

A pharmaceutical standardization of Rasapushpa prepared by classical and conventional methods

Saurav Brahmabhatt^{*1}, Bharat Kalsariya²

¹Post Graduate Scholar, ²Professor & Principal, Department of Rasashastra and Bhaishajya Kalpana, Government Ayurved College Vadodara, Gujarat Ayurved University, Jamnagar, Gujarat.

Date of Submission: 20-01-2025

Date of Acceptance: 30-01-2025

ABSTRACT

Introduction: Ayurvedic pharmaceutical industries globally adhere to stringent standards, including Good Manufacturing Practices (GMP), to ensure the quality, safety, and efficacy of their products. Rasapushpa (mercurous chloride) is mercurial preparation firstly described by Rasatarangini. Rasapushpa is a potent Ayurvedic medicine, though its use in daily practice by Ayurvedic practitioners is limited. It is classified as a Nirgandha, Saagni and Kanthashta type of Kupipakwa Rasayana, traditionally prepared using Valukayantra. With the increasing need for standardisation in Ayurveda, particularly in the era of globalization, the use of EMF for preparation is essential for ensuring consistency and enabling the commercialization of Kupipakwa Rasayana. **Aim:** This study seeks to establish standardised pharmaceutical parameters for Rasapushpa, prepared using both classical and contemporary methods, to ensure its consistent quality. **Result:** Parada Shodhana and Kasisa Shodhana were done in three batches and then Rasapushpa was prepared in three batches of both batches. The average yield was 28.27% and 30.12% respectively. **Conclusion:** Both methods were found similar in context to their pharmaceutical study.

Keywords: Kasisa, mercurous chloride, Parada, Rasaushadhi, Rasashastra

I. INTRODUCTION:

The term 'Pharmaceutical' refers to the science of drug preparation and formulation. Ayurvedic pharmaceuticals focuses on preparing dosage forms using traditional methods, including raw material identification and testing based on classical parameters. This ensures the efficacy and quality of the final product.

Rasashastra, a key branch of Ayurveda, focuses on the therapeutic use of metals, minerals, and other substances, including metals, gems, and herbal formulations. It consists of four main categories: Kharaliya Rasayana, Parpati Rasayana,

Pottali Rasayana, and Kupipakwa Rasayana, with Kupipakwa Rasayana being particularly notable for its small doses, tastelessness, rapid effectiveness and quick recovery. Rasapushpa is a Nirgandha, Saagni and Kanthashta type of Kupipakwa Rasayana which is chemically Hg_2Cl_2 (Mercurous chloride). It is first described in Rasatarangini, detailing its preparation, properties, and uses. Rasapushpa contains Shuddha Parada, Shuddha Kasisa and Saindhava in equal portions.

In today's globalized world, Ayurvedic pharmaceutical industries adhere to strict Good Manufacturing Practices (GMP) to ensure the quality, safety, and efficacy of their products. This includes standardizing raw materials, manufacturing processes, and finished products. Kupipakwa Rasayana, traditionally prepared in Valukayantra, has been adapted for Electric Muffle Furnaces (EMF) to meet modern standards and facilitate commercialization. Rasapushpa, a potent Ayurvedic medicine, remains underutilized in daily practice. As standardization becomes increasingly important, using EMF for preparation ensures consistency and broadens its application. To develop a standardization process, an attempt was made to prepare three batches each of Rasapushpa using both classical (Valukayantra) and conventional (EMF) methods.

OBJECTIVES:

To develop SMP (Standard Manufacturing Procedure) of Rasapushpa prepared from classical and conventional methods.

MATERIAL AND METHODS:

The whole pharmaceutical study was carried out in following steps;

- I. Procurement and authentication of raw materials
- II. Preparation of Drug

I. Procurement and authentication of raw materials:

Ashuddha Parada and Ashuddha Kasisa were procured from an authorized trader in

Vadodara, Gujarat. They were identified based on their Grahya-Agrahya Lakshana and physical properties as per classical guidelines at the Pharmaceutical Laboratory of the Upgraded Department of Rasashastra and Bhaishajya Kalpana, Vadodara. Saindhava was procured from Government Ayurvedic Pharmacy, Rajpipla, Gujarat.

