

A REVIEW ARTICLE ON AYURVEDIC PERSPECTIVE OF NANO SCIENCE W.S.R TO BHASAM

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➤ ABSTRACT

Adequate literature of *Ras-shastra* is available regarding various formulations. These formulations includes various metal and mineral based drugs. Earlier *Acharyas* had mentioned mostly about plant based drugs in their *Samhitas*. Later on *Ras-shastra* got evolved and introduces the mineral based drugs. Though *Ras-shastra* was not invented for metallurgy purpose. Its ultimate goal was to attain long life and liberation through *dehveda*. As the time changed, a revolution took place when the era of minerals and metal based medicines came in light. In this era the therapeutic uses of these drugs pop out like a shining star. On other hand, Nano technology is well established and effective technology of 21st century.^[1] According to *Ayurveda*, *Bhasam* form is consider under nano science. When the nano particles of *Bhasam* underwent analytical study it falls under category of nano

technology. Therapeutically the use of nano particles of mineral and metallic compounds has become common in practice. It is due to its high efficacy, lesser dose and more potency. The size of nano particles is usually between 1-100nm. As per *Ayurveda*, metals and minerals cannot be taken in its raw form. Therefore proper procedure is followed to obtain small size material with particular dimension. This process include – *Shodhan*, *Maran*, some time *amritikaran* also etc. These are the *sanskars* which are done to change the properties of drug, conversion of lower metal into higher metallic state and eliminates the toxic nature of drug. These *sanskars* plays an important role in the preparation of *Bhasam*. The benefit of *Bhasam* in the form of nano medicine is unstoppable. *Ayurvedic Bhasam* have strong therapeutic relevance and can serve as an excellent development of nano medicine.

KEYWORDS:- *Ras-Shastra, Dehveda, Nano Technology, Bhasam, Shodhan, Maran, Amritikaran and Sanskars.*

➤ INTRODUCTION

Ras-Shastra is an important branch in the world of *Ayurvedic aushdhi* or can say *Ayurvedic Pharmacology*. It is believed that all types of knowledge in Indian history originate from our *Vedas*. *Ras-Shastra* begins from *vedic* period when herbal preparations were also practiced. In today's time, extensive knowledge of *Ras-Shastra* has been possible only through extensive research of thousands of years. From time to time many important texts on *Ras-Shastra* were written by different *Acharya* but unfortunately they had been lost during chronology. The action of *Dehvada and lauhvada* also disappeared with time and the use of *Ras-Shastra* remain confined to medicine.^[2] Now a days *Ras dravya* are used for *rasayana* and therapeutic purpose, which are described in the *samhita*.

When we look in the field of medicine, we found the most effective preparation of *rasdravyas* i.e *Bhasam*. *Bhasam* is a very fine powder which is obtained by calcination.^[3] On other side, Nano science is the branch of science which deals with ultra small material. The nano particle size is usually in the range of 1-100nm. Nano medicine is involved in today's science and can be correlated with *Bhasam* preparation of *Ayurveda*. As *Bhasam* is a very fine dosage form of *rasdravyas*, which is composed of minute particles. *Rasdravyas* cannot be used in its raw form. So for internal administration of *rasdravyas* they are converted into suitable dosage form. *Bhasam* are the unique preparations of *rasdravyas* which are prepared through various *sanskars* i.e – *Bhavana* with specific herbal *Swarasa, Shodhana, Maran*, sometime *Satwapatan and Amritikaran* also (according to *Dravyaguna-karam*). While preparation of *Bhasam* various physical and chemical changes takes place in a given material. So that it can be used therapeutically.

In present era for effective therapeutic results the *Bhasam* are widely used. *Bhasam* has some classical features like – proper absorption, easy digestion, tasteless, easy administration etc. When *Bhasam* preparation is done in proper way then it has anti – aging and immuno – modulatory properties along with proper action of drug with maximum bioavailability. The nano size of *Bhasam* particle got easily dissolve and absorb in alkaline medium of intestine. The rate of absorption of *Bhasam* is also high and further it get distribute directly in systemic circulation. Due to this *Bhasam* form have faster action then other forms of drugs.

➤ Nanotechnology

Nanotechnology is the most acceptable technology which deals with the particle size of the material. The particles are studied on the nano scale level and their size dependent on their physical and chemical properties. Along with this description it is important to know about *Bhasam* form. *Bhasam* are also studied on the nano scale level and are therapeutically very effective due to its nano size. The chemical composition and structure of nano size particles in raw form (metals/mineral) is totally different then the end product. This is due to its physical and chemical changes which takes place during *Bhasam* preparation.

