Preparation of *Rajat Bhasma* (Nanoparticles) By Traditional Method

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ABSTRACT

Introduction:

"In all things of nature, there is something of the marvelous. When used with an exact and precise science, they have the power to become miraculous (Aristotle)".

Auyrveda is one of the systems of medicine, practiced in Indian sub-contiment from since thousands of years in the forms of drugs & remedies for various disorders. *Ayurvedic Bhasmas* which are used *as herb mineral Formulation (HMF)* are very individualized and specified which work as catalysts in nature.

Bhasma is powder of a substance obtained by calcinations is called bhasma.

Major of content in *Rasaushashi* are used in the form of *bhasam*. *Rajat bhsama* used as *medhya*, *vrushya rasrana* in ayurveda. Mythologically it is said to have originates from semen of moon. Drop of tear from third eye of lord Shiva which fall on the earth became rajat. This bhasma use as antioxidant for society because this bhasma has rasyana like properties which are mentioned in different literatures of ras Shastra.

Purpose: *Rajat bhasma* prepared by traditionally method

1. To check the intensity of heat of cow dung cake as comparison to that of electric heat i.e. furnace.
2. To enhance the therapeutic efficacy.
3. *Rajat bhasma* prepared for patient who were suffer from diseases like shukarmeha (Types of Diabetes) and used as medha vardhak (means brain tonic)

Methodology: In this phase of study the details of

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pharmaceutical process have been incorporated. The pharmaceutical study encompasses following points.

- Identification, Procurement of genuine basic raw material & associated drugs for *Shodhana*(purification) and *Marana* (specific heat for nanoparticle of silver).
- Proper methods of processing like *Samanya Shodhana*(common media purification), *Vishesha Shodhana*. (specific media purification).
- Main procedure to obtain Superior quality product.
- Quality control of finished products.

The objective includes:

i. Selection of Raw Materials.

ii. *Shodhana* (purification)of Raw Materials,

iii. *Shodhana of Parada*(Mercury)

iv. *Shodhana of Gandhaka*(Sulphur)

v. Preparation of *Rajat Bhasma*

Procedure- Schematic presentation of the whole procedure is as follows:

Ingredients

(Raw materials selected according to classical standards)

↓

Shodhana of Raw materials (*Rajat Patra*)

↓

Mixing *Rajat Patras* with *Parada Bhavana (trituration)* given with *Kumari Swarasa (aleo vera)*

↓

Chakrika Nirmana (pellet formation) is done and dried kept in *Sharava*

↓

Laghuputa (specific temp. 650 dgree celcius)

is given by 2.5kg cow-dung cake.

***Rajat Bhasma* Nirmaan**

Result- Observations

- Total time taken for burning of cow dung cakes was 3 hours and for completes self-cooling 12 hours.
- The maximum temperature recorded was 650 0C.
- Weight of *Rajat Bhasma* after 1st *Puta* 38 Gms.

Lakshanas* of *Rajat Bhasma* after 1st *Puta

Parameters	Observations
1)Colour	Black shiny
2)Taste	Metallic
3)Odor	Like *Gandhak*
4)Touch	Soft
5)Appearance	Powder
6)Rekhapurnatva	Negative
7)Varitara	Negative

Puta	1st	2nd	3rd	4th	5th	6th	7th
(1) Initial weight-							
a) Weight of *Shudha Rajat*	38gms	50gms	52gms	49gms	40gms	35gms	30gms
b) Weight of *Shudha Parada*	38gms	50gms	52gms	49gms	40gms	35gms	30gms
c) Weight of *Shudha Gandhak*	38gms	50gms	52gms	49gms	40gms	35gms	30gms
(2) Ghritkumari Swarasa	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
(3) Colour of dried *Chakrika*	Greyish	Greyish	Greyish	Greyish	Blackish	Black	Black
(4) Weight of Chakrika-							
a) Before *Puta*	110gms	152gms	166gms	147gms	120gms	105gms	94gms
b) After *Bhavna*, weight gain	2gms	1ms	2gms	1gms	2gms	1gms	2gms
c) After *Puta*	50gms	52gms	49gms	40gms	35gms	30gms	32gms
d) Change in weight in *Rajat*	12gms +ve	2gms +ve	3gms -ve	9gms -ve	5gms -ve	-5gms -ve	2gms +ve
(5) Odour	Sulpur like	Sulphur like	No specific	Odourless	Odourless	Odourless	Odourless
(6) Touch	Rough	Rough	Rough	Soft	Soft	Soft	Soft
(7) Nishchandrika	-ve	-ve	-ve	-ve	+ve	+ve	+ve
(8) Rekhapurna	-ve	-ve	-ve	+ve	+ve	+ve	+ve
(9) Varitara	-ve	-ve	-ve	+ve	+ve	+ve	+ve
(10) Colour after *Puta*	Greyish	Greyish	Greyish Black	Black	Black	Black	Black