II. Preparation of drug:

Rasashastra and Bhaishajya Kalpana, Government Ayurved College, Vadodara, Gujarat. To develop SMP of Rasapushpa prepared from classical and conventional method, following steps were carried out;

1. Parada Samanya Shodhana
2. Kasisa Shodhana
3. Preparation of Kajjali for Rasapushpa
4. Preparation of Rasapushpa

1. Parada Samanya Shodhana

The Shodhana of Ashuddha Parada was performed in three batches by following the method described in Rasatarangini. It was divided into two main steps. In the first step (practical 1a), 300 g of Ashuddha Parada and 300 g of Sudha were triturated for 3 days (8 hours per day), washed with hot water, and filtered using double-folded cotton cloth, resulting in an 86.22% yield of Parada. In the second step (practical 1b), the obtained Parada was mixed with Nistusha Rasona and Saindhava until a black paste formed. Then, washed with hot water, and filtered using a double-folded cotton cloth. This black paste indicates the chemical reaction between sulfur compounds in garlic and mercury. The Mardana process in practical 1b took about 14 hours and 15 minutes, producing a 99.48% yield of Shuddha Parada. The overall yield of Shuddha Parada after both steps was 85.77%.

2. Kasisa Shodhana

Kasisa Shodhana was performed as per Rasatarangini 300 g Ashuddha Kasisa in each batch subjected to Swedana in Dolayantra using Bhringaraja Svarasa for 72 minutes (specified in Rasatarangini as 3 Ghati). An average of 1600 ml of Bhringaraja Svarasa was used during Swedana. Effervescence was observed throughout the heating, likely due to the release of gases from the chemical reactions between the acidic components of the Svarasa and the iron ions in Kasisa. The average yield of Shuddha Kasisa after the process was 93.11%.

3. Preparation of Kajjali

A total of 6 batches of Kajjali were prepared to develop SMP, with 3 batches for the classical method (RPVY) and 3 batches for the conventional method (RPEMF). For all batches, the initial weights of ingredients—Shuddha Parada, Shuddha Kasisa, and Saindhava—were 50 g each, totalling 150 g. The average yield of Kajjali was 96.66%, with the loss in final weight attributed to the spillage of fine Kajjali particles from the iron mortar. The average time required to prepare Kajjali was 18 hours and 20 minutes.

4. Preparation of Rasapushpa

Rasapushpa was prepared using two methods: the classical method (by Valukayantra) and the conventional method (by EMF). While classical texts, including Rasatarangini, describe methods like Valukayantra, Damruyantra, and Handi, research comparing Rasapushpa prepared by classical and conventional methods is lacking. So, these 2 methods were selected for the study.

4.1. Preparation of Rasapushpa by classical method (RPVY)

3 batches of Rasapushpa by classical method were prepared for the development of SMP.

Name of Practical: Preparation of Rasapushpa by classical method

Reference: Rasatarangini Taranga 6/29-31, P. 108

Principle: Nirgandha Murchchhana (Gradual heating pattern)

Equipment: Electric weighing balance, iron mortar pestle, Bhrashtri, Valukayantra, 7 layered clay-smeared Kachakupi, funnel, pyrometer, spoon, torch, Multani Mitti, Sheeta Shalaka, charcoal and mineral coal, cork, knife, blower, jute thread, matchbox, cotton cloth, kerosene.

3 batches were prepared for the development of SMP.

Ingredients:

Table No. 1: Ingredients of all batches for preparation of Rasapushpa by classical method

No.	Ingredients	Part used	Quantity (g)			
			B-1	B-2	B-3	Average
1.	Kajjali	1 Part	145	146	145	145.33

Procedure:

