



OVERVIEW ON AYURVEDIC PARAMETERS OF BHASMA PARIKSHA - AN ANCIENT INDIAN NANOMEDICINE

[Sheenam Rani¹](#), [Aditi Sharma²](#), [Usha Sharma³](#), [Shuchi Mitra⁴](#), [Khem Chand Sharma⁵](#)

¹MD Scholar, P.G. Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus Haridwar, India

²MD Scholar, P.G. Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus Haridwar, India

³Professor, P.G. Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus Haridwar, India

⁴Associate Professor, P.G. Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus Haridwar, India

⁵Professor & HOD, P.G. Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus Haridwar, India

Corresponding Author: josansheenam416@gmail.com

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ABSTRACT

Bhasmas (incinerated metals) are distinctive Ayurvedic metallic or mineral preparations, treated with herbal juices or decoction and exposed to a certain quantum of heat as per the *Putā* system of Ayurveda and are widely recommended for treatment of a variety of ailments. *Bhasma* is the unique formulation, prepared either by the *Putapaka* method or by the *Kupipakva* procedure. To determine the accurate endpoint of the *Bhasmīkarana* (incineration) process, various parameters have been described in different textbooks of Ayurveda. These are significantly qualitative and aid to ensure that the resulting *Bhasma* is accurately formed and does not change back to its original state. If *Bhasma* is not formed accurately, it can cause multiple complications like *Kushtha* (skin diseases), *Jwara* (fever), *Bhrama* (delusion), etc. Therefore, Different classical textbooks of Rasashastra have given various parameters for

the Standardization of *Bhasma*, because a single method is not applicable for determining the accuracy of different *Bhasmas*. Methods vary from metal to metal that is to be used for authentication of *Bhasma* formed.

Keywords: *Bhasma, Marana, Apunarbhava, Niruttha*

INTRODUCTION

The term “*Bhasma*” stands for “Holy ash” which is an elaborate process involving *Shodhana* (purification) followed by *Marana*(incineration) [1]. Rasa Tarangini has mentioned *Shodhana* (purification) as a process of elimination of *Doshas* from the *Lohadi Dhatus* by subjecting them to a procedure like *Peshana, Mardana* (trituration), *Bhavana* (levigation), etc. with a previously prescribed *Aushadha* drug [2]. *Marana* is described as the process by which metals and minerals are grounded with liquids (*Svarasa* etc.) and when dry reduced to *Bhasma* by heat [3]. For proper achievement of *Paka* of *Rasadi Dhatus*, a quantum heat (*Agni*) in the form of *Putra* is required which should be neither less nor more [4][5]. To ensure that the *Bhasma* is properly prepared, a set of parameters are specified in the various Ayurvedic textbooks as well as the Ayurvedic Formulary of India [6][7].

PROPERTIES OF *BHASMA*:

One of the remarkable properties of *Bhasma* is termed “*Rasibhavana*” [8], which indicates that accurately prepared *Bhasma* upon ingestion must be easily absorbable, adaptable, and assimilable in the body and must be non-toxic too. Another property of *Bhasma* is “*Shighravapyati*” which indicates that after *Marana*, *Bhasma* quickly spread in the whole body [1]. *Bhasma* has also been explained as *Agnideepana* as it increases metabolism at the cellular level and acts as a catalyst [9]. These characteristics of *Bhasma* are comparable with the action of nanoparticles in the body which are bio-degradable, bio-compatible, and non-toxic in nature [9]. *Bhasmas* are believed to be more efficacious

than any other healing system because these metals and minerals do not react at the cellular level to the body and being insoluble can enter the blood stream. These particles are more biocompatible as compared to any chemically produced entity, similar to biologically produced nanoparticles [10]. *Bhasma* as compared to its plant drug counterpart has more stability over a longer period of time, more palatability, require in less dosage form, is easy to store and handle along with sustained availability [11][12].

***BHASMA PARIKSHA* PARAMETERS:**

Apunarbhava Nischandre Slakshnata Sukshmata Laghu| Rekhapuram Niruthna cha Nirdhumaut-tamam tatha|| Varitaram Awami cha Niswadu Mridu Varankam|| Dante Kachkachaabhavam Dhatunaam Bhasma Niranya|| Tamram Amla Pariksha Sayat Rasavidhbhi Parikshitam|| [13]

A. PHYSICAL PARAMETERS FOR *BHASMA PARIKSHA*:

1. *Varna* (Colour): Acharyas have mentioned specific colours for each *Bhasma*. Alteration in specific colour suggests that *Bhasma* is not prepared properly, because a particular metallic compound formed during *Bhasma* preparation possesses unique colour.

