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RESEARCH ARTICLE

PHARMACEUTICAL STUDY OF HARATALA BHASMA

Lavanya S.A* and Doddamani M.S

Department of Rasashastra & Bhaishajya Kalpana, Taranath Govt Ayurvedic Medical College, Ballari

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ABSTRACT

In *Ayurveda* many metals and minerals have been in usage as medicine since many years. Metals and minerals are in the non-absorbable form which is later converted into absorbable, most effective and non-toxic form using the process of *Bhasmikarana* (Incineration). The changes in the physical and chemical properties of these drugs are due to the *Samskara* done through the process of *Shodhana, Bhavana, marana*etc. Each and every drug has its own method of incineration as required for its medicinal use. One such inorganic compound is *Haratala* (Arsenic Trisulphide) which has very specific method of incineration depending on the therapeutic utility. *Haratala* is considered to be noxious compound if given without purifying and incinerating it. Many media's have been explained for the incineration process of *Haratala* among which *shuktibhasma* is specifically told in the context of using *Haratala bhasma* for *Kushta*(Skin Ailments).An attempt is made to prepare *Haratala bhasma*as per the classics.

INTRODUCTION

Rasashastra is a science which mainly deals with metals and minerals. Most of the metals are considered to be poisonous when taken internally even though they have the therapeutic quality of healing. In order to overcome this, our *Acharyas* have unearthed the process such as *Shodhana*[1] (Purification) and *marana*[2] (Incineration). These processes convert the mineral into an absorbable and non-toxic form. Three arsenic compounds mentioned in our classics that are deadly poisonous are *Haratala* (Arsenic Trisulphide), *Manahshila*(Arsenic disulphide) and *Gouripashana* (Arsenic oxide). *Haratala* is an inorganic compound mentioned in *uparasa varga*[3]. Mythologically *Haratala* is considered as *Harebijam.* 2 varieties of *Haratala* are mentioned in classics i.e *Patratala* and *Pindatala.Patratala*is considered as the best variety of *Haratala* which is used for therapeutics[4]. *Haratala bhasma* is considered to be the best medicine in various skin ailments. Many procedures with different media's have been mentioned in the classics for the *marana* of *Haratala.* One among them is *MuktaShukti* media which is therapeutically useful in treating the *Kushta* (Skin ailments)[5].

Aim

To prepare *Haratala Bhasma*as per the classics.

MATERIAL & METHODS

Step 1: *Shodhana of MuktaShukti*[6](Oyster shell)

Materials

- Raw*MuktaShukti* - 590gms
- *Nimbuswarasa*(Citrus Limon)–Q.S.

Equipments

Gas stove, *Dolayantra*[7].

Method

MuktaShukti was taken in *Khalvayantra* and made into small pieces. These pieces were washed with hot water to remove sand and mud if any. The pieces of *Shukti* were placed in three folded clean cloth tied into 2 *Pottali's*. These *Pottali's* were suspended with the help of stick and immersed in *nimbuswarasa* present in the earthen pot so that the bottom of *Pottali* should not touch the inner surface of the pot. This *Dolayantra* was kept over mild fire and boiled for 3 hours. *Nimbuswarasa* was added subsequently to maintain the level of media. pH of *nimbuswarasa* was recorded at an hour interval. After 3 hour *Pottali* was taken out and allowed to cool. After cooling, *ShodhitaShukti* was collected from *Pottali* and washed with warm water and allowed for complete drying.

Precaution

- *Mandagni* was maintained throughout the procedure.
- The *Pottali* was not allowed to touch the bottom of pot.

Observations

- Initial pH of *nimbuswarasa* was 4 and there was gradual increase of pH of *swarasa* during the process and at the end it was 5 with gross rise of 1 in its pH.

- Quantity of *Swarasa* used 5.9 litres.
- The weight of the *MuktaShukti* was reduced to 570g.

Table No 1 Showing the Observations during *MuktaShukti Shodhana.*

S.L No	Observation	Before *Shodhana*	After *Shodhana*
1	Colour	White and Black shades	Pale White
2	Brittleness	Not Brittle	Brittle

Step 2: *Marana* of *Mukta Shukti*[8]

Materials

- *ShodithaMuktaShukti* – 570gms
- *Kumariswarasa* (Aloe Berbedensis) – Q.S
- *Khalwayantra*
- Two earthern *sharava (Plates),* Cotton cloth & *Multanimitti,* thread.
- *Gajaputa*Pit.Cowdung Cake.

