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Importance of *Shodhana* processes of herbomineral drugs with special reference to detoxification and modification of therapeutic activities

Vd. Raman Belge[1], Dr. Rameshwar Pandey[2], Dr. Prakash Itankar[3]

[1]Ph.D. (Scholar), [2]Dr. Rameshwar Pandey, Guide, Ex-Principal & Professor, Dept. of Rasashastra & Bhaishajya Kalpana, Shri Ayurved Mahavidyalaya, Nagpur, [3]Dr. Prakash Itankar, Co-Guide, Associate Professor, Dept. of Pharmaceutical Sciences, RTMNU, Nagpur, Maharashtra, INDIA.

ABSTRACT

Background: *Rasachikitsa* has formed an integral part of Ayurvedic treatment. It will not be wrong to state that Ayurvedic therapy is incomplete without proper usage of the *Rasaushadhis*. Some misconceptions are prevailing regarding toxic effects of the *Rasaushadhis*. It is an accepted fact that the *Rasadravyas* are having certain toxic effects, but this can be overcome by treating these toxic *Rasadravyas* along with certain *Shodhana Dravyas*. This article deals with the *Shodhana* concept of *Rasaushadhis*, the therapeutic utility of these *Rasaushadhis*, and the Shodhana processes performed on these *Rasaushadhis*, so as to make them therapeutically effective. **Objectives:** To have the critical review of *Shodhana* processes with reference to the changes taking place during *Shodhana* and to study its utility in Ayurvedic Pharmaceutics. **Materials and Methods:** The physical, chemical and biological changes were noted; Processes involved and role of *Shodhana Dravyas* was also noted; use of *Shodhana* in *Rasaushadhi* preparation; different types of *Shodhana* are discussed. The *Panchabhautik* aspect of *Shodhana* is also discussed. **Results:** *Shodhana* process imparts certain physical, chemical and biological changes through incorporation of certain properties of the media used. The processes involved offer multiple benefits to the *Shuddha Dravyas*. This imparts better therapeutic efficacy and offers a broad spectrum utility against a number of diseases. **Conclusion:** *Shodhana* is one of the most scientific methods described in the Ayurvedic texts. It is one of the *Samskaras* which potentiates the therapeutic properties and thus is one of the most useful processes in the Ayurvedic Pharmaceutics.

Key words: *Shodhana, Media, Poisonous herbs, Processing, Purification.*

INTRODUCTION

In Ayurvedic Medicine the concept of *Shodhana* treatment was in practice since the times of Caraka *Samhita* (1000 B.C. to 500 B.C.). According to it *Saucha* (*Suddhi Karana*) was also included in the measures claimed to be responsible for the alteration or addition of the properties of the drugs when subjected to various pharmaceutical operations & processes. Right from 8th century A.D. i.e. during the *Rasashastra* period, the use of toxic herbs and minerals necessitated the use of *Shodhana* processes. *Rasaushadhis* have been in Ayurvedic practice since last few centuries. There were various trends of Ayurvedic practice, but after 8th century AD, the *Rasaushadhis* gained importance due to their fast acting, low-dosage and broad-spectrum utility in the diseases.

Until recently *Rasaushadhis* were abundantly prescribed by the Ayurvedic practitioners. These practitioners include the degree holders as well as the non-degree holders. But recently some studies confirmed the presence of heavy metals in few formulations. This led to imposing ban on prescribing these *Rasaushadhis* in certain Europian countries. The

Address for correspondence:
Vd. Raman Belge
Ph.D. (Scholar), Dept. of Rasashastra & Bhaishajya Kalpana, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, INDIA.
E-mail: ramanbelge@gmail.com

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ancient alchemists really did a hard work to offer health even with the use of the *Vishadavyas*. The *Rasaushadhis* could be prescribed in the conditions without considering the *Doshas* and the *Dushyas*. This can be attained through purifying the toxic drugs with certain *Shodhana* techniques.

This article is an attempt to state the importance of *Shodhana* processes of herbomineral drugs with special reference to detoxification and modification of therapeutic activities.

