UNDERPINNING THE CLASSICAL PREPARATION RASAKARPURA
(MERCU.RIAL SALT) - A REVIEW

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ABSTRACT

Rasakarpura is one of the Nirgandha murchana bheda of Parada. Kupipakwa preparation using Parada, conc H2SO4 and Saindhav Lavana is one among the method for the preparation of Rasakarpura. As per Rasatarangani, Nirgandha Murchita Parada should not be administered after Rogashamana. The work was taken up to review Parad Murchana and Rasakarpura by carrying out the shodhana of the drug Parada and preparing Rasakarpura as per the reference of Rasa Tarangini.

KEYWORDS Rasakarpura, Murchana, Parada, Literary study.

INTRODUCTION

Rasashastra is a most important and popular branch of Ayurved developed in medieval period. It deals with knowledge related with alchemy and Ayurvedic pharmaceutics specially connected to the drugs of mineral origin to prevent mankind from ageing process.

Concept of Rasashastra in Ancient classical text book shows the inclination in the usage of Parada was towards Dhatuvada and Dehavada, which gradually turned its importance in Chikitsa. For the purpose of chikitsa the concept of Murchana of Parada came into existence.
Murchana is the most important process of Mercury in which Parada is made to convert in such compound form which must poses disease destroying property.

Under the concept of Murchana 4 forms medicines are explained they are Parpati Rasayana, Potali Rasayana, Kharaliya Rasayana and Kupipakwa Rasayana. Among the 4 divisions, Kupipakwa Rasayana is one which is prepared by using Gandhaka and without Gandhaka known as Sagandha and Nirgandha respectively. Rasakarpura is one such Nirgandha variety of Kupipakwa Rasayana, Hence improper use of Rasakarpura will lead to Parada vikaras. As per Modern science it is considered as Mercuric or Mercurous Chloride. Mercurous Chloride because of its low solubility it is poorly absorbed and is regarded as safe medicine, but in large doses it acts as irritant poison and even in medicinal dosage it produces toxic effect in susceptible individuals in some cases death may also occurs.

**METHODOLOGY**

Rasaushadis are more popular by their quick action, better therapeutic efficacy, and its Rasayana property by small doses. There are three most common Nirgandha murchana Yogas of parada are found in Rasashastra viz. Mugdha Rasa, Rasakarpura and Rasapushpa. Out of these three Mugdha Rasa is niragni variety of murchana, whereas other two are Sagni murchana of Parada. Most of Acharyas opined that Rasakarpura and Rasapushpa are same, but Acharya Sadanand Sharma has mentioned that both of them are different.

I. **Antiquities**

A. **Bhava prakasha**

The drug Rasakarpura was first mentioned in the treatise Bhavaprakasha under phiranga roga chikitsa.[1]

B. **Rasagrantha’s**

*Rasa Prakasha Sudhakara (13th cent. A.D.)*

Acharya Yashodharaji in his text described Rasakarpura as “Ghanasara Rasa” and included under Shweta Rasa bhasma, He uses word ‘Kachaghati’[2]

C. **Rasendra Chintamani (14th cent. A.D.)**

In the context of Murchanadyaya, acharya ase described two methods of preparation of Rasakarpura with difference in ingredients. Kupipakwa method is adopted for the preparations.[3]
D. Rasa Darpana (16\textsuperscript{th} Cent. A.D.)

The Parada vignaniyam adhyayam of the treatise gives details of preparation of 4 types of Rasakarpura, he mentions all are nirganda variety of Parada murchana yoga.\textsuperscript{[4]}

E. Rasa Chintamani (16\textsuperscript{th} cent. A.D.)

In this text the author describes various methods of Rasa Bhasma preparations among which one preparation can be considered as Rasakarpura where ingredients method of preparation similar to Rasakarpura in other treatise.\textsuperscript{[5]}

F. Rasa Manjari (18\textsuperscript{th} Cent. A.D.)

Detailed explanation of different Rasakarpura preparation are available in the text. Usage of Kupipakwa method is common for most of the preparation, one he mentions use of Anda musha for the preparation of Rasakarpura is available.\textsuperscript{[6]}

G. Ayurveda Prakasha (19\textsuperscript{th} cent.A.D.)

Here Acharya Madhava has explained two different Rasakarpura preparations, in the context of Rasabhasmikaran. He mentioned bhasmikarana as one of the Parada bandha.\textsuperscript{[7]}

H. Rasamrutam (20\textsuperscript{th} Cent. A.D.)

Explanation and method of preparation of Rasakarpura is found in this grantha.\textsuperscript{[8]}

I. Rasa Tarangini (20\textsuperscript{th} Cent. A.D.)

Complete description regarding Rasakarpura is available in the Murchana vignaniyam of this text. Use of Gandakamla for the preparation was first found in this book for the preparation of Rasakarpura.\textsuperscript{[9]}

J. Bharatiya Rasashastra (20\textsuperscript{th} Cent.A.D.)

This text with holds one complete chapter named as Kupipakwa Rasanirmaana Vigynana, where details of kupipakwa rasa preparation along with its paribhasha, different stages of preparation, general instruments used and preservative techniques are explained. In the same chapter, description about preparation of Rasakarpura is available.\textsuperscript{[10-11]}

K. Rasa Yoga Sagar (20\textsuperscript{th} Cent. A.D.)

This text is comprehensive compilation of Rasayogas, details of 27 different types of Rasakarpura preparation is available in the name of Karpurarasa in first volume. Where use of different yantras are also explained for the preparation of Karpura Rasa.\textsuperscript{[12]}
II. Concept of Parada murchana

Murchana is a procedure where we are converting Parada into medicinal form. Here in Murchita Parada means a state where Parada attains vyadhinashaka quality. It can also be interpreted as Parada can be given with an intention to destroy disease, then its Murchita avastha is considered.\textsuperscript{[13]}

Types of Murchana:

- **Depending upon the formulations**\textsuperscript{[14]}:

\begin{itemize}
  \item Kharaliya Rasayana
  \item Parpati Rasayana
  \item Pottali Rasayana
  \item Kupi pakwa Rasayana
\end{itemize}

- **Kupi Pakwa Rasayana**
  - Kajjali
  - Vasantkusumakar rasa
  - Arogyavardhini rasa
  - Mrityunjaya rasa

Rasakarpura is the kupipakwa murchana yoga. Kupi Pakwa Rasayana is among four different kalpanas of Parada Murchana yoga. Rasakarpura is special preparation prepared through sublimation, which result in the formation of white crystal powder it is also known as Shweta bhasma.

