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Research Paper

Bhasmas-Nanomedicines of Ancient Times

Computer Science

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ABSTRACT

Bhasmas are nano-medicine of ancient times that has been used to treat a variety of diseases, the basis for these bhasma medications are metals or gems. Bhasmas are used since seventh century, it was only assumed that these medicines have superior level of efficacy in comparison to other ayurvedic dosage forms. "Now, studies have also established that manufacturing methods of Bhasma are in tune of nanotechnology.

All 'Bhasmas' have some common properties like immuno-modulation and anti-aging quality and ability of drug carry and targeted drug delivery. These are prescribed in very minute dose (15 to 250 mg/day) and if prepared properly they are readily absorbable, adaptable and assimilate in the body without being toxic.

There are silver nanoparticles , Gold Bhasma,Diamond Bhasma, Rajat Bhasma and other Bhasma Medicines available in Ayurvedic Science these are similar to Gold nanoparticles and Carbon nanoparticles

Nanomedicines have promising applications in ; Diagnosis of disease, drug delivery targeted at specific sites in the body and molecular imaging Nano-sized structures have the advantage of being able to sneak past the immune system and across barriers (e.g., the blood-brain barrier or the stomach wall) the body uses to keep out unwanted substances. Pharmaceutical compounds reformulated as nanoparticles not only reach various parts of the body, their large surface area and small size can also make them more biologically active. Increased bioavailability means that lower concentrations of expensive drug compounds would be required, with potentially fewer side effects.

In Ayurveda Methods of Preparation of Bhasmas(Bhasmikaran) involves following steps:

(Bhasmikaran is a process by which a bioincompatible substance is made biocompatible by certain processes) -

a) elimination of harmful matters from the drug

b) modification of undesirable physical properties of the drug

c) conversion of some of the characteristics of the drug

d) enhancement of the therapeutic action

In Ayurvedic system of medicine, materials from different sources, viz., plants, animals, metals and minerals, are used to prepare the formulations. In metal-based preparations of Ayurveda, the metal is not used as it is, but after subjecting it along with herbs, to an involved series of processing steps. The output of such a process is a fine powder, called Bhasma, which is used either alone as a drug or in combination with other herbs (herbo-mineral preparations, e.g., Chandraprabha vati).

Preparation process

Metals are first purified through a process called Sodhana, during which the metal is repeatedly heated and then cooled in herbal extracts. This is followed by Bhasmikaran, the Sodhit metal is repeatedly triturated with herbs (Bhavana) and calcined in closed earthen crucibles in a pit, by burning cow dung cakes (a process called puta), to obtain Bhasma. This process is repeated as many times as prescribed in the classical texts for each preparation. Hence we have dasa puta (10 cycles), shatha puta (100 cycles), sahastra puta (1000 cycles), etc. To ensure that the Bhasma is properly prepared, a set of tests are also specified (Ayurvedic Formulary of India, 2003). Bhasma are known to be effective in very small doses, usually a few milligrams. Shelf-life of Bhasma is believed to be infinite. Atomic absorption spectroscopy and flame photometry studies have their limitations as they only reveal the presence of the specific metal and the quantity of the metal in a preparation. With the advent of nanotechnology, the current belief is that during bhasmikaran the metal acquires nano particle size, which is responsible for its enhanced bioavailability and activity and hence the dose is small.

Recently, doubts have been raised on the safety of the Ayurvedic preparations using Bhasma and concern is expressed regarding the metal toxicity of traditional preparations containing Bhasmas. Ayurvedic practioners themselves admit that due to commercialization of ayurvedic preparations, some of the manufacturers are resorting to shortcuts in the preparation of Bhasma, because of which there is a chance of the presence of free metal.

The Processed Tamra bhasma is one it is claimed to have Hepatoprotective activity so it should decrease the enzyme levels. But if bhasma is not processed, it increases the enzyme levels and cause hepatotoxic effect. the study suggest that, incompletely processed bhasma is toxic if used clinically. To get beneficial effects of bhasmas, it is must to process the bhasma completely.