Significance: Specific colour is mentioned for specific *Bhasma*. The colour may be indicating the specific chemical configuration of the *Bhasma*. So, it seems important to co-relate the colour of the prepared *Bhasma* with the classical reference.

Table 01: Different *Dhatu*s (metals) and their *Bhasma Varna* (colour)

| S.No. | <i>Dhatu</i> | <i>Bhasma Varna</i> [14] |
|-------|---------------------------|--|
| 1. | <i>Swarna</i> (gold) | <i>Champak varna</i> i.e brick red |
| 2. | <i>Rajata</i> (silver) | <i>Krishna</i> i.e black |
| 3. | <i>Tamra</i> (copper) | <i>Krishna</i> i.e black |
| 4. | <i>Kansya</i> (bronze) | <i>Dhusar varna</i> i.e brown |
| 5. | <i>Naag</i> (lead) | <i>Paravatprabha</i> i.e blackish grey |
| 6. | <i>Vanga</i> (tin) | <i>Shubhra</i> i.e white |
| 7. | <i>Tikshnaloha</i> (iron) | <i>Jambuphala varna</i> i.e purple |
| 8. | <i>Abhrak</i> (mica) | <i>Ishtekabha</i> i.e brick red |

In Parada Samhita, while quoting the reference from Rasarajsundar, the colours of *Bhasma* are described as follows.

Table 02: *Dhatu*s and their *Bhasma varna*

| S.No. | <i>Dhatu</i> | <i>Bhasma Varna</i> [15] |
|-------|---------------------------|--------------------------------------|
| 1. | <i>Swarna</i> (gold) | <i>Kapotkanthabha</i> |
| 2. | <i>Pittala</i> (brass) | <i>Kapotkanthabha</i> |
| 3. | <i>Tamra</i> (copper) | <i>Mayurkanthabh</i> i.e., bluish gr |
| 4. | <i>Rajata</i> (silver) | <i>Ujjwal</i> i.e white |
| 5. | <i>Vanga</i> (tin) | <i>Ujjwal</i> i.e white |
| 6. | <i>Naag</i> (lead) | <i>Krishnasarpanibha</i> i.e black |
| 7. | <i>Tikshnaloha</i> (iron) | <i>KajjalSannibha</i> i.e., black |

2. Nishchandravam (lusterless) [16][11]: *Bhasma* must be *Nischandra* (lusterless) before therapeutic application. For this test, *Bhasma* is observed under bright sunlight, to assess the presence of any lustre. The presence of lustre implies that the *Bhasma* still needs further incineration. This test is specially described and done for *Abhrak* (Mica) [17] and *Swarna Makshika* (copper pyrite) *Bhasma* [18]. If *Abhrak*(mica) *Bhasma* contain *Chandrika*, it causes *Prameha* (diabetes) and *Mandagni* (indigestion) [19][20].

Significance: The prepared *Bhasma* should be free from the metallic lustre and shine even on observing through a magnifying glass which indicates the presence of any free metal.

3. Varitara [21][22][23][24]: *Vari* means water and *Tara* means to float. This test is applied to access the lightness of *Bhasma*. A small amount of *Bhasma* is taken and sprinkled over the silent water taken into a beaker. Accurately incinerated *Bhasma* will float on the water surface.

Significance: Floating of *Bhasma* signifies the micro fineness and lightness of *Bhasma* particles. Lighter (*Laghu*) the particle, surface tension of water does not allow the particle to sink and keep them floating on water.

4. Unama [25]: This test is subsequently performed after the *Varitara* test. *Bhasma* is placed slowly upon the water and if it does not sink even after placing grains upon the *Bhasma*, but floats like a swan, such a *Bhasma* can be considered to be accurately prepared. *Unama Praiksha* is known as *Uttama Pariksha*.

Significance: It indicates the very lightness of *Bhasma* and also further revalidates *Varitara Pariksha* i.e., nanoparticle concept.

5. Rekhapurnata [26][27][24]: This test is applied to assess the fineness of *Bhasma*. *Bhasma* particles should be of minimum size for easy absorption and assimilation in the body. *Bhasma* is taken in the middle of the thumb and index finger and rubbed, if it fills between the creases of fingers, it is called *Mrita Lauha* [28]. This is a classical qualitative assessment for assessing particle size.

Significance: This test indicates the minuteness and fineness of *Bhasma*.