The prepared Kajjali was triturated for 30 minutes in an iron mortar, then filled into a 7-layered clay-smeared Kachakupi using a spoon and funnel. The sand was filled into the Valukayantra up to 2 inches from the bottom, and the Kupi was placed at the centre of the Valukayantra, with its neck extending slightly outside. The Valukayantra was then filled with sand, and a pyrometer was inserted to monitor the temperature. The Valukayantra was placed in Bhrashtri, where Kapadmitti sealing was applied, and heating was gradually initiated using a blower. As sublimation began at the neck of Kupi, loose corking was done, and the sand covering the neck was removed to ensure proper sublimation. After 6 hours of intermittent heating, the process was stopped, and the Valukayantra was allowed to self-cool overnight. The Kupi was carefully removed, its outer layer scraped with a knife and cleaned with a wet cloth. A jute thread soaked in kerosene was tied below 1 inch from the product's level, ignited, and allowed to burn completely. After the burning, a wet cloth was applied to the burnt surface, and the Kupi was broken. The final product deposited at the neck of the Kupi was carefully scraped, weighed, and stored in an airtight glass container.

Kupi. So, loose corking was done and sand around the neck of Kupi was removed for proper sublimation of the product.

- The characteristic smell perceived throughout the practical.
- Total 2400 g Charcoal and 2600 g hard coal were used.
- Total 26 hours was required for self-cooling of Bhrashtri.
- After breaking the Kupi, white crystals of Rasapushpa were deposited at the neck of the Kupi.
- Colour of the residue was brick red.

Observations:

- Kajjali was yellowish grey-coloured, fine and lusterless powder.
- On every 30 minutes, temperature was recorded.
- Mild temperature (up to 200 °C) was attained gradually in the first two hours.
- Moderate temperature (200–325°C) was attained gradually in the next two hours.
- High temperature (325- 450°C) was attained in the last two hours.
- The Sheeta Shalaka test was performed every 30 minutes after 2 hours of total heating to check the presence of free Hg particles, but no free Hg particles were found throughout the practical.
- After 4 hours of heating, small crystals of Rasapushpa started to deposit at the neck of

Table No. 2: Details of specific observations with time and temperature for the Preparation of Rasapushpa by classical method

Time (hr: min)	Temp. (°C)	Specific observations
00:00	32	The colour of Kajjali was yellowish grey and was completely dried
00:30	85	Kajjali was dried
01:00	130	The smell of burning Kapadmitti perceived
01:30	186	Watery vapours started coming out
02:00	198	Watery vapours continued and whitish fumes started coming out
02:30	225	Fumes continued and the Kajjali was tuned into sand colour
03:00	270	The characteristic smell perceived
03:30	290	The smell decreased, fumes disappeared, the colour of Kajjali was turned into yellowish white
04:00	322	Small white crystals of Rasapushpa started to deposit at the neck of Kupa, loose corking was done and sand around the neck of Kupa was removed.
04:30	345	Loose cork was removed to check the pressure inside the Kupa, almost 30% neck was blocked with product and loose corking was done again
05:00	390	Heating was continued for proper sublimation of the product
06:00	450	Heating was stopped

Precautions:

- Kajjali was triturated 30 minutes before filling in the Kupa.
- Papers were arranged around the Kupa while filling to avoid loss of Kajjali.
- The Kupa was placed exactly in the centre of Valukayantra so that uniform temperature would be obtained and gradual heating pattern was maintained throughout the practical.
- All the precautions were taken while corking, as the surrounding of the mouth of Kupa was very hot and sand around the neck of Kupa was removed carefully.
- Kupa was removed from Valukayantra and broken carefully.
- While breaking the Kupa and scrapping the product, utmost care was taken to avoid mixing of glass pieces of Kupa with the product.
- Eyes and nose were protected by wearing glass and a mask throughout the practical.

II. RESULTS:

Table No. 3: Results of Rasapushpa prepared by classical method

No.	Parameters	B-1	B-2	B-3	Average
-----	------------	-----	-----	-----	---------

1.	Initial quantity of Kajjali(g)		145	145	145	145.33
2.	Final yield of Rasapushpa	(g)	34	37	52	41
3.		(%)	23.44	25.51	35.86	28.27
4.	Weight of residue	(g)	84	82	78	81.33
5.		(%)	55.17	56.55	53.79	55.17
6.	Total loss (g)		27	26	15	22.66
7.	Reason of loss		Due to the evaporation of watery contents			
8.	Total time taken for Rasapushpa preparation (hrs.:min.)		06:00	06:00	06:00	06:00

4.2.