RESULTS

Biologial activities – Rajat bhasam has properties to reduces vata dosha. It improves digestion, lekhan (eradication of fat), gulum (cystic growth) indesgtion, & help to reduce the chronicity of any disease, it helps to, improve bhram (vertigo), unmaadh (psychological disorder). Rajat bhasam when given with ajwain (carom seed & lavang chooran (clove) help is reduction of vata dosha.

Characterization of Bhasma

Description, colour, identification, particle size, total ash, acid insoluble ash, Ayurvedic specification, lusterless, fine enough to enter the cervices of finger (Rekhapurna) Varitara (float on water) Tasteless (niswadu) and Irreversibl (apunrbhva).

Characterization on Nanaoparticle

Nanoparticles are solid colloidal particles ranging from 1 to 100, and nm in size.

Due to small particle size nanoparticles overcome resistance by physiological barriers in the body and easily penetrate to cell wall, blood vessels stomach epithelium and blood brain barriers.

Poly metric nanoparticles an ideal drug delivery system for cancer therapy, vaccines contraceptives and antibiotics.

XRF Report of Rajata Bhasma

Eval2 V2.5.500 Admin 24-10-2019 14:45:13 Sample: *RAJAT BHASMA*

Measured on 24-10-2019 13:50:43 Sample measured by Admin

Measurement method: Best Detection-Vac23mm

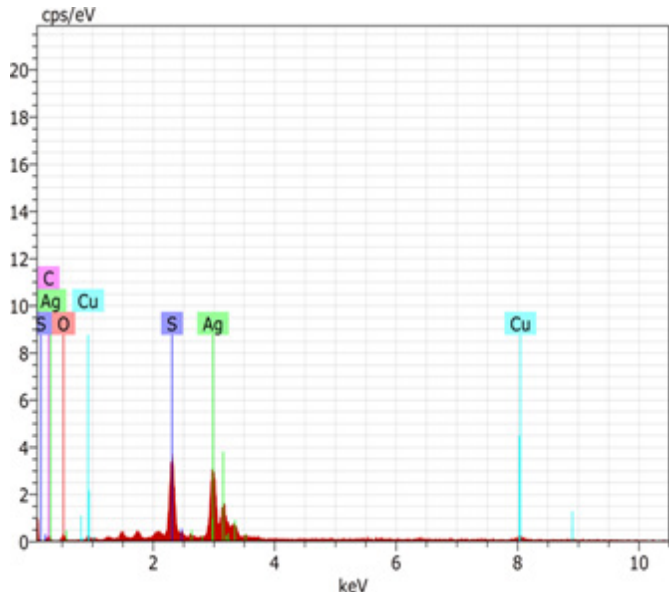
Ag	S	Ca	K	Si	Mg
698.4 KCps	574.5 KCps	13.1 KCps	22.0 KCps	15.4 KCps	10.7 KCps
60.68%	27.09%	2.47%	2.36%	1.69%	1.18%

Cu	Fe	Na	Al	Cl	Hg	Pd
78.7 KCps	29.2 KCps	1.6 KCps	3.5 KCps	3.2 KCps	17.4 KCps	2.7 KCps
1.12%	0.98%	0.50%	0.48%	0.37%	0.36%	0.21%

P	Cd	Mn	Rh	Cr	Re	As
1.5 KCps	1.4 KCps	1.3 KCps	39.2 KCps	0.8 KCps	1.1 KCps	5.2 KCps
0.12%	0.08%	0.06%	0.06%	0.06%	0.03%	0.03%

Ti	Pb	Ni	Sr	Rb	Zn	Sum
0.2 KCps	1.2 KCps	0.4 KCps	2.0 KCps	0.7 KCps	1.1 KCps	
0.02%	0.02%	78 PPM	25 PPM	18 PPM	18 PPM	100.00%

