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A CRITIQUE ON SHODHANA AND MARANA OF HARATALA

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ABSTRACT

Rasashastra and *Bhaishajya Kalpana* known as the art of vedic alchemy is a fusion between mineral and organic compounds. It is a branch of *Ayurveda* which has given great emphasis to the comprehensive knowledge of both mineral and herbal drugs, preparation, preservation and dispensing of the preserved drugs. It includes many metals and minerals which are considered to be deadly poisons but the same compounds have an incredible medicinal effects. This is attained due to the procedures such as *Shodhana* (Purification) and *marana* (Incineration) which reform the properties of the same drug and enables it as medicines. One among such inorganic compounds which is considered to be noxious is *Haratala* (Arsenic Trisulphide-As_2S_3). *Haratala* after the process of purification and incineration acts as an eminent drug in various disorders when used both externally and internally. Here in the article an endeavour is made to converge the Ayurvedic review on the various process of purification and incineration of *Haratala*.

Keywords: *Haratala, Shodhana,Marana*

INTRODUCTION: *Rasashastra* is a discipline which deals with evolution of various herbo mineral and metallic formulations. These metals, minerals and some of the virulent plants (*visha varga dravyas)* contain many impurities and toxic substances within them. Hence these dravyas are subjected to various methods of *Shodhana* (purification) and *marana* (incineration) to make them competent for medicinal use.

Shodhana[1] (purification) is an important pharmaceutical procedure which converts a poisonous drug into a therapeutically effective medicine for various ailments. It includes various methods like *Svedana* (vapouring), *Mardana* (grinding), *Prakshalana* (performing frequent ablutions), *Galana* (straining fluids), *Avapa* (substances are added into the liquefied metals), *Nirvapa* (metals are burnt to red hot and dipped in liquids), Bhavana (maceration), *Bharjana* (frying in pan) etc. where in specific process are described for the *Sodhana* of different metals and minerals.

Marana[2](Incineration) is an essential step to be performed on substances especially related to *Rasashastra*. It is an important pharmaceutical process applicable to metals and minerals for their transfiguration into fine ash form (*Bhasma* form).Due to *marana* the metals and minerals are redesigned into such a form that it will be easily absorbed and assimilated in the body.

Haratala(Arsenic Trisulphide-As_2S_3) is one among the arsenicals mentioned in *Ayurveda*. It is an inorganic compound considered to be toxic which is bright yellow solid well known as Orpiment. In *rasashastra* most of the *acharyas* placed it under *uparasa varga*[3].It is beneficial in various disorders like *vrana sodhana*

(wound cleaning), *pandu karma* (coloring the skin after scars of wounds), *arsha* (piles), for various skin disorders, *granthi* (nodules), *upadamsa* (penile and veneral diseases), *visarpa* (herpes) and as a hair remover in different *yogas* (formulations)[4,5]. There are two types of *Haratala* i.e *patra Haratala* and *pinda Haratala.* Among them *patra Haratala* is considered to be the best variety[6].

The empirical focus of this article is to review the various techniques of *Shodhana* (purification) and *marana* (incineration) of *Haratala* and to explore the principles behind the process.

MATERIAL AND METHODS:

Aim: To review the various techniques of *Shodhana* (purification) and *marana* (incineration) of *Haratala* and to explore the principles behind the process.

The data was collected from various *Ayurvedic* literatures and journals.

SHODHANA OF HARATALA:

Haratala Shodhana is performed by subjecting it to *Bhavana* (Levigation) as well as *Svedana*(vapouring) and at times both. According to the present compilation from 18 texts of *Rasashastra* 14 materials are used for this purpose. Their names are arranged as per the number of references using each material.

Table No.1:Table Showing the Materials used for *Shodhana*(Purification) of *Haratala* and Number of References Against them.