4.3. Preparation of Rasapushpa by conventional (EMF) method

3 batches of Rasapushpa by conventional method were prepared for the development of SMP.

Reference: Rasatarangini Taranga 6/29-31, P. 108

Principle: Nirgandha Murchchhana (Gradual heating pattern)

Equipment: Electric weighing balance, iron mortar pestle, Electric muffle furnace (EMF), 7 layered clay-smeared Kachakupi, funnel, spoon, Multani Mitti, Sheeta Shalaka, cork, knife, jute thread, matchbox, cotton cloth, torch, kerosene

Ingredients:

Table No. 4: Ingredient of all batches for preparation of Rasapushpa by conventional (EMF) method

No.	Ingredient	Part used	Quantity (g)			
			B-1	B-2	B-3	Average
1.	Kajjali	1 Part	146	144	145	145

Procedure:

Prepared Kajjali was taken in above mentioned quantity, triturated for 30 minutes in an iron mortar and filled in the 7 layered clay-smeared Kachakupi with the help of a spoon and funnel. Then, Kupi was placed in EMF in such a way that the neck of the Kupi remained just outside of the EMF. Then heating was started in a controlled intermittent manner and gradually increased. When the product started to sublime at the neck of the Kupi, loose corking was done to facilitate proper sublimation of the final product. After 6 hours, the heating was stopped. On the next day, after self-cooling, Kupi was carefully taken out from EMF, the outer layer was scrapped with a knife and cleaned with a wet cloth. A jute thread soaked in kerosene, tied below 1 inch from the level of product and ignited. After the complete burning of thread, wet cloth was rolled over the burnt surface of Kupi and finally, Kupi was broken. Final product deposited at the neck was carefully scrapped from the Kupi, weighed and stored in an airtight glass container.

Observations:

- Kajjali was yellowish grey-coloured, fine and lusterless powder.
- On every 30 minutes, temperature was recorded.
- 25 °C temperature was increased every 30 minutes up to 4 hours.
- Mild temperature (up to 150 °C) was attained gradually in the first two hours.
- Moderate temperature (150–250°C) was attained gradually in the next two hours.
- High temperature (250- 350°C) was attained in the last two hours.
- The Sheeta Shalaka test was performed every 30 minutes to check the presence of free Hg particles, but no free Hg particles were found throughout the practical.
- After 4 hours of heating, small crystals of Rasapushpa started to deposit at the neck of Kupi. So, loose corking for proper sublimation of the product.

- The characteristic smell perceived throughout the practical.
- Total 32 hours was required for self-cooling of EMF.
- After breaking the Kupi, white crystals of Rasapushpa were deposited at the neck of the Kupi.
- Colour of the residue was brick red.

Table No. 5: Details of observations and heating pattern for the Preparation of Rasapushpa by conventional (EMF) method

Time (hr: min)	Temp. (°C)		Specific observations
	Set	Observed	
00:00	50	36	The colour of Kajjali was yellowish grey and was completely dried
00:30	100	52	Kajjali was dried
01:00	100	106	The smell of burning Kapadmitti perceived
01:30	125	106	Watery vapours started coming out
02:00	150	126	(Reached to 150 °C in 8 min.) Watery vapours continued and whitish fumes started coming out
02:30	175	150	Fumes continued and the Kajjali was turned into sand colour
03:00	200	178	The characteristic smell perceived
03:30	225	200	The smell decreased, fumes disappeared, the colour of Kajjali was turned into yellowish white
04:00	250	226	(Reached to 250 °C in 7 min.) Small white crystals of Rasapushpa started to deposit at the neck of Kupi, loose corking was done.
04:30	275	250	Loose cork was removed to check the pressure inside the Kupi, almost 40% neck was blocked with product and loose corking was done again
05:00	300	278	Heating was continued for proper sublimation of the product
05:30	325	300	Heating was continued
06:00	350	320	(Reached to 350 °C in 8 min.) Heating was continued

Precautions:

- Kajjali was triturated 30 minutes before filling in the Kupi.
- Papers were arranged around the Kupi while filling to avoid loss of Kajjali.
- Gradual heating pattern was maintained throughout the practical.
- All the precautions were taken while corking, as the surrounding of the mouth of Kupi was very hot.
- Kupi was removed from EMF and broken carefully.
- While breaking the Kupi and scrapping the product, utmost care was taken to avoid mixing of glass pieces of Kupi with the product
- Eyes and nose were protected by wearing glass and a mask throughout the practical.

