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A REVIEW ON THE IMPORTANCE OF BHAVANA DRAVYAS IN BHASMA PREPARATION

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ABSTRACT

Bhavana is an important samskara in Rasashastra in which purified metals and minerals are triturated repeatedly with specific liquid media known as bhavana dravyas and dried between cycles to facilitate their transformation into safe and efficacious bhasma.[1,3] This process contributes not only to reduction in particle size but also induces significant physicochemical changes such as chelation, adsorption of herbal constituents, organometallic complex formation and partial detoxification of the parent substance. Proper selection of bhavana dravya based on the nature of the drug, disease condition and dosha involvement, along with its use during pre-marana and inter-puta stages, is essential for achieving classical bhasma qualities such as nischandra, rekha purnata and niruttha nature. Modern analytical studies on Swarna, Yashada and Tamra bhasma demonstrate that bhavana media significantly influence particle size distribution, crystalline phases, trace element composition and overall pharmacological activity and safety profile. This review critically evaluates classical Ayurvedic concepts along with contemporary scientific findings to highlight the importance of bhavana dravyas as media, catalysts and carriers of herbal attributes in herbo-metallic formulations.

KEYWORDS: Bhavana, Bhavana dravya, Bhasma preparation, Rasashastra, Marana, Samskara, Herbo-metallic formulations.

INTRODUCTION

Bhavana samskara is described as the process of triturating powdered drugs, metals or minerals with prescribed liquid media followed by complete drying, repeated for a definite number of cycles.[1,4,6] Classical Ayurvedic texts and commentaries emphasize bhavana as an essential step between shodhana and marana for converting purified metals and minerals into therapeutically acceptable bhasma.[2,6,13] In the preparation of bhasma, bhavana ensures intimate mixing, progressive size reduction, impregnation of herbal principles and preparation of a uniform substrate that allows proper heat penetration during puta.[6,8,11] Various liquid media such as swarasa, kwatha, hima, milk, kanji, gomutra and fermented liquids are employed as bhavana dravyas and are selected according to therapeutic indication and required samskara such as deepana, shamana or yogavahi action.[1,4,12] Contemporary pharmaceutical and analytical studies support classical claims by showing that bhavana influences surface chemistry, organometallic interactions and biocompatibility of bhasma, thereby enhancing efficacy and reducing toxicity.[1,6,10]

NEED OF THE STUDY

A systematic understanding of bhavana dravyas is required to rationalize their selection, optimize bhasma preparation methods, correlate classical Ayurvedic principles with modern analytical parameters and develop reproducible, safe and potent herbo-metallic formulations for clinical use.

REVIEW OF LITERATURE

Classical Concept of Bhavana and Bhavana Dravyas

According to Rasashastra, bhavana refers to wet trituration of powdered dhatu or dravya with suitable liquid media until complete drying, repeated for prescribed cycles to impart specific qualities to the material.[1,2] Bhavana is included under samskara, indicating a purposeful transformation of the guna, virya and karma of the drug through repeated processing.[3,5] Bhavana dravya is the liquid medium used during levigation and acts not only as a mechanical aid but also as a source of phytochemicals, trace elements and disease-specific pharmacodynamic properties.[1,4,12] Classical formulations describe the use of different bhavana dravyas such as Triphala kwatha for Lauha, Kumari swarasa for Yashada and Nimbu swarasa for Tamra, indicating a rational and indication-based selection to enhance therapeutic utility and facilitate marana.[6,8,11,13]

Commonly Used Bhavana Dravyas in Bhasma Preparation.

Metal / Mineral	Typical Bhavana Dravya	Classical / Reported Indication
Lauha bhasma	Triphala kwatha, Kumari swarasa	Enhances hematinic action; tannins and acidic media aid marana and iron metabolism[6,8,12]
Tamra bhasma	Nimbu swarasa, Kanji	Acidic media facilitate finer division and detoxification; useful in liver and kapha disorders[6,11]
Yashada bhasma	Kumari swarasa, Godugdha	Provides mridu yet tikshna medium; modifies crystal structure and trace element profile[6,10]
Abhraka bhasma	Ardraka swarasa, Kumari, rasayana kwatha	Facilitates lamellar breakdown and rasayana impregnation[6,12]
Swarna bhasma	Plant juices, ghee and other liquids	Supports conversion into microfine organometallic form with improved biocompatibility[1,10]

Role of Bhavana in the Standard Bhasma Manufacturing Process

The preparation of bhasma in Rasashastra follows a well-defined and sequential pharmaceutical process that includes shodhana, bhavana, marana through repeated puta cycles and concluding procedures such as amritikarana.[8,10,11] Among these stages, bhavana occupies a strategically important position as it connects the purification achieved by shodhana with the structural and chemical transformation induced by marana. After shodhana removes gross physical and chemical impurities and reduces inherent toxicity, bhavana prepares the material for controlled thermal processing by modifying its physical consistency and chemical reactivity.