Method

The whole method of *Marana* of *MuktaShukti* was completed in following stages.

1. Making pieces *MuktaShukti* of
2. *Sharavasamputa* formation
3. *Gaja Puta*.

Making pieces of Shuktika

ShodhitaMuktaShukti were taken in *KhalvaYantra* and broken into small pieces, and were taken in *Sharava* and spread equally.

Sharavasamputa formation

Two concave earthen *sharava* were taken. The broken *Shuktika* pieces were placed inside one of the *Sharava* and it was covered with another *Sharava. Sandhi* between two *Sharavas* was sealed with one layer *multani* smeared thread and seven layer of *multanimitti* smeared cloth. Each cloth measured 80 cm in length and 8 cm in width (7 in number). Each layer was placed after drying of the previous layer.

Gaja Puta

Size and Shape:*Gaja Puta* was given by using the pit of Following dimensions.

Size of Pit : 58.5cm Height, *58.5cm depth & 58.5cm width*
Fuel : -200cow dung cakes were used
132 cow dung cakes were placed below *Sharavasamputa* and 68 cow dung cakes were placed above *Sharavasamputa,.*to ensure uniform degree of heat.

Mode of Heating

Fire was ignited, by keeping four small camphor balls on all four sides. Thermocouple tip was kept below the *sharava* (upper 1/3rd of *Gaja Puta*). Temperature obtained during Puta was recorded with the help of Pyrometer. After *Swangasheeta, Sharavasamputa* was taken out of pit and layers of *multanimitti* smeared cloth were scrapped carefully with knife. Burnt *Shukti* were taken out and weighed. Likewise 2 more *putas* were given.

Table No 2 Showing the observation During *MuktaShukti Marana*

Test	Before Marana	Observation during*Puta*		
		I	II	III
Colour	Pale White	Whitish Grey	Greyish White	Greyish White
Taste	-	Slight Alkaline	Alkalinity Increased	Alkalinity Increased
Touch	-	Smooth	Mrudu, Soft	Soft
Appearance	-	Flaky	Fine powder	Very fine powder
Weight	570 Grams	B.M 570grms	B.M 499 grms	B.M. 481 grms
		A.M 510grms	A.M 491grms	A.M. 477 grms
Odour	-	Slight burning odour	Odourless	Odourless
Varitaratva	-	NOB	NOB	NOB
RekhaPoornatva	-	OB	OB	OB
Loss	-	60 grms	08grms	04 grms

Step 3

***Shodhana* of *Haratala* with *Kushmanda swarasa*[9]**

Materials

- *Ashuddha Haratala*-300 gms.
- *Kushmandaswarasa-Q.S.*
- *Dolayantra,* Gas stove.

Method

After removing the skin of *kushmanda,* it was cut into small pieces and paste was prepared with the help of juicer. Paste was squeezed to get *swarasa*. Total *swarasa* obtained from 10 kg *Kushmanda* was 6ltrs. *Patra Haratala* of 75gms each were taken in clean square shaped four folded cloths respectively and four *Pottali* were prepared with the help of strong jute threads. These *pottalis* were then suspended with the help of wooden stick and thread in earthen pots. To these pots *kushmandaswarasa* was poured till the *pottalis* were got immersed.

Thus made *Dolayantra* were kept on gas stove and *mriduagni* was given for 3hrs. During the procedure *kushmandaswarasa* was added as and when required. After 3hrs of *swedanapottalis* were removed and *swedita Harataala* was washed with hot water and dried under shade.

Precaution

- *Mandagni* was maintained throughout the procedure.
- The *Pottali* was not allowed to touch the bottom of pot.

Observations

- pH of *Kushmandaswarasa* before *shodhana*: 5.26, After *shodhana*: 5.56
- Quantity of *swarasa* used 5.1 litres.
- The weight of *Haratala* after *Shodhana* – 283 gms.

***Shodhana of Haratala with Churnodaka*[10]**

Preparation of Churnodaka

Materials

- *Churnashila*-2kg.
- Water-20 litres.