- **Depending upon the use of Gandhaka**\textsuperscript{[15]}:

\begin{itemize}
  \item Sagandha Murchana (With Gandhaka)
    \begin{itemize}
      \item Kajjali
      \item Sameer Pannaga Rasa
      \item Rasa Sindura
      \item Rasa Parpati
    \end{itemize}
  \item Nirgandha Murchana (Without Gandhaka)
    \begin{itemize}
      \item Mugdha Rasa
      \item Rasa Pushpa
      \item Rasakarpura
    \end{itemize}
\end{itemize}

Rasakarpura is nirgandha variety of parada murchana yoga. This preparation should be administer till Rogashamana, if we administer after Gadashamana leading to many complications.\textsuperscript{[16]}
Depending upon the Agni used\textsuperscript{[15]}

\begin{tabular}{|l|l|}
\hline
Sagni Murchana & Anaagni Murchana \\
(With fire) & (Without fire) \\
Rasa Sindura & Kajjali \\
Sameer Pannaga Rasa & Mugdha Rasa \\
\textbf{Rasakarpura} & \\
Rasa Parpati & \\
\hline
\end{tabular}

III. Concept of Kupipakva Rasayana

The word Kupipakva Rasayana is made by four words – Kupi, Pakva, Rasa and Ayana. The Rasayana which is prepared with the help of agni, out of kacha kupi using Paradadi dravyas is called Kupipakwa rasayana.\textsuperscript{[17]}

A. Brief History

Kupipakva process is first described in Rasa Prakash Sudhakara as “Udaya Bhaskara Rasa” in the 12\textsuperscript{th} century. In 15\textsuperscript{th} Century, Acharya Anantadeva Suri mentions “Rasaparthiva Rasa” in his Rasachintamani book. Acharya Yashodharaji is also described Rasakarpura as “Ghanasara Rasa” in his book. He uses ‘Kachaghati’. Rasakaumudi, Rasakalpa Yoga (16th century) and Ayurveda Prakash (17th century) mention “Sinduranam Rasa” for Rasasindura.\textsuperscript{[18]}

In 20\textsuperscript{th} century, Rasa Tarangini describes so many drugs prepared by Kupipakva process.\textsuperscript{[19]}

Some authors mention that final product which is sublimed in Kupi is by product of Gandhaka Jarana. Nowadays for Kupipakva preparation, the same method is in practice by using some modification, the beer bottle is used in place of Kachakupi due to their special shape, size and heat resistance quality. Modified heating device in the form of electrical muffle furnace is developed for control and perfect heating in place of Valuka Yantra.

B. Importance

Kupipakva Rasayana is having importance among other Kalpanas because of having following properties:\textsuperscript{[20]}

- Potency of these drugs remains for longer period.
- It requires minimal dose.
• Easy for administration.
• More potent as compared to other herbal preparations.
• Due to its augmenting effect.
• Due to quicker action.
• Chemical bond becomes stronger in the following order: Kajjali, Parpati, Pottali and Kupipakva Rasayana.

C. Types of Kupi Pakwa Rasayana

Depending on Ingredients

Sagandha: Prepared with use of Gandhaka. e.g. Hinguliya Manikyarasa, Rasasindura

Nirgandha: Prepared without use of Gandhaka. e.g. Rasakarpura, Rasapushpa.\textsuperscript{[20]}

Depending on Nirmana Vidhi

Antardhuma: Cork is applied in the beginning and the fumes are not allowed to escape e.g. Rasasindura.

Bahirdhuma: Cork is applied after complete escape of fumes e.g. Hinguliya Manikyarasa, Shilasindura.\textsuperscript{[20]}

Depending on Prapti sthana

Kanthastha: The finished product is deposited at the neck e.g. Hinguliya Manikyarasa, Rasasindura.

Talastha: The product is obtained from the bottom of the e.g. Samirapannaga Rasa, Rasasindura.

Ubbhayastha: Final product obtained from both the sites e.g. Samirapannagarasa, Hinguliya Manikyarasa.\textsuperscript{[20]}

D. Complete Drug and Rasakarpura Preparation Review

Table No: 1; Samanya Shodhana of Parada as mentioned in different Rasa Shastra treatises

<table>
<thead>
<tr>
<th>Sr.no.</th>
<th>Process</th>
<th>Drugs</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Prakshalana&amp; Mardana.</td>
<td>Kumari Swarasaha, Chitrakakwatha, Raktarasasha</td>
<td>Rasa tarangini</td>
</tr>
</tbody>
</table>
Properties of Suddha Parada
Rasa - Sadarasa
Guna - Sara, Guru
Virya - --
Vipaka - --
Dosghnata - Tridosaghana
Prabhava - Vrishya, Balya, Rasayana
Karma - Sarvarogajita, Sodhana, Ropana, Krimighna 21

Parada Sevana Pathyapathya
Pathya
Mudga, Dugdha, Sali, Punarnava, Meghnada, Saindhava, Sunthi, Musta, Roots of lotus etc. have been recommended as Pathya during Rasa-Sevana.