It is clearly mentioned in the classical texts of *Ayurveda* about the *Bhasam* preparations. In ancient time metals/minerals were prepared by going through various processes like *shodhan* done with various herbal juices and proper trituration for specific time period, *maran* done by heating the purified metal/mineral, sometime *amrtikaran* and *satavpatan* also done. This addition of herbs and involvement of heat in the preparation of *Bhasam* leads to various physical and chemical changes in parent metal/mineral. This drastic changes in *Bhasam* gives remarkable effect without producing any toxic effect.

➤ Process of formation of nano particles as *bhasam*

The concept of *Bhasam* as nano particle is set since the period of *Acharya charaka*. Metal based *Bhasam*, mineral based *Bhasam*, herbal based *Bhasam*, animal based *Bhasam* are classified under nano particles of *Bhasam*. To convert element into its nano particle it has to go through from various processes. At the end of these processes we got the final product in the form of nano particles. These processes are attrition, pyrolysis and hydrothermal synthesis, which are as follows –

- **Attrition** – The macro or micro particles are poured into ball mill/a planetary mill in which heavy balls are present which reduces the size of the particles. It is said as mechanical method which converts the macro or micro particles into nano size particles. The obtained particles are then separated by filtration method. In *Ayurveda* nano size of material is done by triturating it with particular *Swarasa/ Kwatha bhawana* for a specific time period in *Khalwa yantra*.
- **Pyrolysis** – It is the heating of a compound in the absence of oxygen. The precursor in the form of liquid or gas is forced through an orifice at high pressure and burned. The end material is collected to recover the nano particles.

- **Hyrdothermal synthesis** – The wide range of temperature is used to produce nano particles. i.e from room temperature to very high temperature. It is a common method which is used to obtain nano size particles.

According to *Ayurveda* nano particles are prepared by various processes like **Kshar**, **Kupipakwa Rasayana**, **Bhasam**.

- **Kshar** – *Kshar* is alkaline in nature which is prepared from ash of the drugs. The end product of ash converts into very fine powder containing nano size particles.

Therapeutically *kshar* is also important, as it is very useful in *twak roga* due to its *Chedana*, *Bhedan* and *Lekhan* property. *Kshar* is used in various pharmaceutical procedures like *shodhan* and *maran*. Many of *ras dravyas shodhan* is done with *kshar*. In “**Rasendra mangal**” it is mentioned that some of the *sanskar* of *parada* is done with *kshar* to increase the potency of *parada* (mercury). *Kshar* assimilate in the body very quickly to show its immediate effect. *Kshar* is also included in *Mitranchak*, which is used as reagent for *Bhasam* testing.

- **Kupipakwa** – *Kupipakwa* is divided into two parts.
- **Kupi** – A glass bottle which is coated with seven layers of mud smeared cloth.
- **Pakwa** – *Valuka yantra* is filled with sand and then glass bottle is immersed in the centre. After this *mridu*, *madhyam* and *tivra agni* is given in three stages gradually.

The end product is in powder form which is in nano size. During the procedure of *kupipakwa rasayana* the temperature gradually increases which makes the matter *laghu* inside the bottle. Due to light weight and nano size particle of the end product it get easily penetrate into the tissues.

Therapeutically: *Kupipakwa rasayana* have upper most position in *Ayurveda*. It has tremendous properties like rapid action, smaller dose, long shelf life. It is very effective in *vaat – kapha* predominant disorders.

- **Bhasam** – *Bhasam* and *maran* does not mean an ordinary ash. There is no specific property in ash other than alkaline nature and carbon presence. The fraction of various metals/minerals never form as ordinary ash. Preparation of *Ayurvedic Bhasam* with fire involve chemical changes in which different herbs or metals/minerals ratio are mixed together to form different compounds. This compound contain both properties of herbs or metals/minerals.

a) **Shodhan** – Purification of various mineral/metallic substances suppress the physical defects, remove the toxicity, become digestable, prepare the mineral/metal for further procedure and also prepare the metal/mineral for therapeutic use. In the preparation of *Bhasam* some parts of the mineral/metal are converted into chemical form and some parts together form various chemical compounds.