Sl.No.	Name of materials	No. of References
1	*Kushmanda Swarasa*	15
2	*Kanjika*	10
3	*Tila taila*	09
4	*Triphala Kwatha*	08
5	*Churnodaka*	08
6	*Nimbu Swarasa*	06
7	*Tila Kshara Jala*	04
8	*Shalmali Moola Kwatha*	04
9	*Palashamula jala*	02
10	*Gruha dhuma Jala*	01
11	*Snuhi Kshira*	01
12	*Katukalaburasa*	01
13	*Mahishi Mutra*	01
14	*Balamula Kwatha*	01

The above said liquids are mostly used for *swedana*(Vapouring) but *Churnodoka* (lime water) and *Kanji*(Sour Gruel) are used for *Bhavana*(Levigation) also.

Some of the purification Procedures:

1. *Haratala* is purified, if boiled in a *Dola yantra*(Type of hot water bath) with juice of *Kushmanda* (Benincasa hispida) or with a solution of ashes of *tila* (Sesamum indicum) plant or lime water.[7]
2. *Haratala*, broken into pieces and combined with one tenth its weight of *tankana* (Borax), is to be dissolved with lime juice and then with *Kanji* (Sour Gruel). It is then to be combined in a piece of cloth made four - fold and boiled by *Dola Yantra* for one day. It is next to be boiled similarly for one

day with *Kanji* (Sour gruel), dissolved with lime, and then again boiled similarly for one day with juice of *Kushmanda* (Benincasa hispida) or with the juice of *shalmali* (Bombax cieba) bark.[8]

3. *Patra Haratala* is purified, if subjected to *bhavana* for seven times with lime water.[9]
4. Clean *Patra Haratala* is to be broken into small pieces wrapped up in a piece of cloth and boiled for six hours in the lemon juice by means of *Dola Yantra*. When cooled on itself, the bundle is to be again boiled in the same way in each of the following, urine of buffalo, Aloevera juice, solution of lime, lemon juice mixed with water, and juice of sugar cane boiled steadily by charcoal. Thus boiled, *Haratala* become purified.[10]
5. *Patra Haratala* is purified, if it is boiled by *Dola Yantra* for three hours each with
   - *Kanji* mixed with lime
   - Juice of *kushmanda*
   - *Tila oil* and
   - Decoction of *triphala* [11]

MARANA OF HARATALA: The compilation of *marana* (Incineration) process of *Haratala* from 32 classical as well as recent compilatory works has shown 41 processes. Similar types of preparation can be found in other indigenous systems of medicine like Unani and Siddha.

Based on *Bhasma Vignyana* the compilatory work of Shri Harisharnanada which has shown some more processes practiced by Unani system. It is to note that among the 136 references available from 32 texts, there are several repetitions without any change from the previous author and some times with change in the heating or in the time or in drug or process. Excluding the repetition with slight changes, 41 references remain as original processes.

The 41 references accounted in this study have directly or indirectly used 52 substances for *Haratala Marana*. The substances of direct use are those which are mixed with *Haratala* during the processes of *Marana*. Indirect use means the substances which are helpful in the process without mixing in it.

The reference of *Nighantu Ratnakara* and *Rasa Tarangini* have not revealed the duration of heating while *Ayurveda Prakasha*, *Bhava Prakasha*, *Brihat Yoga Tarangini* and *Bharata Bhaishajya Ratnakara* and *Rasayoga Sagara* have shown the duration of heating as 5 days. The commentary on *Rasa Tarangini* by Sri. Haridatta Shastri has shown the duration of heating as 3 days and he has quoted *Bhava Prakasha* for the reference of 5 days of heating time. *Ayurveda Prakasha* has also quoted *Bhava Prakasa*.

Ayurvedic formulary of India Part - I has accepted the reference *of Ayurveda Prakasha* for *Haratala Bhasma*.

THE MEDIA USED IN PREPARATION OF HARATALA BHASMA: There are different media's used in the incineration of Haratala like herbal origin, metals, minerals, animal origin and others. There may be certain role in incineration of Haratala .

