wjpmr, 2018,4(11), 163-170

SJIF Impact Factor: 4.639

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Research Article

ISSN 2455-3301

WJPMR

PHARMACEUTICO ANALYTICAL STUDY OF KUMARI SWARASA BHAVITA RASA GARBHA POTTALI

Dr.Karthik Noolvi[1], Dr.Surekha Medikeri[2], Dr.M.S.Doddamani[3]

[1] Assistant Professor, Department of Rasashastra and Bhaishajya kalpana, Sri Adi Siva Sadguru Allisaheb Sivaryula Ayurvedic Medical College, Guntakal, AP, India.
[2] Guide, Professor and HOD, PG Dept. of RS&BK, GAMC, Bangalore, Karnataka, India.
[3] Principal of GAMC, Shivamogga, Karnataka, India. Email: noolvikarthik@gmail.com.

***Corresponding Author: Dr.Surekha Medikeri, Dr.M.S.Doddamani**

2Guide, Professor and HOD, PG Dept. of RS&BK, GAMC, Bangalore, Karnataka, India. 3Principal of GAMC, Shivamogga, Karnataka, India.

Article Received on 01/09/2018 **Article Revised on 22/09/2018** **Article Accepted on 12/10/2018**

ABSTRACT

Rasashastra is a pharmaceutical branch of Indian system of medicine i.e. Ayurveda, which mainly deals with various processing of metals, minerals, animal origin product, toxic herbs and their application in therapeutics. Where in Moorchita Parada Yogas gained more importance in curing the diseases. Pottali rasayana is one among the mercurial compound processed with the help of sulphur. Pottali kalpana is based on its compactness. i.e. the medicine of large magnitude is compacted into a small pottali like structure. In the classical text Rasayoga sagara, Rasagarbha pottali is described as a unique rasa preparation. It is a Sagandha, Sagni, Bahirdhooma, Gandhaka jaarita, Kajjali bandha pottali kalpana. Various bhavana dravyas for preparation of pottali like Kumari swarasa, Tulasi swarasa, Ardraka swarasa etc.. are mentioned in this text. In the current study Rasa Garbha Pottali (RGP) is prepared by using bhavana dravya 'Kumari swarasa' by Gandhaka paka method. (RGP-K). And the changes after Gandhaka Paka are known to evaluate current Pharmaceutical and Analytical Updating.

KEYWORDS: Rasagarbha Pottali, Kumari swarasa.

INTRODUCTION

Deha vada and Loha vada are the two faces of the same coin i.e. Rasashastra. As the name indicates Rasashastra mainly constitutes mercury and mercurial preparations. In many classical textbooks while describing Deha vada, ancient authors have mentioned different Moorchita Parada Yogas.

Among the various Rasa Yogas, "Pottali" is considered as effective form of mercurial formulation which gives better results in a very minimum dosage.[1] Rasagarbha Pottali is a classical Pottali rasayana containing Hingulottha Parada, Kajjali, Shodhita Gandhaka and Swarnatanutantu Khanda, which is Unique, Potent, and fast effective, novel molecule with highly promising therapeutic application.[2]

The current trend in applied medical research encourages good manufacturing product and good clinical practice, which is based on proper processing of the drug. The main aim of this study is to find out working standards for the formulations and safe use of therapeutics.[3]

The present study aims at assessing the Pharmaceutico-analytical evaluation of 'Rasagarbha pottali' (RGP) prepared by Kumari swarasa (RGP-K) by Gandhaka Drava paka method.

AIM

To prepare Kumari swarasa bhavita Rasa garbha Pottali (RGP-K) by gandhaka drava paka method and evaluating its pharmaceutico-analytical results.

OBJECTIVES

- To Carry out Visesha Shodhana of Swarna.[4]
- To prepare Samaguna Kajjali.[5]
- To Prepare RGP by Bhavana dravya 'Kumari swarasa.[6]
- To carry out Pharmaceutical and Analytical study of RGP-K

MATERIALS AND METHODS

Materials

Major raw materials

Swarna, Hingula, Gandhaka

Associated Drug

Kanchanara Patra Swarasa, Nimbu swarasa, Saindhava Lavana, Go-dugdha, Kumari pulp, Silk cloth.

