

## Importance of Media in Shodhana (Purification / Processing) of Poisonous Herbal Drugs

\*Ilanchezhian R<sup>1</sup>, Roshy Joseph C<sup>2</sup>, Rabinarayan Acharya<sup>1</sup>

<sup>1</sup>Department of Dravyaguna, Institute for Postgraduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, Gujarat.

<sup>2</sup>Department of Rasashastra & Bhaishajya Kalpana, Institute for Postgraduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar, Gujarat.

### ABSTRACT

In Ayurveda, a series of pharmaceutical procedures which converts a poisonous drug into a therapeutically very effective medicine for various ailments is termed as Shodhana. Various medias are being used for processing the herbal poisonous drugs, are quite interesting to understand with modern scientific technology. The analysis of media before and after Shodhana (purification / processing) will give clear rationale behind the selection of the particular media for the particular drug. The change that takes place during the Shodhana process can be explored by modern analytical methods. Researchers have proved the presence of strychnine and brucine in milk after Shodhana of *Nuxvomica* highlighting the role media for Shodhana. Importance of Shodhana, the role of media used for Shodhana process of few poisonous drugs is dealt briefly with scientific view.

**Key word:** Shodhana; Purification; Processing; Poisonous herbs; Media

### Introduction:

It is very interesting to observe that specific media is used for Shodhana (purification / processing) of particular poisonous herbs, like *Gomutra* (cow's urine) for Shodhana of *Vatsanabha* (*Aconitum ferox* Wall.) and *Godugdha* (cow's milk) for *kupeelu* (*Strychnos nux-vomica* Linn.).<sup>[1]</sup> Most commonly used liquid media for Shodhana are Cow's urine and Cow's milk. Latest researches have proved that *Gomutra* possess Bio-enhancer properties along with antibacterial and anti-fungal effects.<sup>[2]</sup> Crude Aconite classified under poisonous group is an extremely lethal substance,<sup>[3]</sup> yet Ayurveda looks upon it for its therapeutic value.<sup>[4]</sup> It should not be taken in crude form. In a recent study, the diagnosis of aconite poisoning in 11 patients were established based on identification of aconitine and related *Aconitum* alkaloids in urine by liquid chromatography-tandem mass spectrometry.<sup>[5]</sup> Crude aconite is always processed, i.e. it undergoes *Samskaras* (processing) before being utilised in the Ayurvedic formulations. Aconite in its natural form is a cardiac depressant.<sup>[6]</sup>

A study has documented life-threatening intoxication in 17 Chinese subjects after accidental herb-induced aconite poisoning. All patients developed symptoms of aconite toxicity within 2 Hrs of herb ingestion. Most developed tachyarrhythmias, including ventricular tachycardia and fibrillation from which 2 patients died. Toxicological evaluation revealed that aconites from the *Aconitum* rootstocks were the only plausible casual factor for intoxication.<sup>[7]</sup>

However, after processing, Aconite transforms into a cardiac stimulant. The study was undertaken in mice, to ascertain whether processed aconite is less toxic as compared to the crude or unprocessed one. It was seen that crude aconite was significantly toxic to mice (100% mortality at a dose of 2.6 mg/mouse) whereas the fully processed aconite was absolutely non-toxic (no mortality at a dose even 8 times as high as that of crude aconite).<sup>[8]</sup>

The media used in the process of Shodhana has very important role in either breaking down or destroying the chemical constituent that is not required. The heat treatment - constant boiling of the drug in a particular media for a particular duration has a role in the modification of the chemical constituents etc. There are certain non-poisonous drugs used after purification in Ayurvedic system of medicine. The drug *Kushtha* (*Saussurea lappa* CB Clarke.) is a very common drug used in many formulations.<sup>[9]</sup> It has particular oil (Sesquiterpenes) in it.<sup>[10, 11]</sup> However, only a particular quantity of this oil is therapeutically recommended. The excess oil is removed by the boiling process.<sup>[12]</sup> *Guggulu* (*Commiphora wightii* (Arn.) Bhand.) is also used after purification only. *Guggulu* is boiled in suitable media to make it soft<sup>[13]</sup> and is filtered to remove the insoluble material from it. Sometimes media acts like solvent, to dissolve the material for easy separation from the insoluble impurities like in *Guggulu*. Studies have shown that the toxic constituents are transferred into media rendering the drug nontoxic. All the procedures adopted under the head Shodhana can be analyzed under the light of modern chemistry. It is important to evaluate the drug before and after the Shodhana Samskara.