Apathya
During administration of Parada the following Ahara dravyas have been mentioned as Apathya namely: Kulattha, Atasi, Tila tailam, Masa, Masura, Takra, Kanji, Katu-Amla-Tiksna- Lavana - Picchila- Pittakaraka Dravyas, Dadhi, Ksira, Draksa, Naranga,Bilva etc.21,22

Mercury
Mercury was one known to the ancient Chinese and Hindus and named after the planet by the same name; Aristotle refers to it as quick silver. Mercury or quick silver is a liquid metal with bright silvery luster and a boiling point of 356.9 its melting point is 380.it is 13.5 times denser than water and 1.2 times heavier than lead, its fumes are odorless and invisible.

It is used in manufacture of some drugs, paints, and explosives. It is easily converted into dull grey powder when shaken up with oil or triturated with sugar, chalk; the process is known as
deadling and used in preparing mercurial ointments. It is slightly dissolved by cold sulphuric acid but completely dissolved by strong sulphuric acid and nitric acid.\textsuperscript{[23-24]}

**Occurrence**
Mercury occurs both in native form and in ores. The different ores of mercury are mentioned below:

<table>
<thead>
<tr>
<th>Ore</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cinnabar</td>
<td>HgS</td>
</tr>
<tr>
<td>Meta cinnabar</td>
<td>HgS</td>
</tr>
<tr>
<td>Calomel</td>
<td>HgCl_2</td>
</tr>
<tr>
<td>Montryodite</td>
<td>HgO</td>
</tr>
</tbody>
</table>

**Industrial extraction of mercury and its purification**
Mercury extracted from the cinnabar in following steps

1) Crushing and concentration: The ore is crushed and finely powdered in ball mills and then concentrated by froth flotation process.
2) Combined roasting and distillation; the concentrated ore is placed on the perforated arches and heated by the flames rising from the furnace below. Mercuric oxide first formed by oxidation of cinnabar at about 297°C to give mercury.

\[ 2\text{Hgs+O}_2 \rightarrow 2\text{Hgo+SO}_2 \rightarrow 2\text{HgO} \]

Mercury vaporized and vapors of mercury are condensed in a serial of chambers on either side of the furnace.\textsuperscript{[23-24]}

**Purification**
The metal so obtained contains Zinc, copper, Bismuth, and lead impurities. This is removed by filtering through a thick canvas, so filtered mercury is dropped in a long tube filled with dilute nitric acid. The base metal impurities dissolves in dilute nitric acid as there nitrates. Any Mercurous nitrate if formed reacts with the impurities forming their nitrates and displacing mercury. Further purification of mercury is carried out by vacuum distillation.

**Pharmacological details**

**Absorption**
Absorption of mercurial compounds depends on the chemical form of metals. The inorganic form i.e mercuric and mercurial chlorides are freely absorbed from the entire surface like alimentary tract, skin, sebaceous glands and vapors through respiratory tract.
Storage
It is deposited in different organs like kidney, intestinal walls, liver in the form of alburnates, small amount are stored in blood bone marrow, brain buckle cavity. Organic mercurial compound may pass placental barrier.\textsuperscript{[24]}

Excretion
It is excreted through stools, urine, saliva, sweat, milk, gastric juice, bile juice.

Gandhakamla
Synonyms: Gandhaka Drava, Gandha Drava, Balidrava

English Name: Sulphuric acid (H2SO4)

Preparation Method
100 Pala of Gandhaka is kept in a iron vessel and subjected to heat. In another iron vessel 6.5 Pala of sora, Both these bottles are sealed properly by lid which contains small hole in it To those holes on lid should be connected with nalikas, other end of nalikas should be connected to Two end of ‘T’ tube and the third is fitted in a pot made of lead for collecting vapours from the two iron vessels in the lead pot. A distillation apparatus is taken and filled 210 Pala of water. Its vapor is also collected in the lead pot by another tube. In the lead pot all the three vapors are liquefied and reacted together to form yellow colour liquid of 300 Pala. It is called as Gandhakamla.\textsuperscript{[25]}

Properties:
Virya: Ushna
Guna: Sankochaka
Dose: Internal 5 – 20 drops of 1:12 distilled water diluted Gandhaka Drava with Ajvayan, Sunthi, Dalachini or Lavanga Arka.
Uses: Gulma, Pliharoga, Krimiroga, Udararoga, Visuchika, Raktatisara, Raktasrava, Atisara and Ashuddha Naga (lead) Sevita Vikara.\textsuperscript{[25]}

Sulphuric acid
Earlier mention of sulphuric acid is probably seemed in the writing of geber in latin. In the middle ages it was called as oil of vitriol, as it was prepared by distilling ferrous sulphate crystal (Green Vitriol). Free acid is found in certain mineral springs and is formed there by the action of water on sulphides.\textsuperscript{[26-27]}
Properties of Sulphuric Acid

Physical properties:
Appearance – colorless syrupy liquid.
Density- 1.84
Boiling point- $338^0\text{C}$
Pure 100% acid is obtained by dissolving sulphur trioxide in the dilute acid. Concentrated acid forms strongly in moist air.

Chemical properties:
Sulphuric acid is a strong dibasic acid. It passes all the common properties of an acid. It dissolves in water with evolution of heat and shows dehydrating properties. Metals like zinc react with dilute acid to liberate hydrogen some metals like mercury reacts with concentrated acid to produce sulphur dioxide. It acts as active oxidizing agent.\[26-27]\n
Saindhava Lavana
Knowledge about lavana was known by ancient period itself. In caraka samhita there are about 15 lavanas, in sushruta 10 lavanas, astanga sanhrahra 8 lavanas references we will get. Also there are many other references of lavana and classification we will get in Rasagratnas. Saindhava Lavana is the best Lavana. It is one Lavana which is having Sheeta Virya. If there is the name of Lavana is not mentioned then Saindhava Lavana is taken.\[28]\n
Synonyms: Sindhuja, Shitashiva, Sindhuttha, Sindhu Lavana, Sindhu Bhashaja, Shiva, Nadeya, Shalatmaka, Vashir, Lavanottama etc.

