

ROLE OF MERCURY (PARADA) AND OTHER MEDIAS USED IN THE PREPARATION OF BHASMAS OF METALS (DHATUS)

Honwad Sudheendra V.*

Lecturer, Dept of P.G Studies in Rasashastra, SDM College of Ayurveda, Kuthapadya, Udupi, Karnataka, India

Received on: 11/08/11 Revised on: 14/09/11 Accepted on: 30/09/11

***Corresponding author**

E-mail: dr_sudheendra@yahoo.com, drsudheendra7@gmail.com

ABSTRACT

To assess the role of media used in the preparation of Bhasmas of Dhatus (metals), Tamra bhasma was prepared by Parada media (mercury) Gandhaka media and with Parada, Gandhaka, Haritala and manashila media (Somanathi Tamra Bhasma).

All the three prepared samples were subjected for Physico-chemical analysis such as Analysis of Physical constants, elemental analysis, particle size assessment and structural cell shape study by using different modern instruments.

The results shown by these tests, suggest that Somanathi Tamra Bhasma is significantly better than other two samples.

Key Word: Role of media, Tamra Bhasma, Somanathi Tamra bhasma

INTRODUCTION

Rasashastra mainly deals with the processing of metals and minerals to make them suitable for therapeutic purposes.

In Rasaratna samuchachaya at the context of Loha (metals), the concept of Marana was explained as follows

If Loha Marana is done by using Mercury and its compounds as media, then prepared bhasma is considered as first best category, Herbal drugs as media the prepared bhasma is considered as Second best category, Sulphur, Arsenic (Haratala) etc as media then bhasma is considered as third category. Arilohas (Anti-metals) as media then prepared bhasma is considered as inferior category.

To assess the Rationality present behind this concept, Tamra Bhasma was prepared by using different Medias for marana (incineration) process, the resultant bhasma samples were subjected for Physico- chemical analysis by using modern instruments.

MATERIALS & METHODS

3 samples of Tamra bhasma were prepared with different methods.

For Physico-chemical analysis at A.V.S Ayurveda Mahavidyalaya College, Pharmacy.

For the preparation of Tamra bhasma required materials were collected from A.V.S Ayurveda Mahavidyalaya College, Pharmacy & Herbal garden.

METHODS

Methods of preparation of Tamra bhasma

Ist Sample of Tamra Bhasma (Tamra marana with parada media) was prepared by following reference from Rasa Ratna Samachchaya - 5/53

IInd sample of Tamra Bhasma (Tamra marana with Gandhaka media) was prepared by following reference from Ayurveda prakash - 3/139

IIIrd sample of Tamra Bhasma that is Somanathi Tamra bhasma (Tamra marana with Parada,Gandhaka,Haritala and Manashila media) was prepared by following reference from Rasa Ratna Samachchaya - 5 / 65, 66, 67

OBSERVATIONS & RESULTS

In the preparation of Tamra Bhasma sample T.B1 and T.B2, it is explained in classical text reference that, 3 gaja putas are required to prepare tamra bhasma. While preparing Tamra Bhasma, after 3rd gajaputa, prepared tamra bhasma was subjected for bhasma siddhi pareeksha. It was found negative. Then again 2 more gaja putas were given following the same procedure; again after 5th gaja puta the bhasma siddhi tests were conducted and tests were found positive.

Table 1: Showing the variations in color and weight of Tamra during Samanya shodhana

	Weight	Wt loss	Color	Form
Raw tamra	3600gms	-	Reddish shiny	Patra (flake)
In tila taila	3590gms	10gms	Blackish red	Patra
In takra	3580gms	10gms	Blackish red	Patra
In gomutra	3560gms	20gms	Reddish	Small pieces
In kanji	3555gms	5gms	Blackish red	Small pieces
In kulath kwath	3520gms	35gms	Reddish black	Coarse powder

Table 2: Showing the results of Vissha shodhana of Tamra

Wt. of Tamra churna before vissha shodhana	2000gms
Wt of Vissha Shodita Tamra churna	1980gms
Loss in weight	20gms
Color	Blackish

Table 3: Preparation of Tamra bhasma – Sample – T.B 1 (Tamra bhasma with Parada media)

