

Review Article

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“THE PRINCIPLE OF AMRITIKARANA IN RASASHASTRA AND ITS SCIENTIFIC BASIS: A REVIEW”

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ABSTRACT

Introduction: Amritikarana is a distinctive pharmaceutical process in Rasashastra that enhances the safety, stability, and therapeutic efficacy of Bhasmas (incinerated metal/mineral preparations). Derived from the Sanskrit term *Amrita* (nectar of immortality), Amritikarana symbolizes the transformation of potentially toxic substances into safe, biocompatible medicines. Despite its classical importance, the process has only recently been explored through modern analytical techniques. **Methods:** A systematic review of Ayurvedic classics (*Rasatarangini*, *Rasa Ratna Samuccaya*, *Ayurveda Prakasha*) was combined with modern scientific literature sourced from PubMed, Scopus, and Web of Science. Search terms included “Amritikarana,” “Rasashastra detoxification,” “Bhasma safety,” and “Ayurveda pharmaceutics.” Inclusion criteria were classical descriptions, pharmaceutical significance, toxicological studies, and modern analytical validations. **Results:** Classical texts describe Amritikarana as the final step in Bhasma preparation, often involving trituration of the Bhasma with ghee or specific herbal media, followed by controlled heating. This process improves organoleptic properties, reduces residual toxicity, and enhances shelf life. Modern studies confirm that Amritikarana reduces free metal content, introduces organic moieties from the media, and stabilizes the nano- and micro-particles formed during Marana. Analytical tools such as SEM, TEM, XRD, FTIR, and ICP-MS reveal improved particle homogeneity and reduced toxicity. Preclinical evidence supports its role in minimizing adverse effects while maintaining therapeutic efficacy.

Discussion: Amritikarana is not merely a ritualistic practice but a scientifically valid pharmaceutical principle ensuring safety and efficacy of herbo-mineral formulations. However, standardization, toxicological profiling, and clinical trials remain insufficient. **Conclusion:** The principle of Amritikarana exemplifies the scientific foresight of Ayurveda. Integrating its classical wisdom with modern analytical validation is essential to establish globally accepted standards for safe and effective herbo-mineral medicines.

KEYWORDS: Amritikarana, Ayurveda, Bhasma, Rasashastra, Safety

INTRODUCTION

Rasashastra, the branch of Ayurveda dealing with metals, minerals, and herbo-mineral formulations, emphasizes the transformation of raw materials into safe and therapeutically potent medicines through specialized pharmaceutical procedures^[1-2]. Among these, *Amritikarana* is described as a unique process that enhances the quality, safety, and stability of Bhasmas, thereby ensuring their suitability for therapeutic use. The term itself reflects the idea of transforming substances into an “immortal” or harmless form^[3-4].

Ayurvedic classics such as *Rasatarangini*, *Rasa Ratna Samuccaya*, and *Ayurveda Prakasha* describe *Amritikarana* as the final purification step in Bhasma preparation. Typically, this involves triturating the Bhasma with ghee, honey, or herbal juices, followed by controlled heating^[5-6]. This process was considered essential to remove residual toxicity, enhance bioavailability, and increase shelf life. Ancient scholars emphasized that without *Amritikarana*, Bhasmas may not achieve their full therapeutic potential^[7-8].

The present review aims to critically analyze the principle of *Amritikarana* and its pharmaceutical significance. The objectives are: (i) to describe *Amritikarana* as detailed in classical texts, (ii) to analyze its role in ensuring safety, efficacy, and stability of Bhasmas, and (iii) to examine modern scientific evidence validating its relevance^[9-10].

MATERIALS AND METHODS

A structured literature review was conducted. Primary sources included classical texts such as *Rasa Ratna Samuccaya*, *Rasatarangini*, *Ayurveda Prakasha*, and relevant commentaries. Secondary sources included pharmacopeial references, authoritative Ayurvedic compilations, and contemporary reviews. Databases searched included PubMed, Scopus, Web of Science, and Google Scholar, using keywords “*Amritikarana*,” “*Rasashastra purification*,” “*Bhasma safety*,” “*Ayurvedic pharmaceutics*,” and “*toxicological validation*.”^[11-12]

Inclusion criteria: Classical references describing *Amritikarana*, pharmaceutical studies on its procedures, modern analytical validation, and toxicological/clinical studies^[13].

Exclusion criteria: Non-authentic sources, anecdotal reports, and redundant studies^[14].

A total of 82 sources were screened, of which 44

were included in the final analysis. A thematic approach was adopted to analyze historical concepts, pharmaceutical relevance, analytical validation, and clinical evidence^[15].

OBSERVATION AND RESULTS

1. Classical Basis of *Amritikarana*

Amritikarana is described as the process of converting Bhasmas into a form comparable to “*Amrita*” by enhancing their safety and stability. It is typically performed after Marana (incineration). Examples include:

- *Abhraka Bhasma* (mica ash): Subjected to *Amritikarana* with cow’s ghee.
- *Tamra Bhasma* (copper ash): Processed with ghee and herbal juices.
- *Lauha Bhasma* (iron ash): Treated with herbal decoctions.