Procedure

Churnashila was taken in a mud pot. To this 20 litres of water was added stirred well and kept overnight. Next day only the supernatant water was collected, filtered and stored in a glass bottle.

Materials required for Haratala Shodhana

- *Kushmanadashodita Haratala* - 283gms.
- *Churnodaka* - Q.S

- *Dolayantra,* Gas stove.

Procedure

Patra Haratala of equal quantities i.e. 283gms were taken in four clean square shaped four folded cloths respectively and four *Pottalis* were prepared with the help of strong jute threads. These *pottalis* were then suspended with the help of wooden stick and thread in earthen pots. To these pots *Churnodaka* was poured till the *pottalis* were got immersed. Thus made *Dolayantras* were kept on gas stove and *mriduagni* was given for 3hrs. During the procedure *Churnodaka* was added as and when required. After 3hrs of s*wedana, pottalis* were removed and *swedita Haratala* was washed with hot water and dried under shade.

Precaution

- *Mandagni* was maintained throughout the procedure.
- The *Pottali* was not allowed to touch the bottom of pot.

Observations

- *Churnodaka* used for whole procedure was 9.2lts.
- pH of *Churnodaka* before *shodhana* : 12.4 and after *shodhana :* 12.2

Step 2: Marana of Haratala[11]

Materials

- *Shodita Haratala* -140 gms.
- *MuktaShuktiBhasma*-140 gms.
- *Kumariswarasa*-Q.S
- *Khalwayantra*
- Two earthern *sharava (Plates),* Cotton cloth & *Multanimitti,* thread.
- *Laghu Puta* Pit*,* Cowdung Cake.

Method

The whole method of *Haratala Marana* was completed in following stages.

1. *Bhavana* (Trituration)
2. Preparation of *Chakrikas* ((Pelletization).
3. *Sharavasamputa* formation.
4. *Laghu Puta*

Bhavana (Trituration)

Equal quantity of *Shodhita Haratala* and *ShuktikaBhasma* were taken in a *KhalvaYantra* and powdered separately. Then it was mixed and triturated with sufficient quantity of *KumariSwarasa.* Trituration was continued till the mass attains a viscous and semisolid state.

Preparation of Chakrikas (Pelletization)

After giving *Bhavana*, when mass became viscous and semisolid, the circular *Chakrikas* of 4 cm in diameter and 0.5 cm in thickness were prepared; *Chakrikas* were dried under shade for two days.

Sharavasamputa formation

Two concave earthen *Sharavas* were take. The dried *Chakrikas* were placed inside one *Sharava*, it was covered with another *Sharava.Sandhi* between two *Sharavas* were sealed with one layer of *multani* smeared cotton thread and seven layers of *multanimitti* smeared cloth. Each cloth measured 50 cm in length and 6 cm in width (7 in number)

Laghu Puta

Size and Shape: *Laghu Puta* was given by using the pit of following dimensions.

Size of Pit: 31cm Height 31cm Depth 31cm width

Fuel: 30 dried cow dung cakes were used.

20 cow dung cakes were placed below *Sharavasamputa* and 10 were placed above *Sharava* to ensure uniform degree of heat.

Mode of Heating

Fire was ignited, by keeping four small camphor balls on all four sides. Thermocouple tip was kept below the *Sharava* (upper 1/3rd of *Laghu Puta*).Temperature obtained during Puta was recorded with the help of Pyrometer. After *Swangasheeta, Sharavasamputa* was taken out of pit and layers of *Multanimitti*s meared cloth were scrapped carefully with knife. *Chakrikas* were collected from *Sharava*. They were weighed and subjected for 2 more *putas.*

DISCUSSION

Shodhana

Swedana is one of the *shodhana* procedure which is used for *shodhana* of many *Rasadravyas*. In the process the drug is boiled in the liquids which are either *ksharas, amlas*or both and herbal juices, with the help of *Dolayantra.*

Table No 6 Showing observation during *Haratala Marana*

SL No	Test	Before Marana	Observation During *Laghu puta*		
			I	II	III
1	Colour	Lemon Yellow	Greenish Grey	Greenish grey. Few had tinge of maroon red colour.	Light grey
2	Taste	*Katu, Kashaya*	Tasteless	Tasteless	Tasteless
3	Appearance	Powder	Fine powder	Very fine powder	Very fine powder
4	Weight	140 grams *Haratala* and 140 grams *ShuktikaBhasma*	218 grams	180 grams	174 grams
5	Odour	Sulphur	Slight Sulphur	Very slight sulphur	Odourless
6	Cow dung cakes used	-	30	30	30
7	*RekhaPoornatva*	-	NOB	OB	OB
8	*Varitaratva*	-	Partially	Observed	Observed
9	*Nirdhumatva*	-	NOB	Observed	Observed
10	Loss	-	62 grams	32 grams	6 grams
11	*Nischandratva*	-	NOB	Observed	Observed

NOB – Not Observed.OB – Observed.'