Equipments
Khalwa Yantra,Urdhwa patana Yantra, Kurma puta, Valuka yantra, Gas stove, Vessel, Kora Cloth, Knife, Spoon, Utensils, Multani mitti, Loha sharava, Valuka, Loha shalaka, Thread, Cow dung cakes, Match stick, Glass beaker, Scissor etc.

Method
The whole method of preparation includes

Extraction of Parada from Hingula[7]
Parada is extracted from Hingula by the Hingulakrusta Parada method mentioned in Rasa Tarangini.

From 860 g of Hingula 507 g of parada obtained. It is taken into a porcelain mortar and 31.68 g of Haridra churna added and triturated for 3 days and filtered and 480g of Parada was collected with the loss of 27 g.

Gandhaka Shodhana[8]
Gandhaka Shodhana is carried out in Godugdha by subjecting it to Kurma Puta by Bhoodhara Yantra method as mentioned in Ayurveda Prakasha. 710-730g of Gandhaka is taken for Shodhana each time. Totally: 45.770 kg gandhaka Shodhana done.

Shodhita Gandhaka is of pale Yellow Colour with greenish tinge & shiny.

It is in granular form and few were streak like, fully immersed in the milk.

Visesha Shodhana of Swarna[9]
The method mentioned in Yogaratnakara is followed. 2.587g of Swarna Patras are cut into small layer like pieces and heated to red hot in a mild flame and suddenly quenched into Kanchanara patra swarasa and washed in warm water. Same procedure is repeated for 2 more times. For each time Nirvapa fresh sample of Kanchanara patra Swarasa was used.

Preparation of Swarna Pisti[10]
2.587g of Shodhita Swarna was cut into small pieces and added slowly into Khalva yantra containing 41g of Shodhita Parada and triturated. Amalgamation of Swarna and Parada was taken place after 6 hrs. of mardana.

After complete formation of Pisti, Nimbu swarasa and Saindhava Lavana was added and triturated well. After 3 hrs of trituration swarasa colour turned into greyish black. The Pisti was then washed with luke warm water, until the water stopped turning into black colour and all the acid content disappeared.

Then this Swarna Pisti was collected and weighed. The final product of prepared Swarna Pisti weighs 43.587g.

.

Preparation of Kajjali[11]
331 g of Parada and 331g of Gandhaka were taken in a clean Khalva Yantra. Then gently triturated with uniform speed till all the Kajjali Lakshanas were observed, i.e. the whole mixture converts into a fine, smooth, lustreless powder. Average to and fro movements of Peshani was 14-15 times/minute.

After 72 hrs. Kajjali was taken between thumb and index finger made wet then rubbed and was exposed to sunlight, minute particles were observed in furrows of finger confirming Rekhapornata test. Nischandra, Varitara, Uttama test was confirmed. Obtained kajjali is 662 g.

Preparation of Final Kajjali for RGP
In a Khalva Yantra 43.587 g of prepared Swarna Pisti is taken. To this 10.35g of Gandhaka is added and triturated properly till it is properly mixed.

Later the above mixture is mixed with 662 g of prepared kajjali and again trituration continued. After 72 hrs. Kajjali appeared Smooth and Rekhapornata test found positive. For better fineness and smoothness of kajjali, mardana was continued up to 280 hrs.

Distribution of RGP Kajjali For Kumari swarasa bhavana[12]
238.6 g of kajjali triturated by 150 ml Kumari swarasa for 7 days.

Distribution of kajjali for Pilot study and Main study.

Kajjali for	Wt. before bhavana	Wt. after bhavana	Wt. gain	For pilot study	kajjali for main study
RGP-K	238.6 g	250 g	11.4g	80g	120g

50 g of kajjali is taken for Analytical study.

Pilot Study

	Kajjali	7 days Bhavana	Poogakara Pottali
RGP-K	80 g	40ml Kumari swarasa	5 pottalis: 10.5g, 11g, 11.5g, 11.5g, & 12g

Result after Gandhaka paka of RGP-K.

