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Critical Review of *Bhavana* Processes with special reference to its Utility in Ayurvedic Pharmaceutics

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ABSTRACT

Background: *Bhavana* is a process of wet grinding in which a powdered drug of herbal, animal or mineral origin are ground with particular liquid media (expressed juice, decoction, urine etc.) for a specific period. This process of trituration is followed by drying and is carried out till attainment of *Subhavit Lakshana* and complete absorption of liquid into the powder and drying of the mixture is done. **Objectives**: To have the critical review of *Bhavana* process with reference to the changes taking place during *Bhavana* and to study its utility in Ayurvedic Pharmaceutics. **Materials and Methods**: The physical, chemical and biological changes are noted; Processes involved and role of *Bhavana Dravyas* are also noted; role of *Bhavana Dravyas*, use of *Bhavana* in *Rasaushadhi* preparation; different types of *Bhavana* are discussed. Griffith Theory in Particle Size Reduction is also discussed in this research article. **Results**: *Bhavana* performed through Levigation or soaking method along with the prescribed liquid media imparts certain physical, chemical and biological changes. The processes involved offer multiple benefits to the *Bhavana Dravyas*. **Conclusion**: *Bhavana* 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 most useful process in the Ayurvedic Pharmaceutics.

Key words: *Bhavana, Griffith Theory, Levigation, Samskar, Trituration, Wet Grinding.*

INTRODUCTION

Bhavana Samskara is an important concept mentioned in the ancient Ayurveda texts and is defined as the levigation, i.e. mixing the solid matter with a liquid media for the particular time with sufficient pressure. Here the material is triturated with the prescribed liquid till it becomes dry. *Bhavana* is an important *Samskara* which, not only potentiates the drug, but also induces additional therapeutic properties of the drug. Thus, it plays a pivotal role in the alteration of properties of drugs so as to attain therapeutic requirements. The present review article is an effort to critically review the information of various liquid media for *Bhavana* in Ayurvedic literature, highlighting its pharmaceutical and therapeutic significance and studying its utility in Ayurvedic Pharmaceutics.

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MATERIALS AND METHODS

Materials for *Bhavana*[1]

1. *Dravya* (single or compound powders) - The drug should be taken in powder form which should become moist or adhere together.
2. *Drava Dravya* (liquids) - The liquids form a major factor in incorporating properties to the *Dravya*. Apart from the mechanical procedure like grinding etc. *Bhavana* offers a multifold action to

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the *Dravya* which could be attained by liquids like *Swaras, Kwatha, Dugdha, Mutra* etc.

Types / Methods of *Bhavana*[2]

Bhavana process can be carried out by two methods:

1. Levigation method – the material is mixed with particular liquid media and triturated for the specific period till the entire mixture becomes dry again.
2. Soaking method (*Nimajjana / Nivasana*) – Dried powder is soaked into the liquid and then kept for drying under sunlight and at night in open air. e.g. while preparing *Shilajatu Rasayana*, *Shilajatu* should be left in warm liquid media and the process is to be repeated for seven times.

Quantity of liquid media (*Bhavana Drava Parimana*)

There are different opinions regarding quantity of liquid for *Bhavana*.

1. Gravimetrically / volumetrically equal to the amount of material to be levigated.
2. Quantity sufficient just enough to bind the mixture and turn it to bolus.
3. Quantity sufficient enough so that the drug gets immersed completely in the liquid.
4. Amount of liquid media should be sufficient enough to make the material wet throughout the specific period of grinding.
5. The heat produced during grinding and the atmospheric heat helps in drying the materials quickly. So, quantity of liquid media should be judged on the basis of the weather of that particular area.
6. If the drug is to be levigated with a *Kwatha*, then the *Kwathya Dravya* should be taken equal to the amount of material, eight times water be added to it and reduced to one eighth by boiling. Then this decoction is added to the material, as much that the material remains wet for whole day. This process is continued for seven days.

Objectives

1. To bring minute particles of the drug in contact with the liquid media.
2. Impregnation of the therapeutic properties of the media to the material. e.g. *Tribhuvankirti Ras-Bhavana* of *Tulasi*, *Ardraka* and *Dhattura* offer synergistic action to the drug for enhanced therapeutic activity.
3. Conversion of the drug material to a suitable form so as to have an intermediate product required for further processing. It provides the trace elements for preparation of *Bhasma*.
4. To reduce the particle size, thus exposing maximum drug to the purifying medium.

Larger the surface area, better the absorption of the *Bhavana Dravya*. Hence, a proper *Bhavana* ensures levigation for an optimum period, That reduces the particle size.

Utility of *Bhavana* in *Ayurvedic* pharmaceutics

1. Pharmaceutical implications of *Bhavana* – *Shodhan, Maran, Amritikaran, Lohitikaran, Satvapatan, Nirutthikarana, Samskara, Kharaliya Rasayana, Kupipakwa Rasayana, Pishtinirmana, Nirvishikarana, Churnakriya, Matra Nirmana; Vishahara, Malahara and Gunawardhana.*
2. *Bhavana*, being a *Samskara* carries the;

- *Guna-Karma* (qualities and action) of *Bhavana Drava* into *Bhavya Dravya.*
- *Gunantara* (change in *Guna*)
- *Gunadhana* (addition of new properties)
- *Gunotkarsha* (augmentation)- improvised therapeutic action and paliability
- *Gunahani* (reduction or elimination of properties)
- *Baladhana* (enhancement of therapeutic efficacy) - reduction in required therapeutic dose.
- May help in target specific action or target organ delivery of the drug
- Shelf life of drugs can also be increased.