Bhavana is generally performed after shodhana and prior to the first puta, and it is often repeated between successive puta cycles.[6,8,11] Repetition of bhavana between putas ensures uniform mixing of the material, prevents agglomeration of particles and supports gradual and progressive transformation rather than abrupt thermal decomposition. By incorporating fresh bhavana dravya at each stage, the material remains plastic, homogenous and responsive to heat, thereby allowing uniform penetration of thermal energy during puta. This sequential alternation of bhavana and marana enables stepwise conversion of metals and minerals into fine, stable and therapeutically acceptable bhasma.

Classical texts describe that each cycle of bhavana should be continued until complete drying of the levigated mass, ensuring that the liquid medium has fully interacted with the solid substrate.[1,4] Such complete drying is considered essential for achieving proper subhavita

lakshanas, indicating that the material is adequately impregnated with the properties of the bhavana dravya. Traditionally, one bhavana cycle is regarded as equivalent to a full working period of trituration, emphasizing the labor-intensive and transformative nature of this samskara. Through repeated cycles, bhavana gradually modifies the internal structure and surface characteristics of the material, making it suitable for further puta processing and final bhasma formation.

Pharmaceutical and Physicochemical Importance of Bhavana

From a pharmaceutical perspective, bhavana functions as an effective wet grinding and size reduction technique. Repeated trituration under conditions of moisture, pressure and friction leads to progressive breakdown of particles into micro- and nano-sized ranges.[1,4,14] This reduction in particle size enhances surface area, improves dispersibility and increases the potential bioavailability of the final bhasma. Unlike dry grinding, wet trituration in bhavana allows uniform distribution of stress across particles, minimizing uneven fragmentation and promoting consistent particle morphology.

In addition to mechanical size reduction, bhavana induces significant physicochemical changes through the interaction of metals or minerals with organic constituents present in the bhavana dravyas. Phytochemicals such as organic acids, tannins, flavonoids and polysaccharides form surface coatings and organometallic complexes with metal ions.[1,6,15] These interactions reduce surface reactivity, improve chemical stability and enhance biocompatibility of the bhasma in biological systems. Such organic encapsulation is believed to play a crucial role in reducing irritation, toxicity and uncontrolled metal ion release after administration.

Experimental studies on Yashada, Tamra and Swarna bhasma demonstrate that the choice of bhavana dravya can significantly influence crystalline phases, lattice defects and trace element composition of the final product.[1,6,10,11] Variations in acidity, organic content and mineral composition of the liquid media affect oxidation-reduction reactions and phase transformations occurring during marana. Furthermore, residual organic matter from bhavana dravyas may act as catalysts during puta by facilitating redox reactions and improving uniform heat transfer within the material.[6,12,14] These combined mechanical and chemical effects highlight bhavana as a critical pharmaceutical step that governs the physicochemical identity of bhasma.

Pharmacological and Therapeutic Importance

The pharmacological significance of bhavana lies in its ability to transform an otherwise inert or potentially toxic metal or mineral into a formulation with specific organ-targeted and dosha-specific therapeutic action.[6,12,15] The selection of bhavana dravya is not arbitrary but is guided by disease condition, dosha involvement and intended therapeutic outcome. Through repeated impregnation, the properties of the herbal liquid medium are gradually incorporated into the mineral matrix, allowing the final bhasma to express combined mineral stability and herbal pharmacodynamics.

Bhavana acts as a functional bridge between mineral pharmacology and herbal pharmacology by integrating the dynamic biological activity of plant constituents with the durability and sustained action of metals and minerals.[1,16] This integration is particularly evident in complex rasa yogas such as Parpati, Pottali, Kupipakva and Kharaliya rasayana, where disease-specific bhavana protocols are essential for enhancing yogavahi, rasayana or dosha shamana properties.[6,8,16] In such formulations, bhavana ensures homogenous distribution of multiple components and potentiates synergistic interactions among them.