Results:

TableNo.6: Results of Rasapushpa prepared by conventional (EMF) method

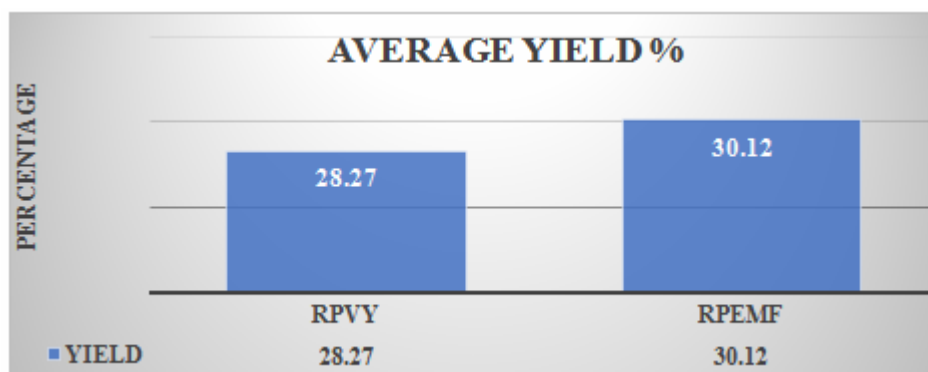
No.	Parameters		B-1	B-2	B-3	Average
1.	Initial quantity of Kajjali(g)		146	144	145	145
2.	Final yield of Rasapushpa	(g)	40	45	46	43.66
3.		(%)	27.40	31.25	31.72	30.12
4.	Weight of residue	(g)	79	78	80	79
5.		(%)	54.1	54.17	55.17	54.48
6.	Total loss (g)		27	21	19	22.33
7.	Reason of loss	Due to the evaporation of watery contents				
8.	Total time taken for Rasapushpa preparation (hrs:min.)		06:00	06:00	06:00	06:00

III.

IV. DISCUSSION

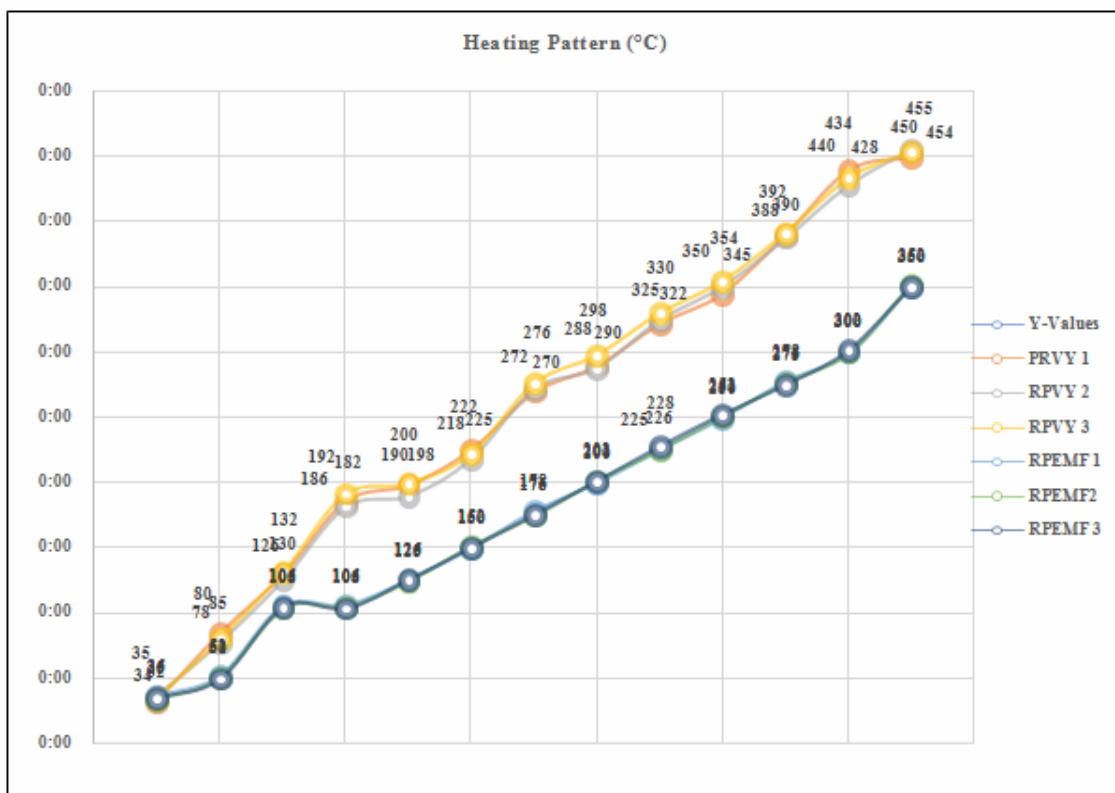
This study aimed to compare Rasapushpa prepared by the classical method and the conventional method with three batches of each prepared to ensure standard manufacturing procedure (SMP). Each unit operation was treated as an independent process for validation. Parada Samanya Shodhana was done in two stages: triturating Ashuddha Parada with Sudha for three days, yielding 86.22% Parada, followed by trituration with Rasona and Saindhava, resulting in 99.48%. The overall yield of Shuddha Parada was 85.77%. Kasisa Shodhana was done by Bhiringaraja Svarasaas the liquid medium in the Swedana process resulting in 93.11% Shuddha Kasisa. Kajjali was successfully prepared in the fourth pilot batch forming properly within 18 hours. Six batches were prepared, yielding an average of 96.66% Kajjali after 18 hours and 20 minutes of trituration.