From the observation of scriptures, it is known that mainly five methods are used to manufacture metal/mineral in the form of ashes, which are as follows –

- *Parad/gandhak Bhasam*
- *Vansapatiyo ki Bhasam*
- *Vishakta dravyo ki Bhasam*
- *Kshar vargiya Bhasam*
- Metal/mineral based *Bhasam*

❖ Mainly divided into three parts –

- 1) *Paradadi Bhasam* is consider *uttam Bhasam*
- 2) Herbal *Bhasam* is consider *madhyam Bhasam*
- 3) *Gandhakadi Bhasam* is consider *adham Bhasam*.

b) **Maran** – The incineration (*maran*) is done to change the form, change the appearance, change the strength of metal/mineral. It also increases the efficacy and does not destroy the metal/mineral. If we accept that may be it destroy the metal/mineral, but according to the law of conservation it does not leave its basic nature. So it conclude that it has high therapeutic effect in any condition. The only thing should be kept in mind that the *Bhasam* is well prepared.

❖ Purpose of inceneration^[4]

The purpose of *maran* is given as follows –

- The substance that can cure human disorders, old age and death.
- The substance which can be administered internally.
- The substance which do not harm after consumption.

➤ Characteristic of *bhasam*

All *Bhasam* have some common characteristic i.e

- *Rasayana*– e.g. *gandhaka rasayana*.

- Reach the target site very quickly.
- Easily absorb and assimilate in the body. (*shigravyapati*)
- It act as catalyst and increase the metabolic process.
- By lowering the dose of *Bhasam* / nanoparticles, the peripheral side effects also decreases.
- Non – irritant to GIT tract.
- Give unexpected therapeutic results. (*vichitragunadepati*)
- Particle size reduction.
- Increases efficacy and potency of drug.

➤ **Bhasam testing** – As per *Ayurveda*, *Bhasam* can be tested by following parts –

- 1) Physical methods
- 2) Chemical methods

Table no. 1: Shown physical methods.^[5]

S. no.	Test	Description
1.	<i>Varitara</i>	Properly prepared <i>Bhasam</i> floats on the surface of water. It is due to the surface tension. It indicates the lightness of <i>Bhasam</i> .
2.	<i>Unam</i>	Properly prepared <i>Bhasam</i> floats on the surface of water even if grain is placed over it. It also indicates the lightness property of <i>Bhasam</i> .
3.	<i>Rekhapurantava</i>	<i>Bhasam</i> occupy the inter ridge space of finger pad. It shows the fine particles of <i>Bhasam</i> .
4.	<i>Nishchandratava</i>	It shows the lusterless property of <i>Bhasam</i> . As metal/mineral convert into specific compound.
5.	<i>Shalshantava</i>	<i>Bhasam</i> is smooth and soft in touch. It also indicates the fineness property of <i>Bhasam</i> .
6.	<i>Anjan sannibhava</i>	<i>Bhasam</i> is soft and fine like a <i>anjana</i> . It shows the fineness of <i>Bhasam</i> .
7.	<i>Varana</i>	The color of <i>Bhasam</i> is detected, which depends on the colour of parent material. Each <i>Bhasam</i> is recognized by its color.

Table no. 2: Shown chemical methods.^[6]

S. no.	Test	Description
1.	<i>Gatrasatva</i>	Devoid of taste. It shows that the <i>Bhasam</i> is tasteless.
2.	<i>Nirdhum</i>	When kept on fire no fumes appear. It shows that <i>Bhasam</i> has no unwanted substance like sulphur, arsenic etc.
3.	<i>Apunarbhava</i>	Do not attain the original state, after heating with <i>dravak gana</i> . It shows that there is complete conversion of metal/mineral into compound.

4.	<i>Nirutha</i>	Do not attain the original state, after heating with a piece of silver. It also shows the complete conversion of metal/mineral into compound.
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❖ According to quality control standardization

Table no. 3: Shown Physio – Chemical testing of *bhasam* includes.^[7]

S. no.	Test
1.	Organoleptic characters – Colour, odour, taste, touch, consistency
2.	Identification
3.	Particle size
4.	Total ash, Acid insoluble ash, Water soluble ash, Loss on drying
5.	Assay of elements

➤ Therapeutic implimentation

- Firstly, all the *rasa dravya* have different doses according to the *Rasgunaviryavipak* and their *karma*. Before using any *rasdravya* proper *shodhan* is done to remove unwanted substance as well as to remove the toxicity of drug. The dose of *rasdravya* are mentioned in our classical texts and is given by all *Ayurvedic* physicians to get the desired effect.