Materials and Methods

Concept of *Shodhana*

Rasashastra, the science that deals with *Parada*, metals, non-metals, minerals, precious stones, herbs etc. advocates the use of some toxic ingredients. The toxicity of such ingredients is dealt with various intermediary pharmaceutical processes meant for reducing the toxicity as well as incorporating the useful properties. *Shodhana* is one of such procedures which have a multidimensional usage in the treatment of herbal as well as mineral drugs. 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* and *Godugdha* for *Kupeelu* (*Strychnos nux-vomica* Linn.) [1]

The ancient *Ayurvedic* texts like *Charaka Samhita* (1200 AD[2] have defined the concept of *Shodhana*. It states that, *Karana* (processing) is the refinement of the natural products which means imparting other properties.[3] These properties are infused by eight ways, one of those is *Shaucha* (cleansing). Although the references regarding the *Shodhana* treatment are available since the *Samhita* times, the pharmaceutical details could be observed only in the texts related to *Rasashastra* (after 8th century AD). In spite of the toxic and harmful properties, the drugs of *Rasashastra* gained popularity amongst common people, which could be attributed to the concept of *Shodhana*.

The *Shodhana* treatment was highly sought by the pioneers of *Rasashastra*, especially *Siddha Nagarjuna* (8th century AD). This was meant for the purification of the herbs as well as the herbomineral drugs. These purification processes reduce the drug toxicity to a body-tolerance limit. The proper application of *Shodhana* processes render such drugs either totally free from toxic effects or at minimal toxic level.[4]

Definition

Shodhana is the process of removal of the *Doshas*, while *Samskara* is the process of enhancing the *Bala* and *Teja* of the drugs.

The herbal and herbomineral drugs form an integral part of the *Rasashastra*. Since most of these drugs occur naturally, those are subject to contamination either physically or chemically. Hence, the *Doshas* are the unwanted qualities, heterogeneous substances which impart toxicity to the drugs. *Shodhana* is indicated to eliminate all such impurities, toxic qualities and also to incorporate valuable qualities.

Thus *Shodhana* is a process of separation by which the physical and chemical impurities are separated from the drugs through different pharmaceutical processing. This helps in purification and detoxification of the drugs.

The *Shodhana* process consists of the two terms[5]

- *Shuddhidravya / Shodhya Dravya* - This is the substance which undergoes purification.
- *Shodhana Dravya* - This is the substance which is used to treat *Shodhya Dravya*.

The objective of *Shodhana* can be stated as follows:

Physical changes

- Elimination of undesired physical impurities which are soluble, evaporable or washable. e.g. *Guggulu Shodhana* includes its separation from the physical mixture; *Shilajit* is separated from insoluble physical impurities.
- Incorporation of the desired therapeutic properties.
- Potentiation of the therapeutic qualities of the drug material.
- Conversion of the drug material to a suitable form so as to have an intermediate product required for further processing.

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- To reduce the hardness and make the mineral brittle; this is attained by repeated heating and quenching. e.g. *Abhraka* is made red hot and quenched into *Triphala Kwatha*.
- To reduce the particle size, thus exposing maximum drug to the purifying medium.
- The cracks which are developed on the surface of the metals and minerals due *to Nirvapa*, are broken into coarse powder. *Bhavana* process further reduces the particle size.

Chemical changes

- Eradication or minimization of the toxicity of the drug to a body tolerance level. e.g. *Vatsanabha* is treated with *Gomutra*, which facilitates reduction in toxic properties of *Vatsanabha*.
- Transformation of the non-homogenous material to a homogenous material; hard to soft, brittle and ductile material.
- Value addition in terms of desired chemical changes- e.g. *Lauha*, on heating reacts with atmospheric oxygen to form ferric oxide, which can be easily absorbed by the body. Also, *Makshika* on heating eliminates sulphur while iron and copper part get converted into their oxide forms.
- Imparting therapeutic properties, suitable for its direct usage.
- Helps to attain suitable form of drug required for *Maran*.
- Elimination of chemical impurities- e.g. During *Shodhana* of *Makshika*, impurities like arsenic get eliminated by heating.

Biological changes

- The drugs are made homologous to the cells, toxicity reduced to a body tolerance limits and acceptability of the cells is increased.
- Incorporation of the organic substances (herbs or drugs of the animal origin) into inorganic substances.
- Aids in faster absorption and assimilation into body fluids

The *Shodhana* treatment is of two types-

- External *Shodhana*
- Internal *Shodhana*- this is further subdivided into
- Meant for Therapeutic effect
- Meant for *Rasayana* effect