Classical Ayurvedic texts claim that proper bhavana enables the use of smaller therapeutic doses while achieving higher efficacy and minimizing adverse effects. Modern scientific observations provide partial support for this concept by demonstrating improved biocompatibility, reduced toxicity and controlled release behavior in completely processed bhasmas.[1,11] The organic coatings, organometallic complexes and micro-nano size achieved through bhavana and marana collectively contribute to safer pharmacokinetic and pharmacodynamic profiles. Thus, bhavana is not merely a preparatory step but a decisive factor in defining the therapeutic performance of bhasma-based formulations.

DISCUSSION

Classical Ayurvedic pharmaceutics clearly recognized that raw metals and minerals are inherently unsuitable for direct therapeutic use due to their toxicity, poor bioavailability and incompatibility with biological systems. To address these limitations, extensive pharmaceutical processing was advocated, among which bhavana samskara occupies a central and indispensable role.[2,3,5] Bhavana was not merely viewed as a mechanical process but as a transformative intervention capable of altering both the physical form and therapeutic potential of the substance. Classical descriptions emphasize that repeated wet trituration with

specific liquid media fundamentally changes the nature of metals and minerals, making them suitable for internal administration.

Bhavana dravyas contribute to this transformation through multiple complementary mechanisms. Mechanically, they facilitate softening, grinding and uniform size reduction of the substrate, ensuring intimate contact between particles. Chemically, they act as reaction media that promote chelation, oxidation-reduction processes and surface modification of metals and minerals. Biologically, bhavana dravyas introduce phytoconstituents such as organic acids, tannins, flavonoids and other secondary metabolites that become adsorbed or chemically bound to the mineral surface.[1,6,14] These phytochemical interactions modify the pharmacological behavior of the final bhasma, reducing reactivity and toxicity while enhancing therapeutic specificity.

Modern scientific investigations provide substantial support to these classical concepts. Analytical studies demonstrate that bhavana leads to measurable changes in particle size distribution, surface morphology, crystalline structure and chemical composition of bhasmas.[1,6,10,11] The formation of organometallic complexes and organic surface coatings observed in several studies aligns well with the Ayurvedic view that bhavana imparts new qualities to the drug beyond simple physical processing. Furthermore, the influence of different bhavana dravyas on phase transformation, lattice defects and trace element incorporation highlights the importance of rational selection of liquid media rather than treating bhavana as a uniform or interchangeable step.

Despite these encouraging findings, existing research remains fragmented and often limited to isolated preparations or single analytical parameters. Comparative studies evaluating different bhavana dravyas for the same metal or mineral, as well as investigations correlating pharmaceutical changes with pharmacological and clinical outcomes, are still scarce.[8,10,15] There is a clear need for systematic, multidisciplinary research integrating classical Ayurvedic principles with modern pharmaceutical science, analytical chemistry and clinical pharmacology. Such studies would help establish evidence-based guidelines for bhavana protocols and strengthen the scientific credibility of bhasma-based formulations.

CONCLUSION

Bhavana samskara, along with the judicious selection of appropriate bhavana dravyas, plays a decisive role in transforming purified metals and minerals into safe, potent and biocompatible

bhasmas.[6,8,11] Rather than functioning solely as a preparatory step, bhavana serves as a dynamic pharmaceutical process that governs the physical, chemical and biological identity of the final formulation. Through repeated wet trituration, bhavana dravyas act simultaneously as mechanical media for size reduction, chemical modifiers facilitating complex formation, catalytic agents supporting thermal reactions during marana and pharmacological enhancers imparting disease-specific therapeutic attributes.[1,6,12,16]

Both classical Ayurvedic descriptions and modern scientific studies consistently indicate that bhavana significantly influences critical quality attributes of bhasmas, including particle size, surface characteristics, organometallic interactions and overall therapeutic performance.[1,6,10,11] The integration of herbal phytoconstituents and trace elements into the mineral matrix through bhavana contributes to improved bioavailability, reduced toxicity and enhanced clinical efficacy.

For the future development, standardization and global acceptance of bhasma-based formulations, systematic scientific documentation of bhavana protocols is essential.[8,10,15] Establishing reproducible methods, validating classical quality parameters with modern analytical tools and correlating pharmaceutical changes with clinical outcomes will help bridge traditional Ayurvedic wisdom with contemporary regulatory and scientific expectations. In this context, bhavana samskara emerges not only as a traditional practice but also as a scientifically relevant pharmaceutical strategy central to the rational use of herbo-metallic medicines.

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