Table No. 2. Showing the Origin Wise Distribution of 52 Substances used in the *Haratala Marana.*

Sl.No.	Origin	Numberof substances

01	Herbal	38
02	Mineral and Metal	06
03	Animal	06
04	Others	02
	Total	**52**

Table No 3: Showing The Herbal Media used in Incineration of Haratala

Sl. No	**Name**	***Rasa***	***Guna***	***Veerya***	***Vipaka***	**Active principles**
1	*Apamarga*	*Katu Tikta*	*Laghu, Rooksha Teekshna*	*Ushna*	*Katu*	Potash in Bhasma form
2	*Arka*	*Katu Tikta*	*Laghu, Rooksha Teekshna*	*Ushna*	*Katu*	Latex-Trypsin, Uscherin, Calotropin Calotaxin
3	*Ankola*	*Tikta Katu Kashaya*	*Laghu, Snigdha Teekshna, Sara*	*Ushna*	*Katu*	Bark- Alangine
4	*Amlika*	*Amla*	*Guru, Rooksha*	*Ushna*	*Amla*	-
5	*Ardraka*	*Katu*	*Guru, Ruksha Teekshna*	*Ushna*	*Katu*	Zingigerine, Zingiberol
6	*Bala*	*Madura*	*Laghu, Snigdha Picchila*	*Sheeta*	*madura*	Ephedrine
7	*Bhrahmadandi*	*Bitter*	-	-	-	-
8	*Bhringaraja*	*Katu Tikta*	*Laghu, Rooksha*	*Ushna*	*Katu*	Eclptine, Wedelolactone
9	*Cikkani*	*Katu*	*Teekshna*	*Ushna*	*Katu*	Volatile oil
10	*Dadrughna*	*Katu*	*Laghu Rooksha*	*Ushna*	*Katu*	Seed -Rhein, Aloe-emodin & Chrysophanol
11	*Dronapuspi*	*Katu*	*Guru, Rooksha Teekshna*	*Ushna*	*Katu*	-
12	*Dhattura*	*Tikta Katu*	*Laghu, Ruksha Vyavayi, Vikasi*	*Ushna*	*Katu*	Scopolamine, Atropine, Norhyosciamine
13	*Eranda*	*Madura*	*Snigdha, Teekshna,*	*Ushna*	*Madura*	Ricin, Ricinin

			Suksma			
14	*Guduchi*	*Tikta Kashaya*	*Guru, Snigdha*	*Ushna*	*Madura*	Berberine, Giloin
15	*Gopalika*	*Madura Tikta*	*Guru Snigdha*	*Sheeta*	*Madura*	Volatile oil P-methoxy Salicylic aldehyde
16	*Kantakari*	*Tikta katu*	*Laghu, Ruksha , Teekshna*	*Ushna*	*Katu*	Diosgenin
17	*Kakamachi*	*Tikta*	*Laghu, Snigdha*	*Anushna*	*Katu*	Fruit- Solanergin, Solasonine, Solanigeine
18	*Kumari*	*Katu*	*Guru, Snigdha, Picchila*	*Sheeta*	*Katu*	Aloin
19	*Kulatha*	*kashaya*	*Laghu, Rooksha, Teekshna*	*Ushna*	*Katu*	-
20	*Kushmanda*	*Madura*	*Laghu, Snigdha*	*Sheeta*	*Madura*	Cucurbitine
21	*Lashuna*	*Amala vargita Pancha Rasa*	*Snigda, Teekshna, Picchila, Guru, Sara*	*Ushna*	*Katu*	Vol.oil Allyl-porpyl sulphide, Diallyldi sulphide
22	*Malakangani*	*Katu, Tikta*	*Teekshna*	*Ushna*	*Katu*	Celestrine Penniculatine
23	*Nagarjnni*	*Katu, Tikta, Madura*	*Guru, Rooksha , Teekshna*	*Ushna*	*Katu*	Cymol, Carvacrol Linconin in later.
24	*Nimba*	*Tikta, Kashaya*	*Laghu*	*Sheeta*	*Katu*	Nimbin, Nimbinin Nimbidin, Nimbosterol
25	*Nimbaka*	*Amla*	*Guru , Teekshna*	*Ushna*	*Amla*	Citric acid
26	*Palasha*	*Katu, Tikta, Kashaya*	*Laghu, Rooksha*	*Ushna*	*Katu*	Kinotannic acid Palasonin
27	*Palandu*	*Madura, Katu*	*Guru , Teekshna*	*Ishat Ushna*	*Madura*	Allyl-propyldi-sulphide
28	*Pippali*	*Katu*	*Laghu, Snigdha*	*Anushna Sheeta*	*Madura*	Piperine