***Shodhana*:** It is further classified as-

- ***Samanya Shodhana***[6]- Here a common procedure suitable to a group of drugs is applied to them. Since the drugs of one group possess some common types of impurities, those drugs are treated with common procedures. e.g. *Dhatuvarga* is subjected to *Samanya Shodhana*, where all the *Dhatus* are purified by heating and quenching into the *Taila, Takra, Gomutra, Kanji* and *Kulattha Kwatha*. This *Shodhana* offers brittleness to the drugs; helps in layer separation and makes it fit for further processes.
- ***Vishesha Shodhana***[7]- Here a specialized procedure suitable to that particular drug is applied. Since each drug differs from others in terms of origin, structure, form, impurities and a specific chemical composition, it is subjected to a particular procedure. The *Vishesha Shodhana* also aims at imparting certain desired therapeutic values. e.g. *Tamra* is purified with decoction of *Triphala* (processed with *Gomutra*).
- Both these procedures are further subdivided as follows[8]
- ***Sagni Shodhana-*** Here the process is accomplished through the direct use of fire. e.g. *Nirvapa*, *Dhalana*, *Bharjana, Puta, Swedana, Patana* etc.
- ***Niragni Shodhana-*** Here the process is accomplished without direct use of fire. e.g. *Bhavana, Gharshana, Nimajjana, Prakshalana, Shoshana, Sinchana* etc.
- The *Shodhana* processes can be categorized as - *Abhyantar Shodhana* and *Bahya Shodhana*. According to indications, *Shodhana* can be of two types - *Kayika* and *Rasayanika*.

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Shodhana processes

- ***Nirvapana* (heating and quenching into the desired liquid medium)[9]**

The material intended for *Shodhana* treatment is made red hot and immediately quenched into the liquid medium. e.g. acidic medium (decoction of *Triphala*), alkaline (lime-water), oils (sesame oil), milk etc.[10]

The heating and dipping treatment is repeated until the material becomes brittle. The hard materials like *Abhraka*, *Swarnamakshika*, *Loha, mandoora, Tamra, Hiraka* are purified by *Nirwapana* treatment. This result into particle disintegration, the reduced particle size exposes more surfaces to an acidic or alkaline medium. The repetition of *Nirwapana* is decided by judging the hardness of the mineral (metals or gems).

The knowledge of melting as well as boiling point of the minerals must be considered before performing the *Nirwapana*.

The commonly used liquid media are sesame oil, butter milk, cow urine, *Kanji* (sour gruel) and *Kulattha Kwatha.*[11]

- ***Dhalana*[12] (Heating, melting and dipping into liquid medium)**

The material to be purified is heated until it melts and then immediately poured into the cold liquid medium. This treatment is repeated until the material becomes brittle and coarsely powdered. The *Putilohas - Naga, Vanga, Yashada; Gandhaka* are purified with this type of *Shodhana* treatment. *Churnodaka* (lime water) is the common medium for the *Putilohas.*[13] This process is accomplished with the help of *Pithara Yantra.*

Gandhak is similarly purified along with ghee and milk.[14] During this process, the fat soluble impurities are dissolved in the ghee; water soluble impurities are dissolved in the milk while physical impurities are retained by the filter cloth.[15]

- ***Urdhvapatana* (Sublimation and Distillation)[16]**

The material to be purified is mixed with some acidic medium e.g. lemon juice, *Kanji* etc. and this paste is applied to the *Urdhvapatana Yantra*.

The aromatic substances and the substances having low vapourization points are purified with this method. The purified material accumulates on the inner surface of the upper earthen pot. e.g. *Parada* is extracted from *Hingula* with this treatment.[17] This treatment ensures separation of adulterants and thus results into a purified medicine.

- ***Adhahpatana* (Sublimation and Distillation)[18]**

This treatment is similar to the *Urdhwapatana* process. Here, the purified material gets stored at the lower earthen pot. e.g. *Parad Shodhana*.

- ***Bharjana* (Frying)**

The material to be purified is treated with *ghee* (e.g. *Hingu*),[19] without *Ghee* (e.g. *Tankana,*[20] *Kankshi*[21]).

The *Bharjana* removes the excessive moisture content from the *Hingu* while *Tankana* and *Kankshi* get evaporated due to loss of water of crystallization. After frying, the material becomes brittle, light and puffed.

- ***Bhavana* (Trituration)[22]**

The material to be purified is treated with the other herbs or minerals. e.g. ginger and lemon-juice are used to offer *Bhavana* for the purification of *Manahshila*[23] and *Kasisa*[24] respectively.