Origin: It is obtained from the mine of Punjab near the Sindhu river.

English Name: Rock salt

Types: In Ananda kanda there is explanation about two types of Saindava lavana.
1) Sita
2) Rakta.
Among these two sita is considered as best.\[28-29]\n
Properties:
Rasa: Lavana, Madhura
Vipaka: Madhura
Virya: Sheeta
Guna: Snigdha, Laghu
Doshaghnata: Tridoshashamaka\textsuperscript{[30]}

Uses:
Hridya, Vrishya, Netrya, Ruchivardhaka, Pachaka, Deepana, Vranadosahara, Vibandhahara.\textsuperscript{[31]}

Rasakarpura
The word Rasakarpura comprises ‘Rasa’ and ‘Karpura.\textsuperscript{[32]}

Rasa means Parada
- As it has the capacity to dissolve or absorb all the metal in it.
- It can overcome old age, disease and death.

Karpura means –
- A substance which is white in colour.
- The substance resembles appearance of Karpura.
- Rasakarpura is a white colored Mercurial product.

General method of Rasakarpura preparation by Kupipakwa vidhi
The whole procedure can be chiefly divided into 3 steps
- Purvakarma
- Pradhana karma
- Paschath karma

Purvakarma
✓ Collection of upakaranas
   All the required instruments are collected in hand like Khalwa yantra, Sharava, Kach kupi., Vastra, pyrometer, Bhand, valuka, Tamrapatra, Multani mitti.

✓ Description of kupi
   One Kacha kupi should be selected, where it should resembles Masi bajana, i.e neck part should not too long or too short, it should be strong enough. In Rrasendra chintamani we will get different materials for the preparation of Kupi like Mud, Loha, Swarna, Rajata, Kacha.\textsuperscript{[33-34]}
Preparation of kacha kupi

The above mentioned Kacha kupi should be selected that should be wrapped with 7 layers of cloth, smeared with mud; each layer should be performed after complete drying of previous layer. In some reference they mentioned that wrapping should be performed till the thickness attains 1 angula pramana. The Rasayana sara states that 1st and 4th layer should be performed by applying madhu.\[34\]

In Ayurveda prakasha mixture of 1 part of saindava lavana ½ part of loha churna, ½ parts of katika churna and water-qs are made into thin paste and should applied over kupi.\[35\]

In Shaivala bakshya tantra 1 part of Tusha, 1 part of Vastrakhanda, 3 part of Mruthika has to be subjected to mardana, to that equal quantity of Narakesha should be taken and mardana to be continued till it attain sticky mass, then soaked in water for 7 days, in middle mardana has to be carried out, that should be applied to kupi.

Preparation of the mixture

Specified ingredients are taken in khalwa yantra mixed homogeneously as per the reference for that particular yoga.

In one of the unique preparation of Rasakarpura, the Parada and concentrated Sulphuric acid should be heated till it becomes moisture less and then equal amount of Saindhava Lavana should be added and triturated till it attain homogeneous mixture.\[36\]

Kupi purana

Once the desired mixture is prepared it should filled into the kupi. 1/3rd of the bottle should be filled with the drug. Now cork the bottle temporarily to shield against any contamination.\[37\]

Kupi sthapana

Take a unique clean Bhandha, that should be prepared out of Loha, Mrut, Kacha. It should accommodate 5 Adaka of valuka in it, or one Vitasti pramana in depth and it should be wide open, in some reference author told there should be hole at the centre of the bottom part over that Abhraka patra should be placed. Place the kupi over Abhraka patra fill with lavana for about 3 to 4 anguli heights, and then fill the Kupi by valuka surrounding uniformly the sides until the Valuka reaches till neck region, remove the cork applied to it.\[38\]
Pradhana karma
✓ Heating pattern
Heat should be started at a very low amount and increased gradually throughout the process (kramagni). The desired agni kala is varies according to preparations.

✓ Mukha mudrana
The mouth of kacha kupi is closed after water vapours disappear from kupi and perfect sandhi bandhana should be done. Sand at the neck of kupi is cleared. Then it is allowed to undergo Pakaprakriya as mentioned in classics. Duration of heat varies according to ingredients used for preparation.

Paschata karma
✓ Swanga sheetali karana
This means self cooling. There after it is left to cool on its own.

✓ Kupi uddharana
After swanga sheeta avastha sand is removed around the kupi and taken out from valuka yantra. Remove mrutakapat layer and clean the kupi carefully.

✓ Kupi bhedhana
The kupi should be tied in the middle with a kerosene dipped thread and this thread is burnt. After burning, it should be wrapped immediately in wet cloth. An audible and distinct sound appears and the kupi is found broken exactly at the thread lining.

✓ Siddhi pramana
Kantastha Rasakarpura is collected separately and weighed.