### Various Medias used for Shodhana:

- *Gomutra* (Cow's urine) - eg. Roots of *Vatsnabha*<sup>[14]</sup>
- *Gokshira* (Cow's milk) - eg. Seeds of *Kupilu*<sup>[15]</sup>
- *Narikela udaka* (Coconut water) - eg. Fruits of *Bhallataka*<sup>[65]</sup>
- *Goghrita* (Cow's ghee) - eg. Seeds of *Kupilu*<sup>[17]</sup>
- *Choornodakam* (Lime water) - eg. Roots of *Chitraka* (*Plumbago zeylanica* Linn.)<sup>[18]</sup>

- *Ardraka swarasa* (Ginger juice) - eg. Laex of *Ahiphena* (*Papaver somniferum* Linn.)<sup>[19]</sup>
- *Ishtika choorna* (Brick powder) - eg. Fruits of *Bhallataka*<sup>[20]</sup>
- *Triphala kwatha* (*Triphala* decoction) - eg. Oleo-gum resin of *Guggulu*<sup>[21]</sup>
- *Panchapallava kwatha*<sup>[22]</sup> - eg. Rhizome of *Vacha* (*Acorus calamus* Linn.)<sup>[23]</sup>
- *Ushna jala* (Hot water) - eg. Fruits of *Bhallataka*<sup>[24]</sup>
- *Aja kshira* (Goat's milk) - eg. Roots of *Vatsanabha*<sup>[25]</sup>
- *Kanji* (Sour gruel) - eg. Seeds of *Kupilu*<sup>[26]</sup>
- *Eranda tailam* (Castor oil) - eg. Seeds of *Kupilu*<sup>[27]</sup>

## Results:

### Role of media in the *Shodhana* of *Kupilu* (*Strychnos nux-vomica* Linn.) Seeds:

Variations in Strychnine content after purification in different media of seed powder of *kupilu*:

Strychnine % in crude *Kupilu* (Unpurified) is 0.63%. Strychnine % after Purification in cow's milk is 0.52%. Strychnine % after Purification in cow's urine, milk, ghee is 0.62%. Strychnine % after Purification in cow's ghee is 0.69%

### Variations in Brucine content after purification in different media of seed powder of *Kupilu*:

Brucine % in crude *Kupilu* (Unpurified) is 0.77%. Brucine % after Purification in cow's milk is 0.68%. Brucine % after

Purification in cow's urine, milk, ghee is 0.57%. Brucine % after Purification in cow's ghee is 0.87%.<sup>[28]</sup> Mehta N. et al. reported presence of strychnine and brucine in milk after *Shodhana* of *Nux-vomica*. This gives us an idea that particular media has its role to remove the particular % of the poisonous substance from the crude drug.<sup>[29]</sup>

### Role of media in the *Shodhana* of *Vatsnabha* (*Aconitum ferox* Wall.):

Nature of the media before and after *Shodana* of *Vatsnabha*: Colour of all the media changed after *Shodhana*, yellowish *Gomutra* became brown; white *Dugdha* became coffee brown and brownish *Triphala Kwatha* became purple. All the media became bitter after *Shodhana*. Before *Shodhana* no tingling sensation was felt in tongue or throat on tasting the media; but after *Shodhana* it was felt.<sup>[30]</sup>

