Tamra Bhasma: An applied ancient Indian nanomedicine

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ABSTRACT
Nano-particles are described as particles of substance that is between 1-100nm. This word also used sometime to described large particles that up to 500nm and tubes or fibber that are lesser than 100nm or that are only two directions. First studies on nanoparticles are underway in 1970s & 80s in the United State and Japanese researchers use ultrafine particles term for nanoparticles. Copper has incredible centrality in Ayurveda and is broadly utilized in various manners to fix numerous maladies. Copper bhasma is utilized since antiquated occasions for the treatment of uncleanliness, tumors, stomach maladies, worms, liver, spleen, heaps, hack, asthma, diabetes, acridity with acid reflux, and in numerous other issue medicines. It is additionally utilized in Ayurvedic treatment of skin maladies, corpulence, interminable respiratory conditions, eye illnesses, paleness, heaps and so on. Copper nano-particles are formed naturally or also with various chemical synthesis. Copper Metal-Natural Structure Nanoparticles balanced out with Folic corrosive improve twisted recuperating in Diabetes. The effective treatment of interminable non-healing wounds requires procedures that advance angiogenesis, collagen affidavit, and re-epithelialization of the injury. Tamra bhasam is itself very good and effective product of rasashastra. But it is aaded as a main ingredient in so many other formulations. It is used to treat various types of diseases like udrashula, pandu, swasa, arsh roga etc. This present work is done for the review of ant diabetic activity of tamra bhasam with the reference of nanoparticles.

Keywords: Tamra, nano-particles, shodhana, bhasmikaran, siddhi lakshan, Anti-diabeteic activity.

1. INTRODUCTION

Nanoparticles happen in an extraordinary assortment of shapes, which have been given numerous casual names, for example, nanospheres, nanorods, nanochains, nanostars, nanoflowers, nanoreefs, nanowhiskers, nanofibers, and nanoboxes.

The states of nanoparticles might be dictated by the inherent precious stone propensity for the material, or by the impact of the earth around their creation, for example, the restraint of gem development on specific faces by covering added substances, the state of emulsion beads and micelles in the forerunner arrangement, or the state of pores in an encompassing strong matrix. Some uses of nanoparticles may require explicit shapes, just as explicit sizes or size reaches. Blend of Copper nanoparticles hushes up testing because of its high inclination for oxidation. It is amazingly delicate to air, and the oxide stages are thermodynamically progressively steady. The high oxidation pace of copper nanoparticles may confine their applications. Oxidation of copper nanoparticles can be dispensed with if the union is directed within the sight of CO or H2. Bhasams prepared from the metals by doing some processes on them, become important pharmaceutical dosage form to treat the deadly diseases[1].

Literature review is done on the tamra and its bhasam called tamra bhasam. Tamra bhasam is used to treat udarshula, kushtha, pandu roga, arsha, swasa. Tamra and its bhasam is also used as main ingredient in some important pharmaceutical formulations.

Table 1. Synonyms and vernacular names of Tamra:

Sanskrita	Tamra, Shulva
Hindi	Tamba
English	Copper
Punjabi	Neeltusey, Tamba
Gujarati	Trambu, Tambu
Tamil	Tampra, Chembu, Shembu
Bengali	Tama, Tam, Tamba
Telugu	Ragi, Samba, Tamramu
Sindha	Tamb
Marathi	Tambe
Malyalam	Chempu
Kannada	Tamra, Tambra
Farsi	Meesa, Mees
Konkani	Tambe
Latin	Cuprum

1.1 View of Ayurveda

According to Acharya Charak

- Acharya Charak defined tamar by using the term “Arka”, which clarified as synonym of Tamra [2].
- Tarma bhasam is used to treat the wide range of diseases like krimiroga, pandu roga, kushta roga, swasa roga, amlapitta, sotha, shula, yakrita roga, krimi roga, sthulya, and grahni roga[3].
- Charak also described the various use of Tamra Patra (vessels) in various pharmaceutical procedures[4].

- 15mg to 60 mg is normal dose of tamra bhasam mentioned by acharya charak in charak samhita[5].

Table 2. Varities of Tamra As per Ayurveda:

Name	Characterstic
Nepalak	• Red in colour. • Found in Nepal • It is said to be superior. • It is heavy, and free from effects[16]
Miechana	• Obtained from other mines[16]

1.2 Synthesis of Copper Nanoparticles

The copper nanoparticles were incorporated by concoction decrease process utilizing copper (II) Sulfate pentahydrate as antecedent salt and starch as topping operator.

- The arrangement technique begins with expansion of 0.1 M copper (II) sulfate pentahydrate arrangement into 120 ml of starch (1.2 %) arrangement with vivacious mixing for 30 min.
- In the subsequent advance, 50 ml of 0.2 M ascorbic corrosive arrangement is added to union arrangement under consistent quick blending.
- Thusly, 30 ml of 1 M sodium hydroxide arrangement was gradually added to the readied arrangement with steady blending and warming at 80 °C for 2 h.
- The shade of the arrangement went yellow to ochre.
- After the fruition of response, the arrangement was taken from the warmth and permitted to settle for the time being and the supernatant arrangement was then disposed of circumspectly.
- The hastens were isolated from the arrangement by filtration and washed with deionized water and ethanol for multiple times to take out the inordinate starch bound with the nanoparticles.
- Ocher shading encourages acquired are dried at room temperature.
- In the wake of drying, nanoparticles were put away in glass vial for additional investigation.