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- Elimination of toxic constituents - e.g. *Shodhan* of *Vatsanabha* in *Gomutra*.
- Judicious use of the drug - Excessive and long term use of *Pippali* should be avoided,[3] but *Chausashtha Prahar Pippali* (*Churnakriya*) possesses *Rasayana* action and hence can be used for a longer time. In the pharmaceutical preparation of *Chausashtha Prahar Pippali*, it was observed that the number of *Bhavana* with *Pippali Kwatha*, was inversely proportional to the Piperine content. Thus it can be inferred that, reduction in Piperine is anticipated in this formulation, justifying the significance of the *Bhavana* process, which comes under effect of *Kala* on product / formulation during *Bhavana* process.

The pharmaceutical process of combination and elimination is done to enhance or subdue any pharmacological activity, This principle for inducing change in properties of drug as acknowledged by *Acharya Charak*, can also be effectively applied for changing therapeutic characteristics / potency of the drug by *Bhavana.*[4] *Churna Kriya*, the concept of potentiating the single or compound drug using their own *Swarasa* / *Kashaya* is recommended by *Charak.*[4] *Bhavana* ensures a reduced quantity of drug having broad spectrum activities.[45] The potentiation of drugs is done with their own juices or the juices having similar potency. Thus synergistic action of drugs can be ascertained.

The *Bhavana* fortifies the inherent properties of that particular substance. e.g. *Amalaki Rasayana*, *Chausastha Prahara Pippali*. The simple grinding or trituration during *Bhavana* process enhances the drug potency.

Changes during the *Bhavana* process

1. Physical changes

- Reduction in hardness - Continuous grinding turns the hard material to soft in consistency.
- Increase in weight - The organic and inorganic contents of the media are impregnated in the material causing gain in weight.
- Reduction in particle size - The mechanical force applied during continuous and repeated rubbing action results into reduced particle size and homogenization leading to modification of properties of the drug. This can be explained by Griffith Theory in particle size reduction.[5]
- **Griffith Theory in particle size reduction:** According to this theory, all solids contain flaws and microscopic cracks. A flaw is any structural weakness that may develop into a crack under strain like pressure applied during levigation process like *Bhavana*. The flaw in a particle determines its fracture strength. Usually the surfaces of particles are irregular. The applied force in the form of pressure is initially taken on high portion of the surface. As a result, high stress may be set up locally in the particles. The bond at this place becomes weak, which may be responsible for flaws. The particle with the weakest flaw fractures most easily and produces largest possible pieces. Later on another weakest flaw fractures. By this series of flaws and cracks, particle size gets reduced.
- Surface phenomenon/attrition in particle size reduction.[6] During *Bhavana*, the materials with liquid media are rubbed between the rough surfaces of mortar and pestle. This results into breakdown of the material by rubbing action between two surfaces i.e. surface phenomena, it is also called as attrition. When stress in the form of attrition is applied, the particle surfaces chip and produce small particles.
- Binding action - During wet grinding process, mixture gets properly mixed and material becomes soft, smooth and sticky. This results into better binding of the material.
- Better binding capacity, hygroscopic nature of the liquid media alter the parameters of standardization of tablets and pills like hardness, dissolution, disintegration and friability, thus affecting the kinetics of the final product.
- Trace element supplement- The inorganic contents of the liquid media get transferred to the *Bhasma* and acts as a trace element.

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2. Chemical changes

- Chemical reaction - During levigation, the minute drug particles come in contact with the liquid media and during grinding heat are produced. This may result into occurrence of chemical reaction between the material and media.
- Better palatability - *Bhavana Dravya* may alter the palatability of the drug through proper selection of media.
- Formation of the intended compound - During *Maran* process, the metals and minerals are mixed with the drug for incineration and there after levigated by liquid media. Liquid media, during grinding may help in chemical reaction between the two.
- Media reduces toxicity of materials and induces intended qualities.
- *Nimajjan* (Immersion in liquid media) process is adapted to remove or reduce the toxic effects of the drug. Impure *Vatsanabha* is immersed into *Gomutra* for three days. This helps in reducing the toxic properties of *Vatsabha*, which are mostly due to the alkaloid, Aconite. Thus, the cardio-toxic impure *Vatsanabha* changes into a cardio-protective pure *Vatsanabha.*[7] Aconite percentage before *Shodhan* into *Gomutra* was 0.113% and after *Shodhan* it changed to 0.089%.[8] Immersion into *Gomutra* during *Kupilu Shodhan* reduces the toxicity by hydrolysis of active components responsible for toxicity and improves the inherent qualities of the drug.[9] Volatile impurities can be removed and percentage of thermo-labile substances may get reduced.
- During rubbing between surfaces of mortar and pestle i.e. surface phenomena, some heat is produced so there may be the possibility of occurrence of chemical reaction in between materials and media or in between materials. Some of the volatile impurities might get evaporated by the temperature produced.
- *Bhavana* of different drugs offers different colours to the *Bhasma* of the same substance.