**Table 1: Analytical data of medias before and after *Vatsanabha Shodhana***

Parameter	Gomutra				Godugdha		Ajadugdha		Triphala Kwatha	
	Initial	Day 1	Day 2	Day 3	Initial	Final	Initial	Final	Initial	Final
pH	7.440	6.950	7.790	8.290	-	-	-	-	3.640	3.590
Specific gravity	1.024	1.050	1.034	1.029	1.033	1.047	1.026	1.040	1.051	1.074
Total solid content (%w/w)	4.989	11.132	7.001	5.937	8.018	16.307	10.090	15.697	12.797	19.315

The total microbial count of Raw *vatsnabha* was 18400 cfu/g, it reduced into 11500 cfu/g after *Shodhana* by *Gomutra*. The pH of *Gomutra* reduced after first day of *Shodhana*; but increased after second and third day of *Shodhana*. pH of *Triphala Kwatha* reduced after *Shodhana*. The 1.024 specific gravity of *Gomutra* increased to 1.050, 1.034 and 1.029 after *Shodhana* of first, second and third day respectively. Specific gravity of all the other media increased after *Shodhana*. The total solid content also increased after *Shodhana* in all the media. (Table 1) Aconitine % before *Gomutra shodhana* is 0.113 and Aconitine % after *Gomutra Shodhana* is 0.089. This value shows how much the Aconitine % is decreased after *Shodhana* by using cow's urine as media.<sup>[31]</sup>

### Role of the media in the *Shodhana* of *Dhattura* (*Datura metel* Linn.):

After completion of the *shodhana* process the colour of the

*gomutra* which was light yellow had changed into dark brown colour which indicates that some of the constituents of *Dhattura* were transferred to *gomutra*.<sup>[32]</sup> Another research work mentioned that during *Shodhana* procedure the *Gomutra* became dark in colour. Colour of *Godugdha* changed to yellowish after *Shodhana*. Percentage of Hyoscyamine and Scopolamine was decreased in both varieties of *Dhattura* after *Shodhana*. In *ashuddha Dattura innoxia* Mill. and *ashuddha Dattura metel* Linn. % of Hyoscyamine and scopolamine are 17.67%, 6.86% and 3.71%, 3.2% respectively. In *Shuddha Datura innoxia* Mill. and *Shuddha Datura metel* Linn. % of Hyoscyamine and scopolamine are 0.0%, 0.55% and 1.01%, 0.0% respectively.<sup>[33]</sup> Total alkaloid contents were decreased where as total protein was increased after *Shodhana* in both samples of *Dhattura*.<sup>[34]</sup>

### Role of the media in the Shodhana of Bhallataka (*Semecarpus anacardium* Linn.):

Mainly and commonly used media for Bhallataka Shodhana is brick powder. Hypothetically, the oily part of the nut is toxic and its degree of removal is proportional to its safety margin. To test this hypothesis, the *Semecarpus anacardium* nuts were treated with brick powders (traditional method of Ayurveda), silica gel and hexane solvent for various time periods<sup>[35]</sup>. Though the oily part of semecarpus nuts is having the blister causing property, it is proved for its anti-cancerous property.<sup>[36]</sup>

### Discussion:

By processing in *Godugdha*, the % of Strychnine & Brucine was decreased. Hence, it is best to purify the *Kupilu* by *Swedana* (boiling) method in *Godugdha*, by which one can expect good therapeutic effects without any complications. Partial to complete removal of aconitine in *Shuddha Vatsanabha* reflects the importance of *Shodhana* of the poisonous plant drugs. Relatively less pathological effects of the *Shuddha Vatsanabha* indicates that the *Shodhana* treatment lessens the toxic effects. *Gomutra* should be considered as a better media for *Shodhana* of *Vatsanabha* in comparison to *Godugdha*, as the *Shuddha Vatsanabha* by *Gomutra* shows better activity profile in toxicity study. After *dhattura* purification process in *Gomutra* (cow's urine) and *Godugdha* (cow's milk) % of Hyoscyamine and scopolamine has decreased in *dhattura*. This may be due to the extraction of toxic alkaloid by alkaline nature of *Gomutra*. Traditional method of purification helps to remove some of the oily part of *Bhallataka* nuts. Therefore purified nuts when used in various formulations will definitely contain some percentage of urushiol making the product to get high therapeutic value in various ailments. The main aim of traditional method is to minimize the toxic effect of the *Semecarpus* nut.