Pottali	Paka kala	Weight	
		Before paka	After paka
1	3hrs	10.5 g	12.5 g
2	6hrs	11 g	14.5 g
3	8 hrs	11.5 g	15.5 g
4	9hrs	11.5 g	14.5 g
5	10hrs	12 g	13.5 g

So by above practical, the Paka kala of RGP-K known by Pilot study is: "11 hours. I.e. 09 hours after the melting of sulphur".

	Dried Poogakara Pottali
RGP-K	3 pottalis of 40g, 40.5g, 39.5g

Main Study

Purva Karma

Equal quantity of Shuddha Gandhaka to that of dried RGP was taken and made into four parts. Four layers of Silk cloth were taken. Each part of Shuddha Gandhaka was spread on every layer of silk cloth. Then the layers were arranged one above the other.

After this the well dried RGP was placed in the centre of the top layer silk cloth.

Then the four layered silk cloth wrapped around the Pottali and tied with cotton thread at the centre and perpendicular to iron rod for the convenience in the Pottali paka.

A Loha patra (iron vessel) of wide mouthed vessel with the measurement of 20cm x 55cm (height x diameter) was taken. 3-4 cm height of Valuka was spread evenly in the loha patra. Then the pot which was 10x12x13 cm (height x top width x middle width) was placed at the centre. Then the rest portion of the Loha patra covered by Valuka so that the pot was immersed up to the neck portion. Total Valuka was taken: 13 kg.

Pradhana Karma

Shodhita Gandhaka was filled in the pot and kept in the Valuka Yantra. Then the arrangement was placed on the gas stove. Thermocouple was properly placed i.e., 5-6 cm away from the pot in Valuka Yantra and 4 cm above the bottom of Valuka Yantra.

Pooja done by chanting of "Aghora Mantra". Fire was set and temperature reading was carried out with the help of pyrometer with thermocouple for every fifteen minutes. Mrudu agni tapa was maintained according to classical reference.

As soon as Gandhaka melts Rasa garbha Pottali was immersed in it. Heating continued throughout the process till the appearance of Pottali paka lakshanas mrudvagni was given i.e., temperature was maintained between 190^{o} C to 215^{o}C.

Observed for accomplishment of Pottali Siddha Lakshana like vyoma varna for molten Gandhaka, Metallic sound was heard when banged against pot. Burning of silk cloth.

After attaining these features the Pottali was then removed and placed in an empty pot and was allowed for self-cooling.

Paschat Karma

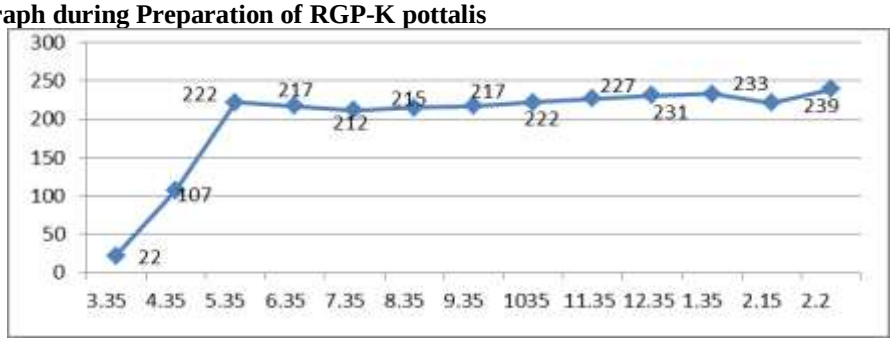
After self-cooling of the Pottali. Burnt silk cloth and Sulphur which was adhered to the Pottali was removed. Then the Pottali surface was cleaned and polished with the help of sharp blade and sand paper. Then the final product was collected in an air tight container.

Temperature pattern and Observation of RGP-K.