- Therapeutic effect** – The *rasdravyas* used in *ras shastra* have therapeutic benefits like – anti microbial, anti inflammatory, immune modulatory, strength boosting effects etc. some of therapeutic effect of *ras dravyas* are given below –

1. *Praval pishti* – Immunity And Digestive Impairment.
2. *Swarnmakshik Bhasam* – *Jwara*, *Kasa Shwasa*.
3. *Ras sindur* – Skin Disorders.
4. *Lauh parpati* – Anemia, Digestive Impairment.
5. *Mukta pishti* – Diarrhea, Bleeding Disorders.

- Probable side effects of *ras dravya***

If proper processing of *ras dravyas* is not done than it may also causes side effects. Thus the knowledge about side effects is also essential. Some of probable side effects are given below

1. *Parad* – Lack of immunity, *Vaman*, *Vaat Roga*, *Kushta*, *Mahashool Roga*, *Daha*.
2. *Abhrak* – *Kshaya*, *Pandu*, *Mandagni*, *Daha*, *Shotha*.
3. *Shilajeet* – *Rakta Pitta*, *Kshaya*, *Agnimandhya*.
4. *Gandhak* – *Kushta*, *Veerya Bala Nash*, *Jwara*.
5. *Hartaal* – *Sanayu Sankoch*, *Vaat Kapha Prakop*, *Ayu Nash*, *Mrityu*.
6. *Swarna* – *Veerya Hani*, *Bala Hani*.
7. *Hingula* – *General Debility*, *Ksheena*.

8. *Vanga – Kshaya, Bala Nash, Kushta, Veerya Nash, Bhagandra.*

- All desirable therapeutic effect cannot be achieved with specific dose of *Bhasam* only, when administrate through oral route. Along with it ten investigation regarding medicine (*dashvidha parikshya bhaav*) and ten investigation regarding patient (*dashvidha pariksha*) is also important, which is mentioned in *charak samhita*^[8] as follows –

Table no. 4: Shown *dashvidha parikshya bhaav*.

S. no.	<i>Dashvidha parikshya bhaav</i>
1.	<i>Kaaran</i>
2.	<i>Karan</i>
3.	<i>Karya-yoni</i>
4.	<i>Karya</i>
5.	<i>Karya-phala</i>
6.	<i>Anubandh</i>
7.	<i>Desh</i>
8.	<i>Kaal</i>
9.	<i>Pravriti</i>
10.	<i>Upaaya</i>

Table no. 5: Shown *dashvidha pariksha*.

S. no.	<i>Dashvidha pariksha</i>
1.	<i>Prakriti</i>
2.	<i>Vikriti</i>
3.	<i>Saar</i>
4.	<i>Sahanan</i>
5.	<i>Pramaan</i>
6.	<i>Satmaya</i>
7.	<i>Satva</i>
8.	<i>Aharshakti</i>
9.	<i>Vyamshakti</i>
10.	<i>Vaya</i>

➤ DISCUSSION

The nano size of the particles easily get penetrate into the tissue of the body. Due to its size, it target the specific site directly and produce desirable effect. The properties of *Bhasam* are similar to biologically produced nano particle. According to classical texts metal/mineral undergo various *sanskara* and produce nano particles of *Bhasam*. These particles enter the blood stream without reacting with body tissue and give quick action with desirable effects. According to *Ayurvedic* texts when number of *putta* is given then the particle size of *Bhasam* decreases. Nano particle size covers the large surface area. Thus increases the rate of absorption with more therapeutic effects. In *Rasendra Saarsangraha* the *putta* of *Abhrak*

Bhasam is mentioned with their benefits.^[9] As 100-1000 *putta* is given for immuno – modulatory purpose, 10-500 *putta* is given for vitalizer purpose, 10-100 *putta* is given for therapeutic purpose.

➤ CONCLUSION

It is believed that metal /mineral *Bhasam* are more preferable by patients due to its quick action, smaller dose, more palatability, efficacy, potency and tasteless properties. After discussing about two technology as *Bhasam* and nano, it is concluded that both the technology is based upon particle size. Also *Bhasam* is consider as more effective therapy then the other healing system. At present many researches are done regarding nano medicine i.e *Bhasam*. Its uses has been extended to get more beneficial effects to serve the society. Eventually *Ayurvedic Bhasam* can serve as an tremendous development of nano medicine which have strong therapeutic effects.

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