### Conclusion:

Studies have shown that the toxic constituents are transferred into media rendering the drug non-toxic. Specific media has definitely an important role in making a drug to act without causing any side effects or adverse effects. Aim of traditional method is to minimize the toxic effect of the drug. Current need of present pharmacies is developing easy and time saving methods to detoxify the poisonous herbal drugs following the principles of Ayurveda and evaluation of *Shodhana* methods with media used in the process.

### References:

1. Rasa Vagbhata. *Rasa Ratna Samucchaya*, Shastri AD editor. Varanasi: Chaukhamba Amarabharati Prakashan; 1995.
2. Dhama K, Chauhan RS, Lokesh Singha. Anti-Cancer Activity of Cow Urine-Current Status and Future Directions. *International Journal of Cow Science*. 2005; 1(2):1-25.
3. Nandy A. Principles of Forensic Medicine. Calcutta: New Central Book Agency (P) Ltd; 1996. P.567.

4. Upadhyay Madhav. *Ayurveda Prakasha*, Mishra GS editor. Varanasi: Chaukhamba Bharati Academy; 1999. p. 289.
5. Lai CK, Poon WT and Chan YW. Hidden Aconite Poisoning - Identification of Yunaconitine and Related Aconitum Alkaloids in Urine by Liquid Chromatography-Tandem Mass Spectrometry. *Journal of Analytical Toxicology* 2006; 30(7): 426-433.
6. Singh LB. *Poisonous (Visa) Plants in Ayurveda*. 2<sup>nd</sup> ed. Varansai: Chaukhamba Sanskrit Bhawan; 2003.
7. Tai YT, But PP, Young K and Lau CP. Cardiotoxicity after Accidental Herb-Induced Aconite Poisoning. *Lancet* 1992; 340(8830): 1254-1256.
8. Thorat S, Dahanukar S. *Can We Dispense with Ayurvedic Samskaras*. *Journal of Postgraduate Medicine* 1991; 37: 157-159.
9. Chakrapanidatta. *Chakradatta-Ratnaprabha*, Sharma PV editor. 1<sup>st</sup> ed. Jaipur: Swami Jayaramdas Ramprakash Trust; 1993. p. 360-362.
10. Sastry JLN. *Dryavaguna Vijnana*, vol-2. 3<sup>rd</sup> ed. Varanasi: Chaukhamba Orientalia; 2008. p.309.
11. <http://www.botanical-dermatology-database.info/BotDermFolder/COMP-19.html>
12. Govind Das. *Bhaishajyaratnavali*, Ambikadatta sastry editor. Varanasi: Chaukhamba sanskruta samsthan; 2001. p.572.
13. Sharangadhara. *Sharangadhara samhitha*, Pandit Parasurama sastri editor. 4<sup>th</sup> ed. Varanasi: Chaukhamba orientalia; 2000. p.186.
14. *Rasa Vagbhata. Rasa Ratna Samucchaya*, Shastri AD editor. Varanasi: Chaukhamba Amarabharati Prakashan; 1995. p. 290-291.
15. Bhavaprakasha. *Bhavaprakash Nighantu*, Chunekar KC, Pandey GS editors. Varanasi: Chaukhamba Bharati Academy; 1999. p.568.
16. Sadananda Sharma. *Rasa Tarangini*, Kasinath sastri editor. 2<sup>nd</sup> ed. New Delhi: Motilal Banarasis; 2004. p.735.
17. Sadananda Sharma. *Rasa Tarangini*, Kasinath sastri editor. 2<sup>nd</sup> ed. New Delhi: Motilal Banarasis; 2004. p.678.
18. Sadananda Sharma. *Rasa Tarangini*, Kasinath sastri editor. 2<sup>nd</sup> ed. New Delhi: Motilal Banarasis; 2004. p.753.
19. Sadananda Sharma. *Rasa Tarangini*, Kasinath sastri editor. 2<sup>nd</sup> ed. New Delhi: Motilal Banarasis; 2004. p. 692.
20. Sadananda Sharma. *Rasa Tarangini*, Kasinath sastri editor. 2<sup>nd</sup> ed. New Delhi: Motilal Banarasis; 2004. p.735.
21. Anonymous. *The Ayurvedic Formulary of India*, Part-I. 2<sup>nd</sup> ed. New Delhi: Govt. of India, Ministry of Health and Family Welfare; 2000. p. 203.
22. Sharma PV. *Dravyaguna vijnana*. Varanasi: Chaukhamba Bharati Academy; 2000. p.99.
23. Chakrapanidatta. *Chakradatta*, Indradeva Tripathy, Ramanath Dwivedy editors. Varanasi: Chaukhamba Sanskrit Samsthan; 2005. p.155.
24. Bhavaprakasha. *Bhavaprakash Nighantu*, Chunekar KC, Pandey GS editors. Varanasi: Chaukhamba Bharati Academy; 1999. p.139.
25. Upadhyay Madhav. *Ayurveda Prakasha*, Mishra GS editor. Varanasi: Chaukhamba Bharati Academy; 1999. 6/57.
26. Sadananda Sharma. *Rasa Tarangini*, Kasinath sastri editor. 2<sup>nd</sup> ed. New Delhi: Motilal Banarasis; 2004. p.678.
27. Gopinath Parikh. *Vanousadhi Rathnakara*, vol-2. 2<sup>nd</sup> ed. Vijaygarh: Sudhanidhi karyalaya; 1990. p. 370-372.
28. Pradeep HR. Effect of Shodhana (Purification) on the toxicity of Kupilu (*Strychnos nuxvomica* Linn.), MD thesis. Bangalore: RGUHS; 2000.
29. Mehta N, Prajapati PK, Chaudhary AK. Role of milk in Shodhana (detoxification) with special reference to Nuxvomica. *Aryavaidyan* 2007; 20(2): 100-104.
30. Prasanta kumar sarkar. Evaluation of shodhana process and antidotal study on vatsanabha, Ph.D. Thesis. Jamnagar: I.P.G.T.&R.A., Gujarat Ayurved University; 2008.