Putas	1 st Gaja Puta	2 nd Gaja puta	3 rd Gaja puta	4 th Gaja puta	5 th Gaja puta
Initial weight	1600gms	1480gms	143gms	1380gms	1320gms
Wt after puta	1280gms	1234gms	118gms	1120gms	980gms
Loss in wt	320gms	246gms	254gms	260gms	340gms
Color	Blackish	Blackish	Blackish	Blackish	Blackish

Table 4: Preparation of Tamra bhasma – Sample – T.B 2 (Tamra bhasma with Gandhaka media)

Putas	1 st Gaja Puta	2 nd Gaja puta	3 rd Gaja puta	4 th Gaja puta	5 th Gaja puta
Initial weight	850gms	586gms	578gms	572gms	556gms
Wt after puta	480gms	472gms	466gms	450gms	412gms
Loss in wt	370gms	114gms	112gms	122gms	144gms
Color	Brownish	Brownish Black	Brownish Black	Brownish Black	Brownish Black

Table 5: Preparation of Tamra bhasma – Sample –T.B 3 (Somanathi Tamra bhasma or Tamra bhasma with Parada, Gandhka, Haratala & Manashila media)

Initial Weight	1125gms
Weight aft. Puta	580gms
Weight loss	545gms
Color	Black

Physico – Chemical Analysis

Table 6: Organoleptic characters of different samples of Tamra bhasmas

Sl. No.	Organoleptic Characters	T.B.1	T.B.2	T.B.3
1	Colour	Blackish	Brownish black	Black
2	Odour	Odourless	Odourless	Odourless
3	Taste	Tasteless	Tasteless	Tasteless
4	Touch	Soft	Soft	Soft
5	Appearance	Amorphous	Amorphous	Amorphous

Table 7: Physical constants of different samples of Tamra bhasmas

Sl. No.	Physical Constants	T.B.1	T.B.2	T.B.3
1	% Of Total ash	92%	91.58%	84.2%
2	% Of Acid insoluble ash	90.4%	89.6%	81.38%
3	% Of Water insoluble ash	88.8%	88.2%	79.98%
4	p ^H	5.52	5.16	5.57
5	Specific gravity	0.9949%	0.999%	0.995%
6	Moisture content	0.4%	0.6 %	0.2%

Table 8: Solubility test of Tamra bhasma

Samples	Solvents									
	D.W	Methnol	P.E	Acetone	Benzene	Toluene	Chloroform	E.A	Xylene	CCl ⁴
Sample T.B1	S.S	S.S	S.S	S.S	N.S	N.S	N.S	S.S	N.S	N.S
Sample T.B2	S.S	S.S	S.S	N.S	N.S	N.S	N.S	S.S	N.S	N.S
Sample T.B3	S.S	S.S	S.S	S.S	S.S	S.S	S.S	S.S	S.S	S.S

N.S – Not Soluble

S.S -Sparingly soluble

Estimation Of Copper Volumetrically From The Given Bhasma (Qualitative Analysis)

The % of soluble copper in T.B1 sample = 26.16%

The % of soluble copper in T.B2 sample = 31.16 %

The % of soluble copper in T.B3 sample = 34.67%

Quantitative Analysis

The Elemental analysis and particle size assessment were done in IIT,Pawai

Using ICP/AES, reports were as follows,

Elemental Analysis By Using ICP-AES

Table 9: Results in microgram/GM (PPM) or % as indicated

ELEMENTS	RT	SST	VST	TB1	TB2	TB3
CU	99.83%	79.56%	42.18%	29.94%	29.70%	20.99%
Fe	0.057%	0.13%	0.41%	1.17%	0.89%	0.30%
S	0.025%	0.096%	0.19%	6.64%	10.07%	18.91%
Ni	0.021%	0.037%	0.019%	0.019%	0.019%	0.011%
Ag	ND	54.65	32.91	42.36	ND	30.28
Al	8.12	1.35%	2.60%	5.52%	3.71%	2.04%
Si	94.27	0.021%	0.026%	0.029%	0.034%	0.016%
Pb	0.043%	0.043%	0.020%	93.07	0.012%	0.084%
Na	-	-	12.60%	-	-	-
Hg	-	-	-	47.73	-	28.11%
As	-	-	-	-	-	10.24%

ND-Not Detected

Particle Size Assessment

Table 10: Particle sizes of different samples of Tamra bhasma

Samples	Count	Mean	Minimum	Maximum
T.B.1	1923 μm	2.32 μm	0.96 μm	8.53 μm
T.B.2	2173 μm	2.20 μm	0.96 μm	17.50 μm
T.B.3	753 μm	2.25 μm	0.96 μm	17.50 μm

The X-RD Analysis

The X-RD analysis was done in Regional Research Laboratory Bhuaneshwara.

