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Pharmaceutical study of *Kasisa Satva*

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ABSTRACT

Satvapatana and use of *Satvabhasma* is neglected part not practiced like other therapeutic process like *Bhasmas*, *Parpati* and *Sindurakalpna* etc. now days we get all *Dhatu* in its pure form but those metals are not extracted as therapeutically active material. Those metals are extracted by using metallurgical methods like leaching, electro wining etc. These methods are not aimed at therapeutically active agent. Basic principle in *Rasashastra* is to make *Asatmya*, toxic metal into *Sharira Satmya Dravya* for that from *Shodhana* to *Marana* process, we use all organic *Sharira Satmya Dravyas* to convert them nonpoisonous, therapeutically active, easily absorbable medicine. These principals are not involved in contemporary extraction methods. This is major difference in metallurgical extracted metal and metals extracted in *satvapatana* process. *Rasa Granthas* have mentioned that *Satvas* are purer, more potent, so here an attempt is done to study the pharmaceutical process of *Satvapatna*.

Key words: *Satvapatana*, *Kasisa*, *Satva*, *Dravakagana*.

INTRODUCTION

The ancient Indian alchemy is dealing with *Parada* (mercury) i.e. *Rasa*, minerals, metals and aquatic substances all are generally considered in *Rasa Shastra*. In the medieval period, it was widely accepted because of its minimum dose schedule and higher efficacy, which gives rise to *Deha Vada* through the *Dhatu Vada*. These substances are categorized under *Maharasas*, *Uparasas*, *Sadharana Rasas*, *Ratnas*, *Uparatnas*, *Lauhas (Dhatu)*, *Vishas*, *Upavishas* etc. as per their quantitative, qualitative differences with reference to its action on *Dhatu* and

body. The metals form a big group of inorganic elements that make up the body building tissues. The metals available in nature are in various forms and in combination with undesired other elements, or in improper and non-consumable form, or toxic in nature. These forms are unwelcoming by the internal milieu of the human body. All modifications and development in *Rasa Shastra* are for the purpose of making these foreign and wild elements, body friendly (*Sharira Satmya*) and tamed to provide maximum benefit, it includes pharmaceutical procedures like *Shodhana* (purification), *Marana* (incineration), *Satvapatana* (extraction of metal from mineral), *Amritikarana* (nectorisation), it also includes different mercurial preparations (*Rasa Kalpanas*) like *Kharliya Rasayanas*, *Parpati*, *Pottali*, *Kupipakva Rasayana*, *Bhasma*, *Kajali* etc. converts deadly toxic substances into safe and potent therapeutic agent. The main aim of *Marana* & *Satvapatana* is to enhance the properties of the drug. To induce new properties, to bring out the *Atyantika Sukshmatva* i.e. finest form of *Bhasma* and pure form *Satva* to bring *Guna Vishishtatva*.

Satva denoted "purity, literally, existence, reality" and brightness. *Satvapatana* is an important process

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which applies after *Shodhana*. So various trace elements are added and molecular changes have been seen in the particular drug during the procedure of *Shodhana* to *Satvapatana*. To obtain the metallic part from the Minerals/Ores/Compounds with the help of *Dravakagana* by strong heating in *Koshthi* (Specially prepared fired place), here *Satvapatana* is Smelting process.^[1] According to *Rasaratna Samucchya* any mineral compound, animal origin or any ore is mixed and rubbed with the drugs prescribed in *Ksharavarga*, *Amlavarga* and *Dravakavarga*. Then it is kept in a closed crucible and heated intensively, in a *Kosthi* (furnace). By this, the metallic essence portion of that compound can be obtained, which is nothing but *Satva*.^[2] After *Satvapatana* potency of these drugs remains for longer period. *Satva* requires minimal dose & easy for administration. More potent as compared to other preparations. *Abhraka Satva* form is eight time more potent than *Abhrakapatra* form.^[3] So here the present paper aims at to study pharmaceutical process of and *Kasisasatva*.

MATERIALS AND METHODS

Raw *Kasisa* and *Bhringaraja* is procured from local market of Pune. Other allied material like *Dravakagana* (*Guda*, *Gunja*, *Tankana*, *Guggulu*, *Madhu*, *Ghritha*) were procured from local market.

Kasisa Shodhana (Swedana in Dola Yantra)^[4]

Material: *Ashuddha Kasisa* (1 kg), *Bhringaraja Swarasa* (4 litres)

Method: *Swedana Vidhi* (Heating under liquid bath)

Apparatus: Steel vessel, iron rode, thread, cloth, gas stove and thermometer, lighter, measuring cylinder.