			Teekshna			
29	*Punarnava*	*Madura, Tikta, Kashaya*	*Laghu, Rooksha*	*Ushna*	*Madura*	Punarnavin
30	*Rohitaka*	*Katu, Tikta, Kashaya*	*Laghu, Rooksha*	*Sheeta*	*Katu*	Tecomin
31	*Sharapunka*	*Tikta, Kashaya*	*Laghu, Rooksha , Teekshna*	*Ushna*	*Katu*	Rutin, Rotenoid
32	*Sigrupatra*	*Katu, Tikta*	*Laghu, Rooksha, Teekshna*	*Ushna*	*Katu*	Moringine Plerygospemin
33	*Sahachra*	*Tikta Madura*	*Laghu*	*ushna*	*katu*	-
34	*Sugandavala*	*Tikta, Kashaya*	-	*Sheeta*	*Madhura*	-
35	*Snuhi*	*Katu*	*Laghu, Teekshna*	*Ushna*	*Katu*	Euphorbon
36	*Tambuli*	*Katu, Tikta*	*Laghu, Rooksha, Teekshna*	*Ushna*	*Katu*	Tannin
37	*Vata*	*Kashaya*	*Guru Rooksha*	*sheeta*	*Katu*	Tannin
38	*Vatsanabha*	*Madura*	*Rooksha, Teekshna, Laghu, Vyavahi, Vikasi*	*Ushna*	*Madura*	Aconitine, Psuedo aconiline

Table No.4: Showing the Mineral and Metal Media used in Incineration of *Haratala*

Sl.No.	**Name of Mineral**	**Name in English**
01	*Chuna (Sudha)*	Calcium Oxide
02	*Tamra*	Copper
03	*Navasadara*	Ammonium Chloride
04	*Parada*	Mercury
05	*Saindhava*	Rock Salt
06	*Hingula*	Cinnabar

Table No 5: Showing the Animal origin media used in Incineration of *Haratala*

Sl.No.	**Name of Animal Substance**	**Name in English**
01	*Aja kshira*	Goat's Milk

02	*Dadhi jala*	Sour Water from curd
03	*Mahisha Mutra*	Buffalo's Urine
04	*Shuktika*	ShellOyester
05	*Samudraphena*	-
06	*Kshira*	Cow's Milk

Table No 6: Showing the Other used in Marana of Haratala

Sl.No.	Name	Name in English
01	*Kanji*	Sour Gruel
02	*Gruhadhuma*	Carbon from kitchen smoke

PROCESSES USED IN INCINERATION OF *HARATALA*: There are different processes like *Bhasma Samputa, Putas, kupipaka* adopted in incineration of *Haratala*

Table No 7: Showing Different types of Process.

Sl.No	Method	No
01	*Bhasma Samputa*	16
02	*Kshara Samkputa*	07
03	*Gajaputa*	04
04	*Kupipaka*	04
05	*Laghuputa*	02
06	*Dravapaka*	02
07	10 Cowdung Cakes *Puta*	01
08	*Gomaya Puta*	01

The table no.7 shows that majority of processes are performed in *Bhasma Samputa* by using *Palasha Bhasma, Apamarga Bhasma, Pippala Bhasma, Vata Bhasma, Snuhi Bhasma, Amli Bhasma, Arka Bhasma,* etc and then in the *Kshara samputa* by using *Palasha Kshara, Punarnava Ksara* & One special puta like *Gomaya Samputa* where *Haratala* is embedded in big cow dung cake. The duration of heating is an important aspect of the preparation but few authors have made it clear.There are different references regarding duration of heating ranges from 12 hours to more than 120 hours. Few authors are not mentioned about heating time. Some authors explained about *putas* like *Gajaputa, Laghuputa. Rasa Tarangini* has explained *Laghuputa* in one method but not explained the size of puta and number of cowdung cakes. Some authors like *Rasa Ratna Samachchaya* have explained number of cowdung cakes and shape i.e, 10 Cowdung cakes.