1.3 Method to prepare Tamar Bhasam as per Ayurveda

Table 3. Ingredients used in Preparation:

Drug	Botanical Name	Part used	Used in Process
Tila taila	Seasamum indicum	Oil	Samanya Shodhana
Takra	Butter Milk	Liquid	
Gomutra	Cow Urine	Urine	
Kanji	Sour Grud	Liquid	
Kultha Kwath	Dolichos biflorus	Seed	
Gomutra	Cow Urine	Urine	Viresha Shodhana
Sh. Parad	Mercury	Mineral	Marana
Sh. Gandhaka	Sulphur	Mineral	
Nimbu Swarasa	Citrus limon	Fruit Juice	Bhawana
Surana Kanda	Amorphophyllus campanulatus	Corm	Amrutikaran

Preparatory method is divided into 3 part:

1. **Purav karam**
2. **Pardhan karma**
3. **Pachat karam**

1. Purav karma

a. Shodhana

Tamra is conridered as highly toxic metal. To remove its toxicity purification method is mentioned in ancient texts. There are various references found of samnya and vishesh shodhana.

i. Samnya Shodhana

For the samanya shodhana "Nirvap" method is mentioned. In this method, firstly tamra is melted in darvi then pour into different medias. Medias are used is tila taila, takra, gomutra, kanji, kulath kwath, pour melted tamra in each media for seven times[9].

In Rasapadhati, same method is mentioned but they change the sequence of liquid media as Takra, Kanji, Go-mutra, Tila taila and kultha kwath[10].

In Rasaratnakar, same procedure is mentioned but insted of using kultha kwath, use of arkakshir is mentioned[11].

Table 4. List of media used to remove dosha:

Dosha	Media for nirvap
Vanti	Tila tail, Takra, Gomutra
Bhranti	Kulatha Kwath, Aranala
Klama	Godugdha
Santapa	Nimbu rasa, Chincha patra swarasa
Shula	Narikela dugdha, Kumari swarasa
Kandu	Godugdha, Ajadugdha
Virechna	Dadhi, Surana
Virya Haratva	Yashtimadhu

ii. Vishesha Shodhana

As per some scholars, after samanya shodhana tarma is subjected to vishesha shodhana. It is considered as compulsory to decrease its toxicity and to enhance the potency[12]. Different procedures are defined in texts for vishesh shodhana. In texts, different medias are described like

- Nirvap with Nirgundi swarasa.
- Nirvap with Mahishi takra, for 7 times.
- Swedana for 1 yama.
- Swedana for 1 day.
- Nirvap for 21 times[12].

2. Pardhan Karam

i. Marana

- Shudha tamra, Parad, Gandhak is taken in the ratio of (1:2:2)
- Firstly we have to make Kajjli.
- Mix kajjli and tamra, and give bhawana by using nimbu swarasa.
- After bhawana, make chakrika and kept for drying process.
- Give Ardhagaja Puta for 10 to 12 times[13].

ii. Amrutikarna

- Tamra bhasam is subjected for bhawana, with Panchamrita.
- After bhawana make chakrika.
- Subject it for Ardhagaja puta[13].

3. Pacchat Karam

The entire confirmatory test should be done. To check the bhasam is ready or it need more time.

Table 5. Test of bhasam as per ayurveda:

Test	Characterstic	Procedure
Varitratwa	Lightness of bhasam	Little amount of bhasam put on water surface. If it is floating on the surface, means bhasam is ready.
Rekhapurnatwa	Fineness of bhasam	When the pinch of bhasam is rubbed between thumb and index finger, bhasam is inserted into lines and crevices of the fingers which is not easily removed by washing.
Apunarbha	No free metal present in bhasam[15]	Bhasma is mixed with equal amount of gunja, madhu, ghrita, and borax and do sandhibandhana, and subjected to heat. After shelf cooling only bhasam is found in the vessel.
Unam/ Uttam	Lightness of bhasam[15]	Little amount of bhasam put on rice piece and rice piece is put over the water, if it is float over the surface, means bhasam is ready.
Nirutha	No free metal present in bhasam[15]	Bhasma is mixed with a fixed weight of rajat patra and do sandhibandhana, and subjected to heat. After shelf cooling the weight of rajat patra is taken, if weight of rajat patra is increased, means bhasam is not completely prepared.
Dantagre kachakachaabhav	Softness of bhasam[15]	Little amount of bhasam is putted between the teethes, bhasam produced some sound or felt like rough, means it is not completely prepared.
Nishchandrika	Lustreless[15]	Bhasam is obverved under sunlight, if lustre is seen, means bhasam is not prepared yet.
Sukshmatwam	Reduced particle size[15]	Bhasam should be like pollen grains of ketakiraja.
Dadhi Pariksha	Absence of free copper/ copper sulphate[15]	Little amount of bhasam is pour on the surface of curd, if there is no discoloration observed, means bhasam is ready[14].
Avami	Absence of free copper/ copper oxide/ copper sulphate[15]	After administration of bhasam no sensation of nausea is obsereved.
Niswadhutwa	Absence of free copper/ copper oxide/ copper sulphate[15]	Bhasma should be tasteless.
Nirdhum	Fumeless bhasam[15]	Bhasma should not produce fumes.