3. Biological changes

- Reduced particle size helps in absorption of the materials and increase bioavailability.
- Induction of trace elements helps to fulfill the body requirement of those elements.
- Therapeutic efficacy is improved due to due to formation of desired compounds during the process of *Bhavana*.
- Organic components of the liquid media are transferred to the drug material to make it organo-metallic or organo-mineral compounds.

Processes involved into *Bhavana* process

1. *Sanyoga* (Combination) - This results into potentiation of low potency drugs to a high potency drug through the process of levigation.
2. *Gunantaradhana* (Modification of properties) - e.g. *Sthulata* to *Sukshmata*, *Guruta* to *Laghuta, Kathinata* to *Mriduta* etc.
3. *Mardana* (Trituration) - This helps in obtaining assimiliable particle size of the drug.
4. *Agnisannikarsha* (Direct / Indirect heating) - Trituration produces heat by friction which ultimately results into certain physical and chemical bonding. This offers a transformation in the properties of the drug material.

Role of *Bhavana Dravyas* in the *Bhavana* process

1. Facilitates in easy and smooth grinding, eliminates the problem of dust.
2. The ground minute particles of the material come in contact to the liquid media.
3. Media impregnate its active principles to the material and make the material organic.
4. Liquid media acts as a binding agent.
5. Pellets can be prepared after proper levigation, which helps in tablet compression.
6. In *Bhasma* preparation, the inorganic contents from the liquid media, are transferred to *Bhasma* and acts as trace elements.

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Duration and number of the *Bhavana*

The duration and the number of *Bhavana* are mentioned separately for the specific drugs. It depends on the constitution of drug as well as the intended therapeutic properties. When any specification about duration of *Bhavana* is not mentioned, then it has to be carried for seven days.[10]

Use of *Bhavana* in *Rasaushadhi* preparation

1. *Shodhan*
2. *Maran*
3. *Amrutikarana*
4. *Satvapatan*
5. *Kalpana Nirmana*
   - *Kharaliya Rasayana*
   - *Kupipakwa Rasayana*
   - *Parpati*
   - *Pishti*
   - *Pottali*

Results and Discussion

The *Bhavana* process is done in two phases. In first phase, continuous grinding is done with specific liquid media for particular time limit. In second phase the levigated mass is allowed to complete dryness. The changes during the *Bhavana* process make it a useful *Samskar*.

Physical changes e.g. Reduction in hardness (due to continuous grinding the hard material turns to soft); Increase in weight (due to impregnation of the organic and inorganic contents of the media); Binding action (due to proper mixing, material becomes soft, smooth and sticky, resulting into better binding); Trace element supplement (due to transfer of the inorganic contents of the liquid media to the *Bhasma*). Reduction in particle size (due to the mechanical force applied during continuous and repeated rubbing action and homogenization leading to modification of properties of the drug. The Chemical changes are observed due to Chemical reaction (due to levigation, the minute drug particles come in contact with the liquid media and during grinding heat is produced resulting into chemical reaction between the material and media); Better palatability (attained through proper selection of media); Formation of the intended compound (due to *Marana* process, the metals and minerals are mixed with the drug for incineration and there after levigated by liquid media); Nimajjan (to reduce the toxic properties); *Bhavana* (the different drugs offer different colours to the *Bhasma* of the same substance). Similarly the Biological changes include Reduced particle size (helps in absorption of the materials and increase bioavailability); Induction of trace elements (helps to fulfill the body requirement of those elements); Improved therapeutic efficacy (due to formation of desired compounds during the process of *Bhavana*), Transfer of organic components of the liquid media to the drug material (to make it organo-metallic or organo-mineral compounds).

The rationale behind selecting a proper *Bhavana* indicates the scientific thinking process of our Rasashastra Gurus. One can find maximum *Bhavana* medium from herbal origin. The incorporation of the inherent properties of the herbal, mineral or plant origin drugs into the drugs is the idea behind this *Bhavana* process. The selection and rationale behind selecting the *Bhavana Dravyas* was determined by considering the physical, chemical and biological properties of the *Bhavana Dravyas* which in turn enhance the therapeutic efficacy of the finished product. Thus from pharmaceutical point of view, *Bhavana* process has immense significance and utilized for various dosage forms.

Conclusion

Bhavana is one of the most unique and distinct pharmaceutical procedures in Ayurvedic Pharmaceutics, which involves processing of the herbomineral drugs with liquid media of - plant, animal or mineral origin. This ensures the incorporation of desired therapeutic activity. This transformed drug becomes fit to prescribe as a medicine. The active principles of the *Bhavana Dravyas* are retained by the drug, thereby

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potentiating the drug efficacy. Thus *Bhavana* process has got a tremendous role in changing the morphological cell structure of processed drugs, thereby enhancing therapeutic efficacy of the formulation.

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