EDX Report of *Rajata Bhasma*



Spectrum: test 5090

Element	Series [wt.%]	unn. C [wt.%]	norm. C [at.%]	Atom. C Error (3 Sigma) [wt.%]
Oxygen K-series	2.1	4.09	13.74	2.4
Silver L-series	30.63	59.56	29.65	3.16
Sulfur K-series	10.19	19.82	33.2	1.26
Copper K-series	7.16	13.92	11.77	1.42
Carbon K-series	1.34	2.6	11.65	1.78
Total	51.42	100	100	10

Particle Size Analysis - Result of PSA

Sr. No.	% Below	Size (in µm)	Volumetric mean diameter(in µm)
1.	10%	1.50	**16.20**
2.	30%	5.50	
3.	40%	6	
4.	60%	8	
5.	90%	30	
6.	99%	50	

DISCUSSION

The purified *Rajat* obtained after *Vishesh Shodhan* done by *Nimbu Swarsa (lemon juice)* was 39.6gms. After Vishesh Shodhan there was loss in Rajat (silver) (1.25%). That loss may be due to mishandling and may be some chemical and physical reactions occured between Rajat and atmospheric oxygen so there should be careful handling during every procedure. After that then addition of Shudh Parad (mercury) and *Gandhank* (sulphur) in same quantity that of obtained purified Rajat (silver) was done. Then it was levigated with fresh Aloevera pulp help in reduction of particle size. In second and third Puta (*Laghuputa i.e., 650 degree celcius*) there was gain in weight Obtained Rajat Bhasm because of there was no optimum heat that help to evaporate *Parada* and *Gandhak*. Weight gained due to *Parad* and *Gandhak*. Weight loss occurred from 4th Puta to 6th Puta due Optimum heat reached to the material inside the *Shrava* that evaporated the *Parad* but *Gandhak* remains in little quantity (confirmed by elemental analysis done by EDX method). But in last Puta there was gain in *Rajat Bhasma* quantity. Change in colour of *Bhasma* due chemical reactions that takes place inside the *Shrava* during the Cow dung cake heat. There was greyish in colour in every Puta. But after 5th Puta colour was changed black from greyish colour due to oxidation process. This method of *Rajat Bhasma* preparation is best because of ghritkumari is best media for levigation and help in particle size reduction, accompanied by an increase in surface area. Since most solid –fluid interactions take place at external surface of the solid, these interactions are promoted through increase in surface area by presence of smaller particle sizes. Increased no. Of Puta also increase property and potency of Bhasma. There was loss and gain in every Puta because of may be different heat pattern or may be due to different chemical reactions, and due to same procedure repeated seven time so in every Puta there was loss during procedure so 32.6gms *Rajat Bhasma* was obtained. There was percentage loss 17.46%.

CONCLUSION

By using Cow dung cake *Rajat Bhasma* was easily prepared. The heat of cow dung cake was help in decrease the particle size of *Rajat Bhasma* than muffle furnace heat more fast. Therefore, in 4th Puta *Rajat Bhasma* float on the water (Varitara). Within seven Puta *Rajat Bhasma* fulfiled the all ayurvedic parameter of prepared *Rajat Bhasma*. This means that intensity of cow dung cake heat is more than that of muffle furnace heat.

PREPRATION OF RAJAT NANOPARTICAL STEPS BY PHOTOGRAPHIC MANNER

Rajat Coin (silver coin)

lemon juice Nimbu swarasa

nimbu swaras

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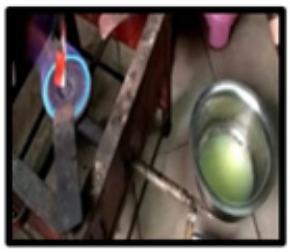


Rajat Quenching in nimbu swarasa

Shudha rajat (purified silver)

RAJAT MARANA

Trituration with Mercury

Rajat Pishti (amlagum)

Rajat after Trituration

Addition of *Shudh Gandhaka*

Trituration with Aloevera *Swarasa*

Trituration with Aloevera

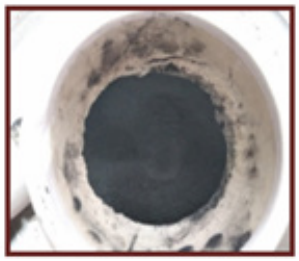
Chakrika Preparation

Shrava Samputta

Cowdung Cake

Melting by Cowdung

Chakrika after 1st



Rajat Powder

Varitara

Rekhapurna

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