The final unit cell parameters for all the five samples have been given below

Table 11: Unit cell volume and shape of different samples of Tamra bhasma

Sample	Volume(A**3)	Shape of the unit cell
R.T	637.852	Hexagonal
V.S.T	390.984	Monoclinic
T.B.1	471.110	Triclinic
T.B.2	505.656	Triclinic
T.B.3	356.200	Triclinic

DISCUSSION

Samples of Tamra Bhasma prepared with various methods were subjected to organoleptic, Physical and Chemical analysis.

It was observed that samples of Tamra Bhasma shown, odorless, amorphous to touch and tasteless property, appears as powder form, Sample T.B1 was Blackish, Sample T.B 2 was Brownish and Sample T.B 3 was Black in colour.

Samples of Tamra Bhasma were subjected to pH study, pH of Samples T.B1, T.B2 & T.B3 were 5.52, 5.16&5.57 respectively. Test for Physical constants of 3 samples of Tamra bhasma were carried out, Physical constants of Sample T.B.1, ash value 92%, acid insoluble ash 90.4%, water insoluble ash 88.8%, Specific gravity 0.9949% and Moisture content 0.4 % were noted.

Physical constants of Sample T.B.2, ash value 91.58%, acid insoluble ash 89.6%, water insoluble ash 88.2%, Specific gravity 0.999% and Moisture content 0.6% were noted.

Physical constants of Sample T.B.3, ash value 84.2%, acid insoluble ash 81.38%, water insoluble ash 79.98%, Specific gravity 0.995% and Moisture content 0.2% were noted.

Tamra bhasma samples T.B1, T.B2 & T.B3 were sparingly soluble in D.W, Methanol, Petroleum ether & Ethyl alcohol, T.B3 samples was also sparingly soluble in Actone, Chloroform, and Carban tetra chloride.

Samples of Tamra Bhasma were subjected to Volumetric analysis of copper, the mean % of copper – 30.92 was noted in all the samples.

Analytical reports of samples were obtained by using inductively coupled plasma atomic emission spectroscopy.

Cu, Fe, S, Ni, Al, Si & Pb were detected in sample RT, SST, VST and 3 samples of Tamra Bhasma. Ag was not detected in sample of RT and TB2, but it was present in sample S.S.T, V.S.T, T.B1 & T.B3. Hg was detected in T.B1 and T.B3 samples may be due to the use of Mercury media in these two samples of Tamra Bhasma. As (arsenic) was detected in sample T.B3 this may be due to the preparation of Somanathi Tamra Bhasma with Manashila and Haritala as a ingredient.

There was decrease in the % of copper from raw to shodita, shodita to vishesha shodita and so on till Tamra Bhasma; this may be due to different purification and incineration processes carried out during bhasmikaran process. (RT-99.83%, SST- 79.65%, VST- 42.18%, T.B1- 29.94%, T.B2- 29.70% and T.B3-20.99%).

There was increase in % of S 6.64%, 10.07% & 18.91% in samples T.B1, T.B2 and T.B3 respectively, compared with raw sample i.e 0.25% this may be due to addition of Kajjali and Sulphur during incineration process.

There was decrease in % of Pb of VST (0.02%) & T.B1 (93.07 ppm) samples than RT (0.043%) sample; this may be due to purification and incineration processes.

Particle size assessment was done at I I T Powai, Mumbai. The mean particle size value of T.B1 was 2.32 μm , T.B2 2.20 μm and the mean particle size value of T.B3 was 2.25 μm .

Maximum particle size value of T.B1 was 8.53 μm , significantly less than the maximum particle size value of T.B2 i.e 17.50 μm , this may be due to the use of mercury media in sample T.B1 and mercury when mixed with metals and minerals disintegrate their atoms and helps in making the substance in to fine state of subdivision.

X-RD analysis was done at Regional Research Laboratory Bhoovaneshwar, it was observed that the cell type in case of RT was Hexagonal with cell volume 390.984 A. the cell type of VST was Monoclinic with cell volume 390.984 A, this indicates that when RT was converted in to VST there was change in the cell type, it changes from hexagonal to monoclinic.