6. *Slakshnatvam* [13]: It is the tactile sensation produced by *Bhasma* by simple touch with fingertips. Properly incinerated *Bhasma* attains this quality.

Significance: *Slakshna Bhasma* indicates uniformity in the texture of the *Bhasma* and fineness of particle size.

7. *Susukshma* [13][16]: '*Sukshma*' implies fine form, and the prefix '*Su*' added to '*Sukshma*' implies very fine form. This *Pariksha* also talks about the fineness of *Bhasma* particles.

Significance: *Bhasma* should be *Sukshma* so that it can be easily absorbed and assimilated into the body.

8. *Anjana Sannibha* [13][16]: *Anjana* (collyrium) is so smooth in character that it can be very safely applied to the eyes without any irritation, so it also refers to the fineness and smoothness of *Bhasma*.

Significance: Properly incinerated *Bhasma* should be smooth and should not cause any irritation to the mucous membrane of the gastrointestinal tract.

9. *Niswadu* (tasteless) [13]: When a small pinch of the *Bhasma* is tasted, it is tasteless i.e., *Niswadu*. It should not contain any taste like *Amla*, *Kashaya*, etc. which is also a qualitative parameter of the *Bhasma*.

Significance: It indicates the palatability of *Bhasma*. If *Bhasma* contains any taste, it indicates *Bhasma* is not formed properly.

10. *Awami* [13]: Pinch of *Bhasma* when taken orally should not produce nausea or vomiting sensation. This test is done specifically for *Tamra* (copper) and *Tuttha* (copper sulphate) *Bhasma* etc. Metallic taste, nausea, vomiting, etc. is felt when *Ashudha Tamra* [29][30][31] and *Tuttha Bhasma* [32][33] are consumed.

Significance: It signifies the acceptability of the *Bhasma* into the body system.

11. *Nirdhoomatva* [13]: This is not a common test applicable for all *Bhasmas*. This is applied mainly for *Hartala* (orpiment) [34] and drugs containing *Gandhaka* (sulphur). Some portion of *Bhasma* is to be ignited on the fire to observe whether fumes are coming out or not.

Significance: The presence of fumes indicates that the *Marana* (incineration) process is incomplete and some more *Putas* are to be required to complete the process.

12. *Dante Kachkachaabhava* [13]: When *Bhasma* does not feel gritty on chewing i.e., *Kachkachaabhava* and has a consistency like pollen grains of *Ketaki* (*Pandanus odoratissimus*) [35], then it is said to be formed properly for use.

Significance: It indicates the particle size of *Bhasma*.

13. *Amla Pariksha* [13]: This *Pariksha* is to be carried out during the *Putra* procedure. When *Bhasma* is kept mixed with any *Amla Dravya* (e.g., curd, lemon juice, etc.), no discoloration in *Amla Dravya* is seen. It is the specific test described for *Tamra* (Copper) *Bhasma* [36][37].

Significance: This *Pariksha* indicates the presence/absence of free metal in the prepared *Bhasma*. If any free conjugated metal is persistent in the *Bhasma* or the conversion process is not complete then such *Bhasma* reacts with the *Amla Dravya* (e.g., curd, lemon juice, etc.) and some salt compounds are formed which may be responsible for the change in colour of the *Amla Dravya*.

B. CHEMICAL PARAMETERS FOR BHASMA PARIKSHA:

1. *Apunarbhava* [38][39][40][41][42]: Prepared *Bhasma* is mixed with an equal quantity of *Mitrapanchaka* i.e., *Guda* (jaggery), *Gunja* (*Abrus precatorious*), *Madhu* (honey), *Ghrita* (clarified butter) and *Tankana* (borax). This mixture is taken in a *Musha* (crucible), and it is to be heated on a gas burner till all organic matter burns. After self-cooling, the mixture inside the *Musha* (crucible) is taken out and observed. If it does not contain any free metal, then the *Bhasma* is said to be *Apunarbhava*. According to *Rasa Tarangini*, it is also known as *Niruttha Bhasma*.

Significance: During this scientific test, an unstable metallic compound can reduce to a metallic state by the carbon reduction process. The absence of reduction denotes *Marana* process is complete and *Bhasma* attains *Apunarbhava Pariksha*. *Mitrapanchaka Gana Dravyas* used may act as a source of carbon at that particular temperature.