On literary survey, there are many formulas are found described for Rasakarpura preparation in Kupipakwa method. These formulations revel that it may be prepared from Parada with Gandhakamla, Kasisa, Sphatika, Tuttha etc.
Table No:2 Table showing different ingredients with duration for Kupipakwa method of preparation.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Ingredients</th>
<th>Bhavana dravyas</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Rasakamadhenu, Rasayoga Sagar-5</td>
<td>Parada Sphatika Gairika Navasadar Tankana, Ahiphena, Chandana</td>
<td>4 days</td>
<td></td>
</tr>
<tr>
<td>2 Brihatyoga Tarangini, Rasayoga Sagar-14</td>
<td>Parada Saindhava Sphatika Navasadara Tankana, Chitraka</td>
<td>4 days</td>
<td></td>
</tr>
<tr>
<td>3 Rasayoga Sagar-15</td>
<td>Parada Gandhaka Kumari</td>
<td>8 Yama</td>
<td></td>
</tr>
<tr>
<td>4 Rasakamadhenu, Rasayoga Sagar-17</td>
<td>Parada Saindhava Sphatika Gairika Ishtika Valmika, Gruhdhuma, Kharpara Snuhi, Danti</td>
<td>15 Yama</td>
<td></td>
</tr>
<tr>
<td>5 Rasayoga Sagar-18</td>
<td>Parada Saindhava Gandhakaml</td>
<td>2 Yama</td>
<td></td>
</tr>
<tr>
<td>6 Rasayoga Sagar-19</td>
<td>Parada Saindhava Gandhakaml</td>
<td>28 Yama</td>
<td></td>
</tr>
<tr>
<td>7 Rasendra Chintamani</td>
<td>Parada Saindhava Maraka Gana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Rasa Tarangini</td>
<td>Parada Saindhava Gandhakaml</td>
<td>12 Yama</td>
<td></td>
</tr>
<tr>
<td>9 Rasatantra Sara</td>
<td>Parada Saindhava Sphatika Kasisa Navasadar Kumari swarasa</td>
<td>2 Yama</td>
<td></td>
</tr>
<tr>
<td>10 Rasatantra Sara</td>
<td>Parada Saindhava</td>
<td>12 Yama</td>
<td></td>
</tr>
<tr>
<td>11 Kupipakwa Rasa Nirman Vijnana</td>
<td>Parada Saindhava Sphatika Kasisa Navasadar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Bharatiya Rasashastra</td>
<td>Parada Saindhava</td>
<td>12 Yama</td>
<td></td>
</tr>
</tbody>
</table>
E. DAMARU YANTRA VIDHI

Poorva Karma

✓ Collection of upakaranas
All the required instruments are collected in hand, appropriate equipments such as two uniform sized Earthen pots, cloths, Khalwa yantra, Multanimitti, chullika, Valukayantra, Knife, should be selected. [39]

✓ Shodhana
Shodhana should be performed for ingredients in the preparation as specified in classics.

✓ Preparation of mixture
Shodhita ingredients should be selected and mixture is to be prepared properly out of the ingredients specified for particular preparation by doing mardana in khalwa yantra till it attains homogeneous mixture.

✓ Preparation of damaruyantra
To prepare Damaru Yantra two pots of uniform shape and size should be taken, in one pot Place the mixture and sandibandana should be performed by inverting another pot over the mixture containing pot. [40]

Pradhana Karma

✓ Damaru Yantra Sthapana
Damaru Yantra should be placed exactly in the centre of the Valukayantra, and sand should cover it evenly by all sides, upper pot should be exposed out, so that it should get homogenous temperature and some authors mentions that it can be placed directly on the chullika. Cold pad application should be done over the upper pot. [39-40]

✓ Heating pattern and temperature measurement.
Temperature should be maintained as per the indication for the preparation. Duration of heat varies from 3 yama to 12 yama.
✔ Maintenance of Condensation system
Upper part of the upper pot made into cool for condensation by applying cold pad over the upper pot.

Paschat Karma
✔ Damaru Yantra Uddharana
After Swangasitibhavana, Damaru Yantra should be removed from Valukayantra gently and carefully otherwise deposited compound may fall into the lower pot.

✔ Sandhimoksana
It should be done by knife, carefully by keeping the pots in horizontal position on clean papers. Drug should be scrubbed gently and collected.

Table No: 3; Table showing different ingredients with duration for Damaru yantra method of preparation of Rasakarpura.

<table>
<thead>
<tr>
<th>No</th>
<th>Reference</th>
<th>Ingredients</th>
<th>Bhavana dravyas</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rasakamadhenu, Rasayoga Sagar–1</td>
<td>Parada Saindhava Kasisa Khatika</td>
<td></td>
<td>1 day</td>
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<tr>
<td>2</td>
<td>Rasakamadhenu, Rasayoga Sagar–3</td>
<td>Parada Saindhava Kasisa Gairika Khatika Majika, Valmika, Khatika</td>
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<td>16 Yama</td>
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<td>3</td>
<td>Rasakamadhenu, Rasayoga Sagar–4</td>
<td>Parada Saindhava Sphatika Mani</td>
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<td>4 Yama</td>
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<tr>
<td>4</td>
<td>Rasakamadhenu</td>
<td>Parada Saindhava Gairika Ishtika Valmika</td>
<td></td>
<td>16 Yama</td>
</tr>
<tr>
<td>5</td>
<td>Ayurved Prakash, Rasayoga Sagar–8</td>
<td>Parada Saindhava Sphatika Gairika Khatika Kshara Lavana</td>
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<td>18 Yama</td>
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<tr>
<td>6</td>
<td>Rasendra Mangal, Rasayoga Sagar–12</td>
<td>Parada Saindhava</td>
<td></td>
<td>12 Yama</td>
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<tr>
<td>No</td>
<td>Dosage Plan</td>
<td>Ingredients</td>
<td></td>
<td></td>
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<td>----</td>
<td>-------------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rasakamadhenu, Rasayoga Sagar–16</td>
<td>Parada Saindhava Ishtika Kasisa Valmika, Gandhaka</td>
<td>16 Yama</td>
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<tr>
<td>8</td>
<td>Rasayoga Sagar–21</td>
<td>Parada Saindhava Ishtika Kasisa Valmika Dhatura, Lakucha</td>
<td>12 Yama</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Rasayoga Sagar–22</td>
<td>Parada Saindhava Valmika Dhatura, Lakucha</td>
<td>Kumri. 2 days</td>
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<tr>
<td>10</td>
<td>Rasayoga Sagar–23</td>
<td>Parada Saindhava Valmika Dhatura, Lakucha Sphatika Kasisa Ishtika Yavakshara</td>
<td>Jambira 16 Yama</td>
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<td>11</td>
<td>Rasayoga Sagar–24</td>
<td>Parada Saindhava</td>
<td>Kumari, Nirgundi 12 Yama</td>
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<tr>
<td>12</td>
<td>Rasayoga Sagar–25</td>
<td>Parada Saindhava Sphatika Navasadar</td>
<td>Kumari, Tulsi 12 Yama</td>
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<td>13</td>
<td>Rasakamadhenu, Rasayoga Sagar–26</td>
<td>Parada Saindhava Sphatika Kasisa</td>
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<td>14</td>
<td>Rasachintamani, Rasayoga Sagar–27</td>
<td>Parada Saindhava Sphatika Kasisa</td>
<td>Lakucha 3 days</td>
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<td>15</td>
<td>Rasachintamani, Rasayoga Sagar–28</td>
<td>Panchamritika Parada</td>
<td>Ankola, Kumari 16 Yama</td>
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<td>16</td>
<td>Rasendra Chintamani</td>
<td>Parada</td>
<td>Kumari 3 days</td>
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Table No: 4; Table showing methods of Rasakarpura preparation by different yantra and ingredients.