Table 6. List of Important parameters for Analysis:

Parameters	
Physicochemical Parameters	Analytical study of bhasma (nanomedicines) majorly includes physicochemical and spectroscopic analysis out of these studies particle size, zeta potential, XRD and SEM is significant part of analyse with the help of these parameters we can analyse the physical nature of metallic particles how ever chemical studies also plays major role in the analysis.
Spectroscopic Analysis	
Chemical Analysis	

Table 7. Rasa of Tamra bhasam as per different texts:

Text	Kashya	Tikta	Madhura	Amla
Anandkanda, Rasender Chudamani[19], Rasratna Samuchya[21], Rastrangini[20]	+	+	+	+
Shushruta Samhita	+	-	+	-
Lauhasarvasvam	-	-	-	-
Raskamdhenu[18]	+	+	+	-
Yogratnakar	-	-	-	-
Bhavprakash, Ayurveda parkash	+	+	+	+
Dhanvntri & Raj nighantu	+	+	+	-
Sidhayoga Samgrah	-	-	-	-
Rasratna Samuchya	-	-	-	-
Siddha bhaishjya manimala	-	-	-	-

Table 8. Guna of Tamra bhasam as per different texts:

Guna virya Vipak	**Anandkanda,Rasender Chudamani[19],Rasratn Samuchya[21], Rastrangini**	**Shushruta Samhita**	**Raskamdhenu[18]**	**Yogratnakar**	**Bhavprakash, Ayurveda parkash[17]**	**Dhanvntri & Raj nighantu**	**Sidhayoga Samgrah**	**Rasratna Samuchya**	**Siddha bhaishjya manimala**
Sara Guna	-	+	-	-	-	-	-	-	-
Laghu Guna	-	-	-	-	+	-	-	-	+
Sheeta Virya	-	+	-	+	+	+	-	-	-
Ushna Virya	+	-	+	-	-	-	+	+	-
Katu Vipak	-	-	-	-	+	+	-	-	+
Madhura Vipak	+	-	-	-	-	-	+	-	-

Table 9. Pharmacological properties of tamra bhasam as per different texts:

Karam	Rasender Chudamani[19]	Raskam dhenu[18]	Rasjalan idhi	Rasratna Samuchya[21]	Rastrangini[20]	Ayurveda parkash[17]	Bhavprakash	Bhaishjya Ratnavli	Yogratnakar
Ayushyam	-	-	-	+	+	-	-	-	-
Brihan	-	-	-	-	-	+	-	-	-
Kusht	-	-	-	-	+	-	-	-	-
Chakshushya	+	-	+	+	-	-	-	-	-
Rasayana	-	-	-	-	-	-	-	-	+
Ruchya	-	+	-	-	+	-	-	-	-
Ropan	-	-	-	-	+	+	+	-	+
Lekhan	+	+	+	+	+	+	+	+	+
Sarakaram	-	-	-	+	+	+	-	-	-

Table 10. Effect of tamra bhasam in pacifying the dosha as per different texts:

Dosha	Rasender Chudamani[19]	Rasratna Samuchya[21]	Anand Kanda	Rastrangini[20]	Siddha Bhaishjya Manimala	Ayurveda parkash[17]	Bhavprakash	Dhanvantri Nighantu	Raj Nighantu
Vatahar	-	-	-	-	-	-	-	-	-
Pittahar	-	-	-	+	+	+	+	+	+
Kaphahar	-	-	-	+	+	+	+	+	+
Vata-kaphahar	-	-	-	-	-	-	-	-	-
Pitta-kaphahar	+	+	+	+	-	-	-	-	-
Tridoshahar	-	-	-	-	+	-	-	-	-

CONCLUSION

Tamra is a metal which is classified under lauh (dhatu) varga by various ancient scholars. They classified various dhatus in dhatu varga like swarana, rajat, tamra, lauh, vang, naga. It is of two types according to text nepalika and miechana. Acharya charak used term Arka as the synonyms of tamra. Various acharya gives their own opinions for rasapanchak and parbhav, karam of tarma bhasam. Few types of procedure are carried out for the manufacturing of tarma bhasam like samanya shodhana and vishesh shodhana, marana, amrutikaran of

tamra. Vessels of tamra also shows good efficacy. Dadhi pariksha is described by various scholars to confirm the bhasam is ready or need some more process. This bhasam is used to cure large number of diseases like udrashula, pandu, kushta roga etc. Now a days tamra is widely used in the various forms traditionally its is known as bhasma which is also considerable as nanoparticles based on size reduction during procedure.

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