INCINERATION PROCEDURES OF *HARATALA* :

1. Purified *Patra Haratala* is to be rubbed in *khalwa yantra* (Mortar and pestle) for one day with the juice of *Punarnava* (Boerhavia diffusa) and made into a lump and dried. Half the portion of earthern vessel is then to be filled with the *Kshara* of *Punarnava*, Upon which is to be kept the lump of *Haratala*. The portion up to the neck of the vessel is then to be filled with the *Kshara* of *Punarnava* and the mouth of the vessel to be closed by means of an earthern basin, the joint being tightly closed in the usual way.

The vessel is then to be placed over fire and heated continuously for five days, the fire being gradually increased at a uniform rate the *Haratala* will thus be incinerated. This is to be use with suitable *anupana*.[12]

2. Purified *Haratala* and *Shuktika Bhasma* are to be taken in equal quantity, triturated with juice of *Kumari* (Aloe berebedensis) for one *prahara* (3 hours) and made in a *chakrika.* Then it is dried in sunlight. It is to be subjected to *laghuputa*.[14]
3. Purified *Haratala* is to be powdered and then triturated with lime water, juice of *Apamarga* (Achyranthus aspera), and solution of *Ksharas* and then to be kept in an earthern vessel with powdered *Ksharas* of barley husks put below and upon. This is to be covered with an earthen basin. The remaining portion of vessel is to be filled with the kernel of a *kushmanda* fruit. The mouth of the vessel is then to be closed. It is next to be subjected to heat which is to be increased gradually at uniform rate for twelve hours. *Haratala* is thus incinerated [15]
4. One *pala* (48g) of purified *Haratala* is to be rubbed with the *kumara swarasa* (Juice of Aloe barbadensis) and dried. Later kept in a *samputa* and heated for 36 hours. [16]
5. *Haratala* is to be finely powdered and rubbed for two days with the juice of *Dugdhika, Sahadevi* and *Bala*, and made into a lump which is to be dried in the shade and confined in a shade and confined in a *samputa* or in a glass bottle with the ashes of *Palasha* (Butea monosperma), placed on all sides of lump and then heated by gradually increasing and strong fire by mean of a *Valuka yantram* or *Handika Yantram*. [17]
6. Fine powder of *Haratala* is to be subjected to *bhavana* for twenty days with the juice of *Asvattha*, rubbed in a clean khalwa yantra(mortar and pestle) and made into a ball which is to be kept inside a vessel, one half of which is filled with the ashes and the mouth of the vessel is to be closed by means of another vessel. The whole thing is now to be heated for 12 hours in *Gajaputa*. [18]

Assessment of *Haratala bhasma*: The prepared *Bhasma* should be subjected to certain tests to assess the genuine character of the sample. Though there were different *Bhasmas* prepared with various methodologies but finally all should have some common characters. The study of these characters is known as *Bhasma pariksha*.

I. Parameters of assessment:

A. Physical Test

1. ***Varitaratva***[19]: The prepared *Bhasma* is sprinkled on water it does not sink but floats. It is known as *varitara*. This test signifies the lightness of *Bhasma*.
2. ***Unama* or *Uttama***[20]: This is the re-assessement test of the floating character of *Bhasma*. A grain is to be kept carefully on the film formed in the previous test in water, observe if the film can resist the weight of the grain, if the grain remains on the film and does not sink in water, the *Bhasma* can be considered as excellent.
3. ***Rekha Purnatva***[21]**:** When small quantity of *Bhasma* is rubbed between index finger and thumb, particle of *bhasma* enters the thread grooves and does not fall down, signifies fineness.
4. ***Nischandratvam:*** Observe the *Bhasma* in bright sunlight whether it is having

lustre or not. The presence of lustre indicates the need of further disintegration of the particles.