<table>
<thead>
<tr>
<th>No</th>
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<th>Yantra</th>
<th>Bhavana dravyas</th>
<th>Ingredients</th>
<th>Duration</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Rasakamadhenu, Rasayoga sagar–2</td>
<td>Vidhyadhar</td>
<td>Parada Saindhava Gairika Sphatika</td>
<td>16 yama</td>
<td></td>
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<tr>
<td>2</td>
<td>Ayurved prakash, Rasayoga sagar–7</td>
<td>Sthali</td>
<td>Parada Saindhava Sphatika Gairika Khatika Valmika, khati</td>
<td>4 days</td>
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</tr>
<tr>
<td>3</td>
<td>Rasendra mangal, Rasayoga sagar–9</td>
<td>Andha musha</td>
<td>Bhringaraja</td>
<td>Parada Tankana, madhu, laksha, oona</td>
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</tr>
<tr>
<td>4</td>
<td>Rasendra mangal, Rasayoga sagar–11</td>
<td>Musha, Snuhi dugdha</td>
<td>Parada Saindhava Gairika</td>
<td>2 days</td>
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<tr>
<td>5</td>
<td>Rasakaumudi, Rasayoga sagar–13</td>
<td>Patana Jambira rasa</td>
<td>Parada Saindhava Sphatika Khatika Patu</td>
<td>4 yama</td>
<td></td>
</tr>
</tbody>
</table>

F. Properties of Rasakarpura

Rasa: Kashaya
Virya: Ushha
Doshagnata: Tridoshashamaka
Varna: Shweta
Shape: Needle shape crystal
Guna: Vishaghna, Grahi, Ruchivardhaka, Kriminashaka, Balya.

G. Indication of Rasakarpura

Krimivisha, Twakroga, Raktadosha,Vranasrava, Aruchi, Atisara, Pravahika, Sphota, Mandala, Phiranga, Upadansha, Pama.\textsuperscript{[41]}
H. Dose of Rasakarpura
Rasakarpura is to be prescribed in the dose of 1/64 – 1/32 Ratti (2 – 4 mg).\textsuperscript{[41]}

I. Sevan Kala of Rasakarpura
Pratah Kala (Morning) and advised till the Vyadi nirharana.\textsuperscript{[41]}

J. Pathya
During the use of Parada preparation the following substance have been considered as most beneficial as Pathya – Vrintaka, Tandula, Patola, Punarnava, Puranashali, Godugdha, Dadhi, Goghrita, Godhuma, Munga Dala, Hansodaka, Jeeraka etc.\textsuperscript{[41]}

K. Apathya
While Rasakarpura is prescribed certain items have been described as contraindicated. Under the contraindicated item, the “Kakaradi Gana” is very famous which includes – Kushmanda, Kamatha (Kachhapa), Kalinga Phala, Kola, Kulattha, Karkoti, Kataka, Kusumbha Pushpa.\textsuperscript{[41]}

L. Toxicity of Rasakarpura
Rasakarpura is listed in the list of poisonous substance under the Ayurvedic and Unani system of medicine in Schedule E1 of Drug and Cosmetic Rule.\textsuperscript{[42]}

IV. Contemporary view of Mercuric chloride
Mercuric chloride exists in the form of heavy colourless masses of prismatic crystal which is crystalline powder. It has styptic nauseous, metallic taste; it is soluble in eight parts of cold water and 3 parts of boiling water. It is readily soluble in alcohol, ether, glycerin, and very soluble in solutions of alkaline chlorides, on account of antiseptic property it is largely used in medicine as well as taxidermy. It is violent poison obtained from bazaars the official dose of mercurial chloride is 2-4 mg.\textsuperscript{[43]}

Uses
Mercuric chloride solutions are quite irritating when applied to the skin, and should never be used as an antiseptic for wounds or on abraded skin because it sufficiently reactive with certain substances to provide appreciable amount of mercuric ion. It is used as disinfectant solutions for utensils and surgical instrument in the ration 1: 1,000.1:2,000 solutions used as surgical scrub (hand wash).
Production and basic properties

Mercuric chloride is not a salt but a linear triatomic molecule, hence its tendency to sublime. In the crystal, each mercury atom is bonded to two close chloride ligands with Hg---Cl distance of 2.38 Å; four more chlorides are more distant at 3.38 Å. HgNO₃ + 2 HCl → HgCl₂ + H₂O + NO₂

Mercuric chloride is obtained by the action of chlorine on mercury or mercury chloride, by the addition of hydrochloric acid to a hot, concentrated solution of mercury compounds such as the nitrate:¹⁴⁴