One should keep in mind the difference between *Bhavana* and *Maardana* with reference to *Parada Shodhana*. *Parada Shodhana* involves the processing of *Parada* with *Triphala*, *Madhu*, *Srishtyambuja* etc. Even then these processes cannot be labelled as *Bhavana* since the media is not absorbed in the material or the *'Sampeshyet Shoshanam'* phenomenon is absent.

The trituration of herbs and minerals facilitate transfer of soluble impurities from the mineral to herbs. Similarly, the organic components are transferred to the mineral substances.

- ***Virechana* (Cleansing)[25]**

The impure substance is cleansed and sifted. This helps to remove the adulteration. *Jiraka*, *Sarshapa* are purified with this method.

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- ***Shoshana* (Drying)[25]**

The material to be purified is shade-dried e.g. seeds of *Apamarga*, Cotton-seeds, *Shigru*.

This helps to remove excessive moisture from the substances.

- ***Sthapana* (Soaking in the liquid medium)**

The impure substances are soaked into the acidic medium like *Gomutra*, *Kanji* etc. The outer shell of *Jayapala*[26], skin of *Vatsanabha*[27] are removed with this treatment. The removal of outer shell (e.g. *Jayapala*), needle-puncture test (e.g. *Vatsanabha*), reduction in stickiness (e.g. *Guggulu*) are the few parameters adopted for quality purification of herbs.

- ***Swedana* (Boiling or fomentation)**

The impure substance is boiled with acidic medium (e.g. *Shankha*, *Shukti*, *Varatika*, *Godanti, Prawal* are boiled with *Nimbu-swaras*).[28] The material to be purified is fomented with steam of water or milk. The external / physical impurities of *Shankha, Shukti, Varatika* and *Prawal* are softened which are further removed by cleansing. The excessive alkalinity of these *Dravyas* is reduced by boiling with the acidic medium.

- ***Galana* (Filteration)**

The liquid substance is filtered through cloth or sieve. This helps in getting rid of adulterants and heterognous substances. The physical impurities are retained by the cloth / sieve and thus filtered liquid is made available. e.g. *Gandhaka Shodhana.*[29]

- ***Gharshana* (Rubbing against rough surface)**

This process is done to lower down the toxicity as well as to remove the shell of the substance like *Bhallataka.*[30]

- ***Mardana* (Trituration)[31]**

This process helps in reduction of particle size, thereby ensuring a faster assimilation of the drug inside the body.

- ***Nimajjana* (Soaking into the liquid medium)[32]**

Here the drug to be purified is soaked into the liquid medium. The difference in osmotic pressures between the two media helps in transfer of active ingredients amongst the two substances.

- ***Nirjalikarana* (Evaporation)**

This process involves evaporation of water molecules from the substances like *Kankshi* or *Tankana* [33].

- ***Pachana* (Baking)**

This process involves a drug baked with a liquid media like water, milk or a decoction. This results into lowering down the stickiness of the substance as well as offer softness to the material. e. g. *Guggulu Shodhana.*[34]

- ***Prakshalana* (Washing)**

This process helps in removal of dust and spurious material by washing the drug with water. e. g. *Shilajit Shodhana.*[35]

- ***Pruthakkikarana/ Virechana* (Cleaning)[36]**

Here the drug is cleansed so as to remove fine dust, adulterants and external impurities. This process helps to remove these impurities and makes it ready for processing. e.g. cleaning *Pippali, Jiraka, Krishnajiraka, Rajika* etc.

- ***Vilayana* (Dissolving the substance into the liquid medium)[37]**

The drugs like *Shilajit* are dissolved into the liquid media like water, *Triphala Kwatha*. The insoluble impurities are then filtered and pure drug is obtained.

- ***Tvaknishkasana* (Removal of the skin of the drug)[38]**

The skin of the fresh drugs like *Ardraka, Shatavari* is removed. Thus a drug with maximum active ingredient is made available.

- ***Nistushikarana* (Dehusking)**

The *Tusha* (husk) of the herbs like *Rasona* is removed before making its *Kalka*. The dehusked *Rasona* is then used for *Parada Shodhana.*[39]

Panchabhautik aspect of *Shodhana* processes

Although all the drugs are composed of *Panchamahabhuta*, they do have different

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proportions. Hence, in order to attain a proper purification, one should consider the *Panchabhautik* composition of the raw drug. Similarly, the Post-*Shodhana* changes in the purified drug should be considered before processing those further.[40]

Table 1: *Panchabhautik* aspect of *Shodhana* processes.