Photo 1 Raw Shukti

Photo 2 Shukti tied in Pottali

Photo 3 1st Putita Shukti

Photo 4 *Bhavana* with

Photo 5 *Chakrikas KumariSwarasa*

Photo 6 3rd*PutitaShukti*

Photo 7 Raw *Haratala*

Photo 8 *Haratalashodhana* With *KushmandaSwarasa*With*Churnodaka.*

Photo 9 *Haratala shodhana*

Photo 10 *Shodhita Haratala*

Photo 11 *Shuddha Haratala*& *ShuktiBhasma*

Photo 12 *Laghu Puta.*

Photo 13 1st*Putita Haratala*

Photo 14 2nd*Putita Haratala*

Photo 15 3rd*Putita Haratala*



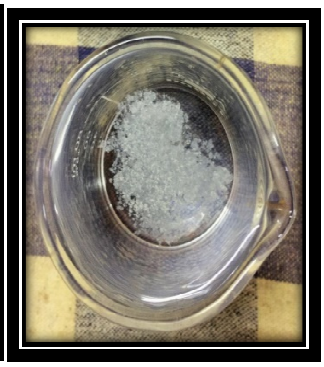

Photo 16 *Haratala Bhasma* **Photo 17** *NirdhumaPareeksha* **Photo 18** *VaritaraPareeksha*

Diffusion process may occur in this kind of *shodhana*. According to Fick's law of diffusion dx/dt = D.dc/dt the flux on atom of substance move from higher concentration to lower concentration in fixed period of time in a solution where D is diffusion coefficient. This law may holds good with *swedana* process. Here the impurities may move from the drug to the *shodhana* liquids and some organic qualities of liquids move from the liquids to the drug resulting in purification and potentization of the drug. And also it may be helpful in reducing the hardness of the drug as heat is given continuously through boiling liquids. Reduction in hardness may help in further processing of the drug.

Marana

Bhavana is given by grinding with some liquid media, so it may be considered as wet grinding and it is observed interestingly that finer size of particles can be achieved by wet grinding than dry grinding as this involves break down of the material by rubbing between two surfaces called as surface phenomena.

In *Puta* heat is applied to the *Sharava* from all sides, so in a spherical mass, there is a temperature difference between the surface and core. But in case of flat pellets, there may not be much difference of temperature between the surface and core, so there heat may get distributed homogeneously. And homogeneous heating is the basic criteria for proper incineration.

Earthen *sharavasamputa* were used for incineration because of inert nature and easy availability. Pores present in earthen *sharava* allow escaping of gases formed during heat treatment and also to regulate uniform heat to the substance and temperature is maintained for longer period.

Depending upon the type of material and the media used for *Marana*, specific types of *putas* have been mentioned. For *shuktimarana Gaja puta* and for *HaratalamaranaLaghu puta* is used. This depends upon the melting point and hardness of the drug.

Cow dung cakes were used as a fuel in the *puta.* Specific type of arrangement of cow dung cakes were used in *puta* i.e., lower 2/3rd of pit was filled with cow dung cakes. Then *SharavaSamputa* was placed and rest of the pit i.e., 1/3rd is again filled with cow dung cakes. This specific type of arrangement allows sustained heat for prolonged period.

Here similar kind of heating pattern was adopted till complete formation of *Bhasma.*

CONCLUSION

Haratala bhasma was prepared according to the classical reference. The total yield of the *bhasma* was 62.14%. There was significant weight loss in the 1st two *Laghuputas* compared to the 3rd*Puta*. The loss after *Shodhana* of *Haratala* in *Kushmandaswarasa* was 5.6% and in *Churnodaka was 1.06%.* The loss after *marana* was 37.86%.

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