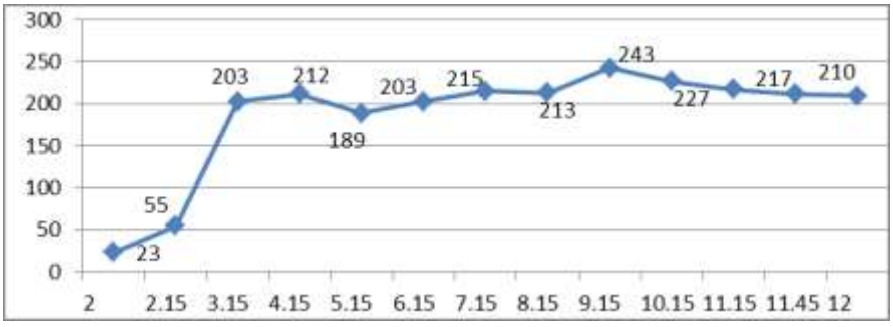
Time	Temp (^{0}c)	Observation
1.45 Am	22^{0}C	Fire ignited
2.00 Am	28^{0}C	
2.15 Am	57^{0}C	
2.30 Am	65^{0}C	
2.45 Am	107^{0}C	Gandhaka started to melt
3.00 Am	170^{0}C	Scum removed
3.15 Am	205^{0}C	
3.30 Am	210^{0}C	Gandhaka melted completely
3.45 Am	222^{0}C	Pottali immersed
4.00 Am	222^{0}C	
4.15 Am	220^{0}C	
4.30 Am	218^{0}C	Yellow colour of sulphur is seen

4.45 Am	217^{0}C	
5.00 Am	216^{0}C	Fumes of sulphur started to appear.
5.15 Am	216^{0}C	
5.30 Am	215^{0}C	Golden yellow colour of sulphur
5.45 Am	212^{0}C	
6.00 Am	212^{0}C	Scum collected at the surface of paka is removed
6.15 Am	213^{0}C	
6.30 Am	214^{0}C	Sulphur- Brownish yellow colour
6.45 Am	215^{0}C	Sulphur became more viscous
7.10 Am	217^{0}C	
9.05 Am	217^{0}C	
9.20 Am	217^{0}C	Brown colour of sulphur is observed
9.35 Am	217^{0}C	Sulphur fumes became denser
9.50 Am	219^{0}C	
10.05 Am	220^{0}C	
10.35 Am	222^{0}C	
10.50 Am	223^{0}C	
11.05 Am		Dark brown colour of gandhaka is seen
11.20 Am	225^{0}C	
11.35 Am	227^{0}C	
11.50 Am	228^{0}C	Bluish black colour of Gandhaka
12.05 pm	230^{0}C	Pottali siddhi laksanas appeared and pottali removed

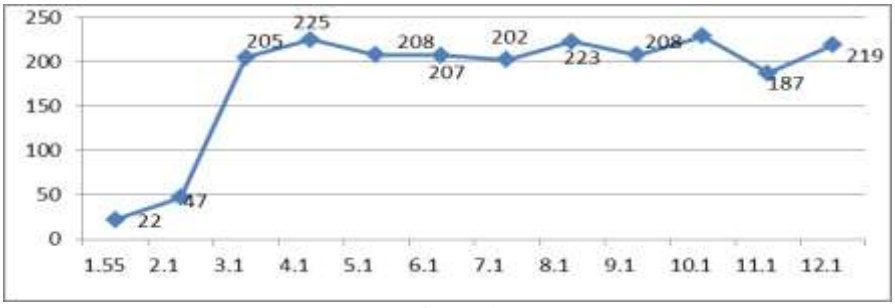
Time & Temp graph during Preparation of RGP-K pottalis



RGP-K 1



RGP-K 2



RGP-K 3

RESULTS

Pharmaceutical Study

Yield of Preparation of Hingulottha Parada

Extraction of Parada from Hingula	Initial wt. of Hingula (860g)	Wt. of parada extracted	Loss	parada Obtained in %	Total Yield in
1st Batch	230g	135 g	95g	58.69	507g 59.05 %
2nd Batch	200g	120 g	80g	60	
3rd Batch	230g	130 g	100g	56.52	
4th Batch	200g	122 g	78g	61	

Yield of Gandhaka after Shodhana

Total Gandhaka taken: 48.210 kg
Total loss: 2.440kg
Total yield: 45.770 kg

Observations made during Swarna Pisti.