Historic use in medicine

Syphilis was frequently treated with mercuric chloride before the advent of antibiotics. It was inhaled, ingested, injected, and applied topically. Poisoning was so common that its symptoms were confused with those of syphilis.¹⁴⁴

Mercurous chloride (sub chloride of mercury)

Mercurous chloride is sold in bazaars as Rasakarpura in fibrous heavy, dirty, white masses often mixed with mercuric chloride, it is heavy amorphous white tasteless powder, insoluble in water alcohol (90%) ether or cold dilute acids. The dose is 30 to 180mg, when heated it sublimes without fusing, it is converted into mercuric chloride by chlorine water, alkaline chlorides and common salts, hence it should be never be prescribed with any of these substances. Mercurous chloride because of its low solubility it is poorly absorbed and is regarded as safe medicine, but in large doses it acts as irritant poison and even in medicinal dosage it produces toxic effect in susceptible individuals in some cases death may also occurs.

Calomel enjoyed a widespread popularity at one time because it was thought to stimulate the flow of bile. This belief was based upon the fact that stools were coloured green coloration, however, has been shown to be due to the antiseptic effect of mercury, which prevents the normal conversion of the bile pigment biliverdin to bilirubin by intestinal bacteria.¹⁴⁵

Preparation

1. It is prepared by heating mercury with mercuric chloride and sublimating the product.

   The sublimates are washed with water until it becomes free from mercuric chloride.

   \[ \text{Hg} + \text{Hg}_2\text{Cl}_2 \rightarrow \text{Hg}_2\text{Cl}_2 \text{ or } 2 \text{HgCl}. \]
2. It is obtained by heating a mixture of mercurous sulphate and sodium chloride and condensing the vapours of mercurous chloride thus formed. Mercurous sulphate required for this is obtained by heating mercury with sulphuric acid until dry mercuric sulphate is formed. Sufficient mercury is to be added to mercuric sulphate, which is immediately mixed with the required amount of sodium chloride and the mixture is sublimed and the vapours are so condensed that a fine amorphous powder i.e. mercurous chloride is formed. It is repeatedly washed with water to remove the mercuric chloride, then washed many times with dilute nitric acid gets removed and then it is heated again and the sublimate is again collected.\[^{[45]}\]

**Uses**

Calomel is used in dusting powders or syphilis, eczema, psoriasis, purities etc. Ointments having calomel have been some time used in the treatment of eczema and as a prophylactic syptulls. When calomel has to be administered internally, it may be given at night and must be followed by saline purgative in the morning. If it gets retained in the intestine, it may cause systemic mercury poisoning.\[^{[45]}\]

**DISCUSSION**

Rasashastra is the science dealing with Rasa (mercury) and its processing. This is a system that stemmed of alchemy in which there is extensive use of mercury and minerals for the purpose to achieve Dehavada and Lauhavada. Later it has developed as a separate branch in the field of Ayurveda to get more therapeutic benefits. Murchana of Parada is the process in which mercury is converted into such compound form which must poses disease destroying property.

As Rasakarpura is nirganda sagni murchana yoga of parada which is administered up to the relief of the symptoms. This indicates Rasakarpura is not a Rasayana, it has got only disease destroying capacity. The word Rasakarpura first mentioned by Acharya Anantdev Suri in his book Rasachintamani but use of Rasakarpura was present in the time of Acharya Yashoddhara Bhatta in the name of “Ghanasara Rasa”, same Rasakarpura was also called as Karpura rasa, Parada bhasma. All this indicates these are synonyms of Rasakarpura these might be given on the basis of structure, appearance, and on their action.

The Parada Bhasmas are of 4 types i.e. Shweta, Rakta, Peeta, Krishna. Rasakarpura is said as one of the example for Shweta Parada bhasma, but it has not having the characteristic
features such as Nirdhuma, Tejohina Sambhavita Adhivyadhihara (Shambhukrupa means it could not prepared by all people easily) hence Rasakarpura is can’t be considered as Parada bhasma.

There are 38 methods found in various texts of Rasashastra for the preparation of Rasakarpura by using different mineral, metal and herbal drugs, though the ingredients are different along with Parada the final outcome is almost similar in nature. Different Yantras are mentioned for the preparation of Rasakarpura like valuka yantra, damaruyantra, and some mushas. Among most widely practiced are valuka yantra i.e kupipakwa preparation that is Bahirdhumavidhi and Damaruyantra which is Antardhuma vidhi.so the preparation of Rasakarpura can be performed through both Bahirdhumavidhi and Antardhuma vidhi the final product obtained are same.

Duration of agni to be given for the preparation Rasakarpura depends on the ingredients used, method of preparation adopted.

The dose of Rasakarpura as per Rasatarangini is 1-2 gm, here there are many openions and variations are found in dose that could be on the basis of Roga and Rogi bala. Rasakarpura mainly indicated in upadamsha, phiranga, atisara, pravahika, kustha externally in the form of oil prepared by using many other drugs. As per modern science Rasakarpura is a combination of mercuric chloride and mercurous chloride. The methodology of preparation and end product yields as mercuric chloride along with mercurous chloride. As per there science while administering to the patient it should be free from mercuric chloride for that repeated washing with water and heat to make that into sublimate.

**Pharmaceutical study**

The pharmaceutical study was carried out in the following unit processes.

**Poorva karma**

**Kupi Nirmana**

Amber colored withholding capacity of 700 ml broad based and long neck, narrow mouthed kupi was selected, selection of kupi depends on the quantity of the drug used for the preparation, in this study 400 gm of mixture was taken because to facilitate proper sublimation. 7 layers of mud smeared cloth wrapping was performed, after each layer of wrapping kupi was dried completely, this wrapping was performed carefully by avoiding
folds, because uneven wrapping leads to air entry leading to breakage of kupi. Total thickness of warring was somewhat equal to 3/4” as to make it thermostable and to avoid breakage of kupi.