31. Singh LB. Poisonous (Visa) Plants in Ayurveda. 2<sup>nd</sup> ed. Varanasi: Chaukhamba Sanskrit Bhawan; 2003.
32. Vidyanand F. Kumbhojkar. Phytochemical and Experimental study of Dhatura (Datura alba Nees.) W.S.R. to its Toxicity, MD thesis. Bangalore: RGUHS; 2008.
33. Patel Yogesh, RN Achrya, V J Shukla. A comparative study on role of sodhana (purification) on sweta Dhatura (D. innoxia) and Krishan Dhatura ( D. metal) seed a phramcognostical and antalytical study, MD Thesis. Jamnagar: I.P.G.T.&R.A., Gujarat Ayurved University; 2009.
34. Patel Yogesh, Bhat Savitha D, Achrya Rabinarayan, Ashok BK, Shukla VJ. Role of Shodhana on analytical parameters of Datura innoxia Mill. And Datura metel Linn. Seeds. IJRAP 2010; 1(2):249-54.
35. Yamini B. Tripathi<sup>1</sup>, Nidhi Pandey, Pratibha Tripathi. Purification of nuts of *Semecarpus anacardium* Linn., a herbal drug for arthritis. *Current science* 2008; 94(8):1062-1065.
36. Weimin Zhao, Lili Zhu, Sowmyalakshmi Srinivasan, Chendil Damodaran, Jürgen Rohr. Identification of urushiols as the major active principle of the Siddha herbal medicine *Semecarpus* Lehyam - Anti-tumor agents for the treatment of breast cancer. *Pharm Biol.* 2009; 47(9): 886-893.