Mahabhuta	Properties	Example
Prithvi	*Gandha* - change in the intensity of smell of the purified drug	*Shuddha Hingu*
Aap	*Kshara - Kshariyata*	*Shuddha Rason*
Teja	*Teja* - luster	*Shuddha Kapardika*
Vayu	*Ruksha* - Increases roughness	*Shuddha Shankha*
Akash	*Vivardhana* - Increased volume	*Shuddha Kankshi/Tankana*

Role of *Shodhana Dravya* in the *Shodhana* processes.

The *Shodhana* processes basically include processing of the herbal or herbomineral drugs with acidic, alkaline or neutral types of vegetable extractives or liquids or with oily materials in the presence or absence of heat for a specified period. The heating process mostly involves a specific *Yantra*, which ensures removal of their volatile or thermo-stable impurities.

These *Shodhana Dravyas* help in breaking down or altering the chemical constituents of the drug. The *Shodhana Dravyas* act like a solvent to dissolve the material for its separation from the insoluble impurities. This ensures eradication of toxic chemicals from the drugs and also helps in the physical transformation of some of metals and minerals.

Depending upon the intended changes, a specific media is used for a specific substance. This specific media decides the physico-chemical changes during the *Shodhana* processes. These physico-chemical changes vary from reduction in particle size, variation in density to variation in elemental composition of major elements. The incorporation of the useful elements as well as the deletion of the unwanted elements from the raw material is ensured through proper selection of the *Shodhana* media.

The *Shodhana* media can be categorized according to their origin[41]

- Plant origin - *Swarasa, Kwatha, Kshira, Taila, Shukta, Kanji, Arka, Madya, Drava Kalpa*.
- Animal origin - *Kshira, Madhu, Mutra, Rakta, Artava, Dadhi, Takra, Dadhimastu, Mamsa Rasa*, *Kukkutanda Taila* and *Hastidanta Kwatha*.
- Mineral origin - *Churnodaka*

Hence it can be summarized that a specific media is used for the *Shodhana* of a particular substance which acts like;

- Media acts like a solvent- to dissolve the material for easy separation from the insoluble impurities. e.g. *Guggulu Shodhana, Navasadara Shodhana*.
- Media acts to eliminate toxic chemical substance from the drug. e.g. *Manahshila* (As_2S_2) is always found mixed with *Gauripashana* (As_2O_3), which is a highly toxic substance. *Churnodaka* (lime water) is generally used for *Manahshila Shodhana. Gauripashana* (As_2O_3) readily dissolves in solutions of alkalis (like *Churnodaka)* but *Manahshila* (As_2S_2) is insoluble in alkali solutions. Here, *Churnodaka* acts to eliminate highly toxic *Gauripashana* (As_2O_3) from *Manahshila*.
- Media helps in incorporation of organic and inorganic principles into the drug.
- Media helps in physical transformation of some metals and minerals.
- During *Dhatu Shodhana,* due to the *Nirvapa* process, repeated heating and quenching into liquid media causes brittleness, disintegration and size reduction of the metals and minerals.

Results and Discussion

The ancient texts of Ayurveda have rightly stated that, “even a strong poison can become an excellent

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medicine if processed and administrated properly. On the other hand, even the most useful medicine may turn to be a poisonous one if improperly processed." The Ayurvedic scholars have suggested certain purification processes, termed as *Shodhana* which impart certain physical, chemical and biological changes through incorporation of medicinal properties into the drugs. *Shodhana* can influence the phytochemical, pharmacological, and toxicological profile of the plant, mineral or animal origin drugs and thereby useful in increasing safety profile and efficacy of these drugs. So *Shodhana* turns the toxic drugs to become nectar if a proper method of *Shodhana* is implemented. Thus, *Shodhana* can be termed as an indispensable step to be followed during preparation of the Ayurvedic formulations.

CONCLUSION

Shodhana is one of the most unique and distinct pharmaceutical procedures in Ayurvedic Pharmaceutics, which involves processing of the herbomineral drugs with various media of plant, mineral or animal origin. This ensures the removal of the *Doshas* apart from the incorporation of desired therapeutic activity. This transformed drug becomes fit to further processes like *Marana*, *Amritikarana* and *Lohitikaraan*. Certain *Shuddha Dravyas* can be directly administered for therapeutic purposes. The active principles of the *Shodhana Dravyas* are retained by the drug, thereby potentiating the drug efficacy. Thus *Shodhana* process has got a tremendous role in enhancing therapeutic efficacy of the formulation.

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