\textit{Ardraka Swarasa}\) (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. It is used for the treatment of convulsions, otalgia, abdominal disorders, malarial fever, dysentery, diarrhea, skin diseases, hysteria, insomnia, gonorrhea, colic, tetanus, and hydrophobia. Its excessive use causes dyspepsia, cough, impotence, melancholy(Feeling of sadness), dropisy, 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)[68]

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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