**Parada Shodhana**

The drug Parada was selected by considering Grahya- Agrahya lakshana, Shodana of Parada was performed to avoid the complications such as murcha, hikka, jwara, shwasa, kasa, brama, in this procedure two methods were adopted
1. Mardana
2. Prakshalana

Mardana was carried out two times by using sudha churna first, second time performed by using nisthusha Lashuna kalka and saindava lavana, after each mardana prakshalana was carried out by using hot water. Gradually mixing of Parada with Sudha churna resulted in color change from white to grey observed during mardana that might be due to chemical reaction between sudha churna and parada. While doing mardana with lashuna kalka the color turned into black due to sulphur content present in lashuna may react with Parada and mixing was too fast because affinity towards parada and sulphur present in lashuna.

In both the procedure color change could be interpreted as transformation of some impurities from parada to media used for shodana. For the Prakshalana ushna jala is specified otherwise it leads to shandatwa of Parada. During Prakshalana Parada easily got separated from both sudha churna and lashunakalka and settled at the bottom because mercury is heavy in nature and it can break the water surface tension. The Prakhalita jala was collected and kept for sedimentation in other container to collect some of the Parada particle which was seen on the surface of water same is said as jalagati, malagati of parada. After shodana parada was appear to be smooth and shining.

**Preparation of the mixture**

Preparation of the mixture was carried out in two steps:
1. Parada was heated in Con H₂SO₄:
   Parada and Con H₂ SO₄ mixture was carried out in sharava using gas stove as heat source, glass rod for continuous stirring. During the procedure dense fumes were released that could be SO₂ liberation, total 3 hour 15 min was required to get into complete powder form, that was duration of heat require to react parda with sulphuric acid and to form new compound
that is mercuric sulphate which was pure white in color. This one kind of parada banda where parada is converted into solid form performed by using H₂SO₄ and heat.

2. Addition of saindava lavana to mixture of Parada and Con H₂SO₄. The mercuric sulphate prepared by above procedure was mixed with saindava lavana weighing the weight of Parada; mardana was performed for 1 hour to get the homogeneous mixture. After mardana change in color was observed from pure white to dull white.

**Kupi poorana**

After complete homogeneous mixture the 400 gm mixture was filled into the kupi by using funnel. After filling the mouth of the kupi was temporarily sealed to avoid entry of sand particles during sthapana.

**Kupi Sthapana**

The drug filled kupi was placed in valuka yantra by filling 4 angula of valuka at the base, and surrounded by valuka till mouth part of the kupi to facilitate uniform heat all around the kupi. The temporary seal was removed after kupi stapana.

**Pradhana Karma**

**Rasakarpura nirmana**

After kupi stapana initially mrudu agni was started later madyamagni was maintained till the corking (28°C -370°C), this was where actual formation of compound HgCl₂ takes place, duration taken was 7 hours. Assessment of siddilakshana for Rasakarpura is absence of white paper wetting, presence of white dots over the tamra patra. Wetting indicates presence of moisture, and white dots on a Tamra patra indicates initiation of sublimation of formed compound. it is the time where mukha mudrana is needed. Soon after the mudrana valuka was cleared around the neck part to allow space for sublimation.

At the time of the mukha mudrana the temperature of valuka was 370 degree, there was about 80- 100 degree difference was observed inside the kupi to valuka. After the mukha mudhrana the intensity of agni was increased for 5 hours the temperature maintained during this period was 428°C-610°C. After complete 12 hours of heating kupi was allowed to swangasheetata, here to make compound stable.
Passchath karma

Kupi uddharana and Kupi Bhedhana
After kupi udharana wrapping around the kupi was scratched and removed carefully. By this the compound inside the bottle was clearly visible. This also facilitates the demarcation point between the Sublimation portions of the Rasa Karpura, also particles in the bottom of the bottle.

Once the demarcation between the compound & the empty space is noted, the procedure of kupi bhedhana is done. Kerosene dipped cloth was tied in between demarcation point and lightened for 3 minute, then rolled in between wet cloth resulting in the breakage of kupi. sudden change in temperature result in breakage of the bottle.

Siddhi pramana
Needle like crystalline white structure was observed at the neck part of the kupi. Dull white smooth powder was observed at the base of the bottle. Totally there was 42.5% of the Rasakarpura attained by this procedure at the neck part of the kupi.

CONCLUSION
The word Rasakarpura was first mentioned by Rasa Chintamani and the use of Rasakarpura was first time mentioned in Rasa Prakasha Sudhakara with the name of Ghana Sara Rasa. Rasakarpura is nirganda saagni variety of murchana of Parada. It is used as a medicine for many of the disease such as phiranga, kusta, upadamsha, vrana.atisara, pravahika in dose of 2-4 mg. There are various procedures and instrumentations explained for the preparation of Rasakarpura, as well as different heating patterns are also mentioned, kupipakwa preparation is one such procedure. Shodana of Parada is essential before subjecting into Murchana Procedure to avoid the complications.

Preparation of Kupi is essential to avoid breakage during the procedure. Stepwise addition of ingredients Parada, Conc H₂SO₄, and then saindava lavana should be followed. Sufficient space should be allowed inside the Kupi after filling to facilitate proper sublimation. The temperature pattern maintained for Rasakarpura preparation was

Mrudu-28-220 °c
Madyama-278-432 °c
Teevra-432-685 °c
Absence of Paper wetting, appearance of dots on TamraPatra is the Pakasiddilakshana of Rasakarpura. After proper assessment of Siddhi lakshana, the Kupi should be sealed properly followed by Teevragni and lastly Kupi udharana should be done after attainment of swanga shitata.

REFERENCES
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