Procedure

1 kg *Ashuddha Kasisa* was taken and coarse was made. The *Ashuddha Kasisa* was kept in a piece of cotton cloth and *Pottali* was prepared. An iron rod was introduced at the tip of the *Pottali* and it was hanged in steel vessel. Sufficient amount of *Bhringaraja Swarasa* was added to dip the *Pottali* completely. The vessel was kept on the gas stove. The small amount of *Bhringaraja Swarasa* was added time

to time in sufficient quantity to dip the *Pottali* completely. *Mandagni* was given for three hours then *Pottali* was taken out. *Kasisa* was dissolved in *Bhringaraja Swarasa* and kept for 24 hours. After that steel vessel containing *Bhringaraja Swarasa* and *Kasisa* was subjected to heat for evaporating water content and after obtaining the solid mass of *Kasisa* was subjected to sunlight to dry. After drying it was pounded in Kharal for making powder.

Observations

Ashuddha Kasisa was green in colour in crystal form and lustrous in nature before *Shodhana*. After 15 minutes of *Swedana*, *Kasisa* started to be dissolved in *Bhringaraja Swarasa*, *Bhringaraja Swarasa* observed some what viscous and gradually size of *Pottali* was reduced. After three hours most of the *Kasisa* was dissolved in *Bhringaraja Swarasa*. The level of *Bhringaraja Swarasa* was decreased. Impurities which were insoluble in *Bhringaraja Swarasa* remained inside the *Pottali*. *Bhringaraja* and *Kasisa* was subjected to heat for evaporation of water content during effervescing the *Bhringaraja Swarasa* was sprinkled out form the vessel. After drying *Kasisa* become whitish green in color.

Precautions

The *Pottali* should be hanged properly inside the steel vessel, but care should be taken of not to touch the vessel from any side. After *Shodhana*, *Kasisa* should be dried, well powdered and weighed.

Results

- Total time taken for *Swedana* : 3 hours
- Weight of *Kasisa* before purification : 1 kg
- Evaporate time taken : 7 hours
- Weight of *Shuddha Kasisa* : 1004.4 gm
- *Kasisa* inside the *Pottali* : 12 gm
- Total *Kasisa* weight : 1016.4 gm
- Weight gain : 16.4 gm
- Total time taken : 2 days
- Cause of weight gain : Due to solid content of *Bhringaraja Swarasa*

Practical (*Kasisa Satvapatan*)

- **Reference:** (Rasaratnasammuchya)^[5]
- **Material:** *Shodita Kasisa. Kanji Davakhana*
- **Apparatus:** crucible graphite, pyrometer, furnace, crucible holder

Procedure

1. First *Shodhita Kasisa* was taken in *Khalwa Yantra. Bhavna* of *Kanji* was given to *Kasisa*. First *Kanji* was poured in *Shodhita Kasisa* till it got wet. 3 *Bhavana*s were given to *Kasisa*. Approximately for 6 hours 1 *Bhavana* is given.
2. Then *Bhavita Kasisa* was taken, 50 grams of *Dravaka Gana* was added in *Kasisa* and homogeneous mixture was prepared. Then mixture was kept in crucible and intense heat was given to crucible upto 5 hours then mixture was removed. Mixture was taken out side of the crucible, then *Churnikarana* of material was done and with the help of magnet iron partials were separated from slag and separated iron partials were again kept in crucible for melting purpose for 3 hours then white-greyish fumes were seen then mixture was removed from crucible. In poured material hard metal balls were observed, those balls were collected by using magnet apart from those balls other material in *Churna* form stuck to magnet that was also collected.

Observations

Time (min)	Temperature (°C)	Observation
15	100	
30	200	
45	350	
60	500	
75	670	
90	900	Mixture was melted (black color)

105	1080	Same as above
120	1220	Same as above
135	1360	Same as above
150	1400	Same as above, and quantity of mixture is reduced
165	1490	Mixture was melted
180	1560	Mixture was melted
195	1500	Mixture was melted
210	1500	Mixture started to become dry
225	1600	Same as above
240	1600	Same as above
255	1600	It is almost dried
270	1600	Mixture was dried
285	1600	Mixture was dried
300	1600	Same as above

- After heating for 5 hours iron was not separated from mixture.
- Mixture was kept for longer period so there were chances that crucible might break so crucible was taken out from the furnace.
- There was reduction of weight.
- Appearance of product metallic black with some shine (ferrous sulphide).

Conclusion

Metallic part wasn't extracted from *Kasisa*, it was again decided to heat mixture for certain time. There was not sufficient temperature for extraction of iron. Intense constant heat was not maintained for longer time.

Procedure 2

Mixtures was taken out from the crucible and its *Churnikarna* was done and 50 grams of *Dravakagana* was mixed and again the material was subjected to

high intense temperature. For that more coal was added in furnace to create high heat. High temperature was maintained for longer period than previous process of *Kasisa Satva*. Once the white fumes were seen crucible were taken out from the furnace.