2. Niruttha [43][44][45][46]: The *Roupya* is mixed with *Bhasma* & heated vigorously in the fire. If not even a little amount of the *Bhasma* mixes with the *Roupya* (silver), such *Bhasma* is called *Niruttha Bhasma*. According to *Rasa Ratna Samucchya* and *Rasendra Chudamani*, it is also known as *Apunarbhava*.

In the case of *Niruttha Pariksha* of *Rajata* (silver) and *Naga*(lead) *Bhasma*, the use of *Tamra* (copper) *Patra* is prescribed for testing of *Bhasma* instead of *Roupya* (silver) [47]. In *Anandakandah* also, the use of *Tamra* (copper) *Patra* has been mentioned only for the testing of *Roupya* (silver) *Bhasma* [48].

Significance: This test signifies the complete conversion of metal into *Bhasma* form. It can be considered the chemical analytical test. Specifically meant for *Dhatu* & indicates the stability of *Bhasma*.

DISCUSSION

The implication of “*Bhasmikanarana*” (incineration) is that the harmful effects of the resulting metal oxide are completely nullified along with introducing the medicinal properties into it. *Bhasmas* are more stable over longer periods of time and are required in lower dosage form, as compared to herbal formulations. The development of authentic analytical methods including quantitative analysis of bioactive compounds and other key constituents is a major need for scientists of this era. Ancient Acharyas were well known for the after-effects that occurred by ingestion of *Ashudh* and *Apakwa Bhasma*. So Acharyas have described various

parameters for qualitative issues of different *Bhasmas*. These parameters have different significances. *Nishchandratvam* and *Amla Pariksha* indicates the presence of any free metal in *Bhasma* while *Varitara* and *Unama Pariksha* signifies the micro fineness and lightness of *Bhasma* particles. In *Nirdhoomatva Pariksha*, the presence of fumes is a cardinal sign which states that *Bhasma* needs further incineration. The *Niswadu*, *Awami*, and *Susukshma Pariksha* manifest palatability, acceptability, absorption, and assimilation of *Bhasma* respectively. *Slakshnatvam* and *Anjana Sannibha Pariksha* indicates the texture of the *Bhasma*. In *Apunarbhavata Pariksha*, *Guda* (jaggery) and *Gunja* (*Abrus precatorious*) used are having a low melting point and act as a source of Carbon at that temperature. *Tankana* (borax) helps in reducing the melting point of the mineral concentrate, permitting easy liquification. *Madhu* (honey) and *Ghrita* (clarified butter) also melt at very low temperatures and turn to carbonized form which will help to segregate *Dhatu* from *Dhatu Bhasma*. If *Bhasma* treated with *Mitrapanchaka* regains its original state, then it is triturated with *Gandhaka* (sulphur) and *Ghritkumari* (*Aloe barbadensis*) and subjected to *Gajaputa* for proper *Bhasmikanarana* (incineration). In *Niruttha Pariksha*, *Roupya* (silver) is used as it has more affinity towards other metals and also has the highest thermal conductivity property. There are various complications (*Vyapad*) manifested out of *Ashuddha* and *Apakwa Bhasma Sevana Doshas* therefore, various methods of *Bhasma Parikshas* are described by Learned Acharyas.

Table 03: Ayurvedic Parameters of *Bhasma Pariksha* and their significance

| Sr. no. | Parameters | Significance |
|---------|---|--|
| 1. | <i>Varitara</i> , <i>Unama</i> , <i>Susukshma</i> , <i>Dante Kachkachaabhava</i> , <i>Rek-hapurnata</i> , <i>Slakshnatvam</i> and <i>Anjana Sannibha Pariksha</i> | The fineness of particle size of <i>Bhasma</i> |
| 2. | <i>Nishchandratvam</i> , <i>Amla Pariksha</i> , <i>Apunarbhava</i> , <i>Niruttha Pariksha</i> | Presence of any free metal |
| 3. | <i>Nirdhoomatva Pariksha</i> | Fumes indicate further incineration |
| 4. | <i>Niswadu</i> , | Palatability |
| 5. | <i>Awami</i> | Acceptability |
| 6. | <i>Susukshma Pariksha</i> | Absorption and assimilation |

CONCLUSION

Ayurveda has mentioned many parameters such as *Apunarbhava*, *Niruttha*, *Nirdhoomatva*, *Rekhapurnata*, *Varitara*, etc. which are equivalent to some physico-chemical testing parameters described in modern science. Free metal may be present in *Bhasma* after *Marana* (incineration) process which could be very fatal, therefore *Bhasma Pariksha* is necessary before its consumption.

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