These steps were believed to reduce toxicity and impart Rasayana (rejuvenating) properties.

2. Procedures of *Amritikarana*

The process varies depending on the metal or mineral:

Media used: ghee, honey, cow’s milk, herbal decoctions (e.g., *Triphala*, *Aloe vera* juice).

Process: trituration followed by mild heating, repeated several times.

Outcome: removal of residual free metals, improved texture, enhanced therapeutic properties.

3. Pharmaceutical Significance

Safety: *Amritikarana* reduces metallic toxicity by stabilizing nano-particles.

Stability: Prevents reoxidation and degradation of Bhasmas.

Bioavailability: Herbal media introduce organic ligands that improve assimilation.

Therapeutic enhancement: Ghee and herbal media impart Rasayana and bioenhancing effects.

4. Modern Analytical Evidence

Contemporary research validates classical claims:

SEM/TEM: *Amritikarana*-treated Bhasmas show more uniform nano-sized particles.

XRD: Confirms stable crystalline phases post-treatment.

FTIR: Demonstrates presence of organic functional groups from herbal/ghee media.

ICP-MS: Shows reduction in free metallic ions, lowering toxicity risk.

5. Pharmacological and Toxicological Studies

Animal studies show that *Amritikarana*-treated Bhasmas are safer and better tolerated. For instance:

- *Abhraka Bhasma* processed with ghee demonstrated improved antioxidant activity.
- *Lauha Bhasma* subjected to Amritikarana showed superior hematinic activity with reduced hepatotoxicity.
- *Tamra Bhasma* exhibited reduced toxicity after Amritikarana compared to raw copper.

6. Clinical Relevance

Limited clinical studies indicate that Amritikarana improves patient tolerance and efficacy of Bhasma formulations in chronic diseases, anemia, and metabolic disorders. However, robust randomized controlled trials are lacking.

DISCUSSION

Amritikarana represents a unique pharmaceutical refinement in Rasashastra, demonstrating ancient scholars' understanding of detoxification and stabilization. It ensures that Bhasmas are not only potent but also safe and stable over time. From a scientific perspective, Amritikarana can be compared to processes such as surface modification and stabilization of nanoparticles, which are standard in modern pharmaceuticals^[16].

The use of media such as ghee and herbal decoctions contributes both chemically and pharmacologically. Ghee acts as a lipid-based stabilizer, preventing agglomeration of particles and imparting Rasayana qualities. Herbal decoctions provide phytochemicals that may chelate metallic ions, reduce toxicity, and enhance therapeutic action. Modern FTIR studies confirm the presence of organic functional groups coating the particles, which likely improves biocompatibility^[17].

Pharmacological studies reinforce the classical claims. For example, Amritikarana-treated Lauha Bhasma demonstrates improved hematinic effects, while Abhraka Bhasma processed with ghee shows enhanced antioxidant activity. Toxicological studies confirm reduced adverse effects compared to untreated Bhasmas. This suggests that Amritikarana functions as a bioenhancing and safety-assuring process^[18].

Despite these insights, significant challenges persist. Lack of standardized procedures, variations in media and heating conditions, and absence of pharmacopeial benchmarks create inconsistency. Reports of toxicity from improperly prepared formulations undermine confidence in Ayurveda. Moreover, modern research is limited to small-scale animal or laboratory studies; large-scale clinical

trials are rare^[19].

Future prospects lie in bridging classical and modern science. Standardization of Amritikarana protocols, mechanistic studies on molecular interactions, and pharmacokinetic profiling will be critical. Collaborative research between Ayurveda scholars, material scientists, and pharmacologists can help establish Amritikarana as a scientifically validated process with global relevance^[20].

CONCLUSION

Amritikarana, a distinctive pharmaceutical principle in Rasashastra, represents the final step in refining Bhasmas to achieve safety, stability, and therapeutic excellence. By processing incinerated metals and minerals with ghee, honey, or herbal decoctions, this method reduces residual toxicity, enhances bioavailability, and prolongs shelf life. Classical scholars emphasized that without Amritikarana, Bhasmas may remain incomplete or unsafe for therapeutic use.

Modern analytical studies have substantiated these claims, revealing that Amritikarana improves particle uniformity, stabilizes crystalline phases, and incorporates organic coatings that enhance biocompatibility. Pharmacological evidence supports improved efficacy and safety of Amritikarana-treated Bhasmas, particularly in conditions like anemia, chronic fatigue, and metabolic disorders.

However, the practice faces challenges related to lack of standardization, limited toxicological validation, and insufficient clinical trials. Addressing these issues through pharmacopeial guidelines, Good Manufacturing Practices (GMP), and interdisciplinary research will be crucial for its global recognition.

In conclusion, Amritikarana exemplifies Ayurveda's foresight in pharmaceutical refinement. It bridges ancient wisdom with modern material science, offering insights into safe and effective drug processing. Its integration with contemporary analytical validation and clinical evaluation can elevate its relevance in integrative medicine, ensuring that Ayurveda continues to contribute to global healthcare.

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