VST has been converted in to T.B1 with mercury media (Kajjali) during the course of conversion the cell type changes from Monoclinic to Triclinic with cell volume 445.638 A.

VST was converted in to T.B2 in only sulphur media during the conversion also the cell type changes from monoclinic to triclinic, but the volume observed in case of T.B2 is larger than T.B1 and T.B3 i.e 505.656 A

VST has been converted in to T.B3 with mercury, sulphur and arsenic media (Manashila and Haritala), during the course of conversion the type of unit cell undergo change from monoclinic to triclinic, though the cell type in all the three i.e T.B1, T.B2 & T.B3 is same but the volume observed is smallest in case of T.B3 (356.472 A).

CONCLUSION

Sample T.B1, T.B2 & T.B3 were sparingly soluble in most of the solvents.

Physical constants of Samples; Ash value of sample T.B1 was 92%, T.B2- 91.58% & of T.B3 was 84.2%. Acid insoluble ash of sample T.B1 was 90.4%, T.B2- 89.6% & of T.B3 was 81.38%. Water insoluble ash of sample T.B1 was 88.8%, T.B2- 88.2% & of T.B3 was 79.98%. Specific gravity of sample T.B1 was 0.9949%, T.B2- 0.999% & of T.B3 was 0.995%. Moisture content of sample T.B1 was 0.4%, T.B2- 0.6% & of T.B3 was 0.2%.

pH of Tamra Bhasma samples have demonstrated the pH ranging between 5.16 to 5.57.

Cu, Fe, S, Ni, Al, Sn & Pb were detected in sample RT, SST, VST and 3 samples of Tamra Bhasma. Except RT & T.B2 Ag was noted in all the samples, while Hg in T.B1 & T.B3 samples and As (arsenic) was noted in only in sample T.B3. Gradual decrease in the % of Copper was noted from raw to shodita, vishesha shodita and till Tamra Bhasma.

There was increase in % of S 6.64%, 10.07% & 18.91% in samples T.B1, T.B2 and T.B3 respectively, compared with raw sample i.e 0.25%. There was decrease in % of Pb of VST (0.02%) and in T.B1 (93.07 ppm) samples than Raw Tamra (0.043%).

Particle size; the mean particle size value of Tamra Bhasma is in between 2.03 μm to 2.32 μm in all the samples. The minimum particle size value of Tamra Bhasma is 0.96 μm in all the samples. The maximum particle size value of Tamra Bhasma is in between 8.53 μm to 17.50 μm in all the samples.

The cell type in case of RT Hexagonal with cell volume 390.984 A, VST Monoclinic with cell volume 390.984 A, T.B1 Triclinic with cell volume 471.505 A, T.B 2 Triclinic with cell volume 505.656 A and in case of T.B 3 was Triclinic with cell volume 356.472 A. The volume of the sample T.B 3 was significantly small in comparison with other samples of Tamra Bhasma.

Preparation time, solubility, particle size, cell type, cell volume & cost, concerned Somanathi Tamra Bhasma (sample T.B 3) may be considered better than samples T.B1 & T.B 2.

REFERENCES

1. Sudheendra.Honwad et-al, Physico-chemical Analysis & Toxicity study of Tamra Bhasma prepared with various methods. M.D. (Ayu.) Dissertation (thesis), Submitted to RGUHS Bangalore, 2006.
2. Sri. Dattatraya. Ananta Kulkarni, Rasaratna Samuchchhaya, 1st Edn, ML Publication, New Delhi, 93-94,101-102, 1969.
3. Gulrajsharma Mishra, Ayurveda prakasha, 2nd Edn, The choukamba Vidya Bhawan Varanasi, 371, 1962.

Abbreviation

- 1) RT: Raw Tamra
- 2) SST: Samanya Shodhita Tamra
- 3) VST: Vishesh Shodhita Tamra
- 4) T.B 1: Tamra Bhasma with Parada media
- 5) T.B 2: Tamra Bhasma with Gandhaka media
- 6) T.B 3: Somanathi Tamra Bhasma or Tamra Bhasma with Parada, Gandhaka, Haratala & Manashila media

Source of support: Nil, Conflict of interest: None Declared