Rasapushpa was prepared using two methods: the classical Valukayantra method and the conventional Electric Muffle Furnace (EMF) method. In the classical method, after optimizing the heating pattern, three batches were prepared, yielding 23.44%, 25.51%, and 35.86%, with an average yield of 28.27%, surpassing the previous research yield (18-22%). In the EMF method, three batches were prepared with an improved heating protocol, yielding 27.40%, 31.25%, and 31.72%, resulting in an average yield of 30.12%. These results demonstrate the effectiveness of both methods and their potential for reproducibility in future research.



Graph 1: Average yield % of RPVY and RPEMF

The preparation of Rasapushpa using two different methods, Valukayantra and Electric Muffle Furnace (EMF), follows a similar temperature gradient and process but with some variations in the specifics. In both methods, In Valukayantra, the temperature was gradually increased to mild (up to 200°C) over the first two hours, moderate (200–325°C) over the next two, and high (325–450°C) during the final two hours, requiring a total of 26 hours for self-cooling of the Bhrashtri. In contrast, the EMF method increased temperature by 25°C every 30 minutes, reaching mild (up to 150°C), moderate (150–250°C), and high (250–350°C) temperatures over 4 hours. Differential heating patterns from both methods is drawn in graph 2. These results suggest that while both methods are effective in producing Rasapushpa, differences in heating times and temperature gradients could influence the overall cooling time and potentially the yield and quality of the final product.



Graph 8.2: Comparative temperature chart of all batches of RPVY and RPEMF

V.

VI. CONCLUSION:

Rasapushpa by classical (RPVY) and conventional method (RPEMF) were standardised by preparing three batches of each method with 6 hours of heating and a maximum temperature of 450 °C in RPVY and 350 °C in RPEMF. Both methods were found similar in context to their pharmaceutical study.

REFERENCES:

- [1]. Dr.Siddhinandan Mishra, AyurvediyaRasashastra, Chaukhambhaorientalia Varanasi, 11th edition, P. 247
- [2]. Yogesh A. Dahegaonkar et al., Research article on Analytical study of Rasapushp. International Journal of Research in Ayurveda and Medical Sciences, Vol 3, Issue 1,2020
- [3]. Sadanand Sharma, Rasatarangini, Translated by Shree Kasinath Shastri, Taranga.6, Murchhanavijnaniya, ver. 20-52. Motilal Banarsi das, Delhi, 11th Edition, 2021; P.107-109