But if Bhasma is not processed, it increases the enzyme levels and cause hepatotoxicity. This clearly indicates that, the incompletely processed bhasmas are very harmful and may cause liver or kidney damage. The various tests to check purity of Bhasmas according to Ayurveda is:

Physical tests:

1 Varitaratwa

2 Rekhapurnathwa

3 Gatarasatwa

Chemical tests:

· Reaction with Curd

1 *Varitaratwa*

Jalaptava is the synonym used for this test. It should be present in all the prepared Bhasmas. The meaning of this term is to float over the surface of water. If a Bhasma floats over the surface of water, it can be regarded as standard one. Take a beaker full of water and allow it to become quiet. Now pour the Bhasma powder slowly over the water surface and see whether all the particles of the powder are floating over water surface or some of

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them sink into the water. If the entire particles float then the Bhasma is considered to be of the best quality, otherwise some more putas are to be given to make the Bhasma up to the standard. Here the surface tension of the water plays an important role. i.e, the particles of the Bhasma have become so fine that they cannot break the surface.Tension of the water in the ordinary way. After attaining this stage the Bhasma should be recommended for internal use (Aruna K, Subhash P,& Varute AT. 1989).

2 *Rekhapurnathwa*

This indicates the fineness of the Bhasma. Here the Bhasma powder is rubbed in between the thumb and the fingers. If the particles of the Bhasma enter the furrows of the fingers it is presumed that they may also be absorbed into the system and then the process of marana may be considered complete (Jha C B & Mohaptra S.2010)

Gatarasatwa

After the completion of the marana process, generally the Bhasmas are without any taste. To test this, a portion of the Bhasma should be put on the tip of the tongue to detect its taste if any. In case of Tamra Bhasma, this test is most important as the Tamra Bhasma having an astringent taste cannot be considered suitable for clinical use. If such Bhasma is used internally may produce nausea, vomiting, vertigo and burning sensation in the human subjects(Jha C B & Mohaptra S.2010)

Chemical test (Reaction of Tamra Bhasma with curd)

A pinch of prepared Tamra Bhasma was put on the surface of the curd which is kept in beaker for 24 hrs. The colour of the curd around Tamra Bhasma needs to be observed for any change in the color of the curd(Aruna K, Subhash P,& Varute AT. 1989).

These above bhasma parikshas are qualitative in nature and they don't reveal anything about the characterization. Hence to overcome this lacuna, modern analytical parameters like XRD, SEM, and ICPAES etc. are very helpful.

About the elemental composition of the bhasma. Hence both classical and modern analytical parameters are to be used for justification of the proper preparation of Ayurvedic bhasma.

Antioxidant / restorative effects of swarn Bhasma against global and focal models of ischaemia (stroke) have alse also been reported (Bajaj and vohora S B.1998)

Typical features of Aurvedic Swarn Bhasma have been demonstrated through TEM and atomic force microscope Brown C, Bushcell G.R et.al

Physicochemical characterization of Yashada Bhasma using modern techniques [TEM,TCP,elemental analysis with EDAX,Dynamic light scattering(DLS),ICP]revealed that fraction of particles are in nanometer size range.Properties like oxygen deficiency and nanosize paricles might impart therapeutic properties of particular type of medicines (*Bhowmick T k,Suresh A k ,et al)* NP size of Ayurvedic Bhasmas has been confirmed in another study(Rastogi, S. 2010).

Methods used for the preparation of nanoparticles (nanotechnology)

There are two approaches for the manufacturing of nanomaterials. The "top-down" approach involves the breaking down of large pieces of material to generate the required nanostructures from them. In the "bottom- up" approach, single atoms and molecules are assembled into larger nanostructures.Natural phenomena and many human industrial and domestic activities, such as cooking, manufacturing or road and air transport release nanoparticles into the atmosphere.

Man-made nanoparticles engineered to have the desired size, chemical composition, and surface and charge properties can be produced in the liquid phase mainly through controlled chemical reactions.The main route of bottom-up formation of nanoparticles in the gas phase is by a chemical reaction whereby gases are converted into tiny liquid droplets, followed by condensation and growth.

Conclusions

It is ultimately the size that matters because all the systems, membranes working in living organisms are size sensitive of various ions. If the size of drug is reduced to nano level it can prove wonders in medicines. The nanomedicines have advantage of drug delivery to the specific morbid regions of the body. Also such medicines need to be used in small amount which reduces the side effects and lowers cost of medicine.

The nanosize can be achieved by certain chemical reactions or it can be done by Bhasmikaran the method used by Ayurveda since ancient times.

Nowadays most of people are switching over to the ayurvedic medicines as they are considered to be having lesser side effects but while using such medicines it must be ensured that Bhasmikaran procedure used has been properly followed. This can only be done by opting for branded Ayurvedic medicines instead of local cheap preparations

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