5. ***Bhasma Varna*:** The colour of the *Bhasma* is mentioned in some cases. If the colour of prepared *Bhasma* coincides with that of textual description it can be considered as one of the signs of properly prepared *Bhasma*. The colour of *Bhasmas* of the same drug may vary according to the media used. So this test can be taken as a supporitive one.
6. ***Gata rasatvam*:** The properly processed *Bhasma* attains tastelessness. The presence of taste in *Bhasma* indicates the imperfectness of *Bhasma.*
7. ***Slakshnatvam* and *Mrudutvam*:** The hard materials converts to soft and smooth ash form on subjecting to *Marana* process. These qualities can be felt by simple touch with fingertips.

B. Chemical Tests:

1) ***Nirdhumatvam*:** This is a special *Bhasma Pariksha* meant for such substances which evolve smoke in the raw form like *Haratala* and *Manashila.* The *Bhasma* on sprinkling on redhot coal, if does not emit smoke then it can be considered as genuine *Bhasma*.[22] The state of *Nirdhumata* shows that either the evaporative contents are lost during the *marana* process or it has been chemically converted into such a compound which is thermostable. Several process of *Haratala Marana* have specified this calcination test and as stated earlier the later *Acharyas* have put a query on the authenticity of this test. But looking to the repeated confirmation shown by the *Acharyas*, one has to be convinced that there will be such a state of *Haratala* which will not evolve smoke in fire.

2) Qualitative Test of *Rasataragini*:[23]

A pinch of *Haratala Bhasma* is put into Hydrochloric acid kept in glass vessel and it is heated using a spirit lamp. A yellow precipitate at the bottom of the glass vessel shows the powder is *Haratala Bhasma.*

Colour of *bhasma*:

The colour of *Haratala Bhasma* is white colour[24] or Brown colour[25]

DISCUSSION: Among the *Shodhana* medias used in the process of purification of *Haratala*, most of them are alkaline in nature which helps in reducing *tikshna* and *Pittakara* properties of *Haratala*.. Alkalinity further helps to breakdown the crystalline structure of *Haratala* to gain amorphous nature. The breakage of bonds helps in annealing the *Haratala*. This may be the chemical affinity of alkalis towards Arsenicals.

Shodhana is commonly done using 2 methods namely *Bhavana* and *Shodhana,* among which *Shodhana* is more accepted. In the process the drug is boiled in the liquids which are either *ksharas* or *amlas* or both, with the help of *Dolayantra.* 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 in *swedana* process. Here the impurities may move from the drug to the liquid media and some organic qualities of liquids move from the liquids to the drug resulting in purification and potentitiation 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.

In the process of *Bhavana*, it is hypothetically believed that the *Bhavana dravya* acts as an antagonistic to the *Bhavya dravya* thereby destroying or neutralizing the toxic properties of a raw material. Further there will be addition of organic compounds to the mineral in process leading to potentiation[26].This phenomenon helps in removing the soluble impurities and addition of useful material to the drug. The two media used in the *Haratala Shodhana* by *Bhavana* method are *kanji* and *choornodaka* that are alkaline in nature which helps in dissociation of *Haratala.*

The aim of *Haratala marana* is to convert the *Shodita Haratala into* very fine powder form till it attains thermostable property and other *sumrita bhasma* qualities to make *Haratala* safe and *rasibhava* (absorbable) form for therapeutic use. The media used for *Haratala marana* are majorly *kshara, amla dravyas* which helps in breaking down of crystalline structure of *Haratala* and also the herbal media used acts as anti-oxidant, free radical scavenger and has detoxificant properties may help in converting *Haratala*, chemically free from free radicals and hence oxidation molecules finally converting into a form of acceptable and reducible molecule.

CONCLUSION: *Haratala* is considered to be the most useful *rasa dravya* which has to be administered only after proper process of purification and incineration. As the quotation goes even poisonous substances act as ambrosia when used judiciously in the same way *Haratala* which is one of the most toxic substance in *rasashastra* acts as a potent medicine. The process of purification and incineration converts the inorganic arsenic into an organic compound which enables the consumption of *Haratala.* It converts *Haratala* into a safe and therapeutically potent form by enhancing its bioavailability.

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