Minutes of heating	Temperature	Observation
20	1100	
40	1210	
60	1360	Mixture didn't melt
80	1420	Same as above
100	1540	Same as above
120	1600	Became red hot
140	1600	Remained red hot
160	1600	White fumes seen (Shudhavarta)
180	1600	White fumes seen (Shudhavarta)

After this stage crucible was taken out from the furnace and balls of metals were separated with magnet and other particles in crushed (*Churnita* form) were also collected.

Precaution: same as mentioned for *Suvarna Makshika Satvapapana*.

Results

- Total time taken for *Satvapapana* of *Kasisa* : 8 hours
- Weight of mixture before *Satvapapana* : 1100 gm
- Weight of *Satva* : 120 gm (*Satva* in balls form 40 gm, *Satva* in *Churna* form 80gm)
- Weight of slag : 530
- Weight loss : 450
- Cause of weight loss : Due to heavy smelting procedure

- Appearance of *Satva* : blackish, and steel like colour, Heavy like metal, glow like metal.

ANALYTICAL STUDY

Organoleptic characters

Organoleptic characters	Raw <i>Kasisa</i>	Shodita <i>Kasisa</i>	<i>Satva Kasisa</i>
<i>Varna</i>	Greenish	Whitish green	Blackish and mealic like steel
<i>Sparsha</i>	<i>Khara</i>	<i>Mrudu</i>	Metal like
<i>Gandha</i>	<i>Lohan gandhakwat</i>	<i>Loha gandhakwat</i>	-
Test	-	-	Metallic

By inductive couple plasma

Samples	Iron percentage
<i>Raw Kasisa</i>	20.88%
<i>Shodita Kasisa</i>	22.25%
<i>Satva Kasisa</i> (pure metal iron ball) A	81.21%

When *Kasisa Satva* was done *Satva* was collected with help of magnet it was observed that we got it two forms:

- Kasisa Satva* one was in metal balls form named as sample A
- Kasisa Satva* second was in blackish *churna* form named as sample B

Both were stuck to magnet out of which metal balls were subjected to inductive couple plasma test and blackish *Churna* formed *satva* is subjected to *semedax*:

SEM EDAX

<i>Kasisa Satva</i> second was in blackish <i>Churna</i> form named as sample B	S-54.60, fe-45.40
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Figure 1: *Kasisa Satva* (Balls)



Figure 2: *Kasisa Satva Patana*



Figure 3: *Kasisa Satva* (Churna and ball form)



Figure 4: *Kasisa Slag*



Figure 5: *Shodhita Kasisa*



Figure 6: While pouring *Kasisa Satva* in container



Figure 7: *Kasisamardana* in Kanji



DISCUSSION

Satvapatna and its *Bhasma* is not well practiced like *Parpati*, *Bhasma*, *Sindura Kalpna*, it is said that it is very challenging and difficult process, it is neglected *Kalpna* so here humble attempt is done to understand its pros and cons of the *Satvapatana*.

This study was taken to understand the concept of *Satvapatna* (purity of metal) by using modern parameters. Previously it was decided to carry study in electrical furnace but electrical furnace above 1300°C was very difficult to make available, still we tried in furnace upto 1300°C, it was found that water

came out of furnace when *Kasisa* was kept in furnace that might have created some serious problems like electrical short circuit etc., second thing was temprature wasn't enough for *Satvapatna* so we decided to carry study in coal furnace.

Collecting *Kasisa* in its natural mineral form was very difficult so we decided to take artificial *Kasisa*. Graphite crucible was used for *Satvapatna* of *B Dravya*, one crucible can be used for one time only other wise there is chances of breakage.

CONCLUSION

Maximum temperature required to kasisasatva is 1600°C. Continues high temperature is maintained for *satvapatana* of *Kasisa*. Total time consumed to obtain *Kasisa Satva* is 8 hours. Percentage of iron in raw *Kasisa* was 20.88 percent and purity increased up to 81.21 percent this shows its purity in quantity wise, Melting iron is very difficult process as it has higher melting point it requires lot of fuel. *Kasisa* is ferrous sulphate on being heated first losses its water then it melts then get converted to anhydrous ferrous sulphate further heated it get converted into ferric oxide which is red in colour which exactly look like *Kasisa Bhasma* to avoid this formation we need to use carbon, the reason behind it carbon is more reactive than iron so it displace iron from iron compounds. *Bhavana* of *Dravakagana* is given to get organic carbon to *Kasisa*, so it would not react with oxygen and would restrict the formation of *Bhasma*. so addition of *Dravakagana* is most important thing in pharmaceutical study of *Kasisa Satvapatna*. Sample A that is *Satva* in balls form is closer to concept of *Satva*,

sample B in *Churna* form contains more percentage of sulphur than sample A. In *Rasa* texts they used reductants and fluxes and smelting process at high temperature. They also identified specific signs i.e. *Shuddhavarta* and *Beejavarta* which appear at particular temperature and indicate the melting of material and separation of metallic contents from the liquefied material. The metallic contents of the material are known as *Satva*. The slag portion is called *Kitta*.

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