Swarna Pisti	Shuddha Swarna Patra	Hingulottha Parada	Nimbu Swarasa	Saindhava Lavana	Swarna Pisti after Prakshalana	Loss during Pisti
1	2.587g	41g	60 ml	1 pinch	43.587g	0

Kajjali distribution for Pilot study and Main study

Kajjali for	Wt. before bhavana	Wt. after bhavana	Wt. gain	For pilot study	For main study	For Analysis
RGP-K	238.6 g	250 g	11.4g	80g	120g	50 g

Pilot Studies

The Paka kala known by Pilot study is:
RGP-K: 11 hours. i.e. 09 hours after the melting of sulphur.

Main Study

Observations of RGP-K: (3- Batches).

RGPK	Duration Hrs	Wt. Before Gandhaka paka	Wt. After Gandhaka paka	Yield g	Total Before Paka	Total After Paka	Total Yield
1	8:45	40 g	47 g	7g Gain	120 g	144.5 g	24.5g Gain (19.5%)
2	9:35	40.5 g	47.5 g	7g Gain			
3	8:20	39.5 g	50g	9.5g Gain			

Analytical Results

Classical Parameters.

Sl. No.	Test	RGP-K
1	Sparsha	Smooth and soft
2	Gandha	Characteristic Smell.
3	Rekhapurnatva	Fine powder of RGP-K entered the furrows of the fingers.
4	Varitaratva	Fine powder of RGP-K was floating on the surface of water in a test tube.
5	Nischandratva	There was no shining particle in the finely powdered RGP-K even when it was rubbed between thumb and index finger and made wet, observed in the bright Sunlight.

Organoleptic characters.

Sample	Colour	Odour	Appearance	Taste
RGP-K	Black	Characteristic	Amorphous	NO

Qualitative and Quantitative Study
Physical Tests

Sample	P^H Value	Ash Value	Acid insoluble ash	Water soluble ash	Loss on drying
RGP-K	4.28	16.10%	1.45%	0.75%	0.00%

Chemical Tests
Percentage of Mercury and Gold

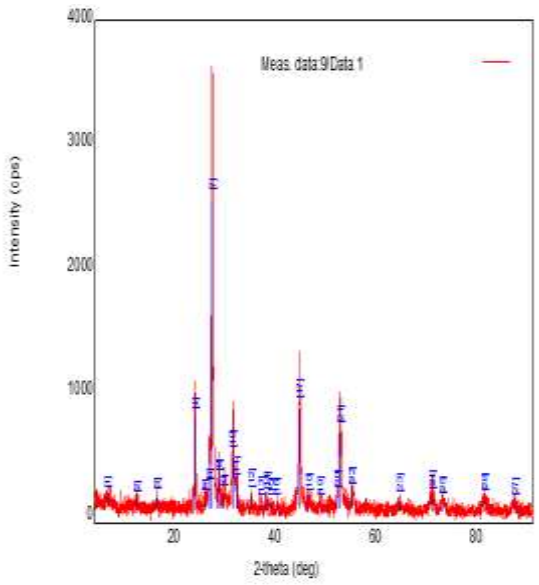
Sample	Total Mercury	Mercurous Mercury	Mercuric Mercury	Free Mercury	Gold
RGP-K	15.15 %	3.51 %	11.64 %	0.00%	0.45 %

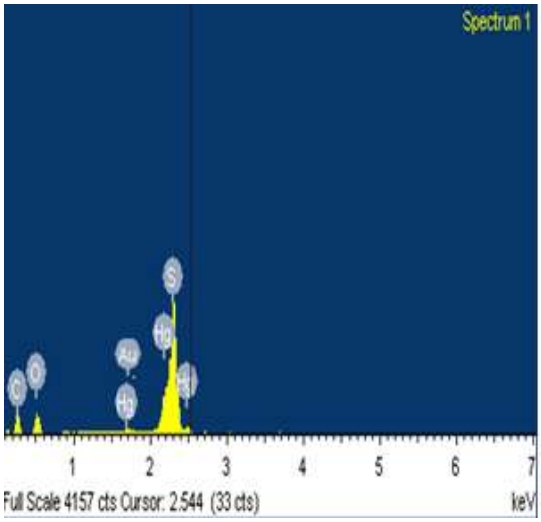
Estimation of Sulphur by Eschka Method

Sample	Total Sulphur	Sulphide	Sulphate	Free Sulphur
RGP-K	7.21 %	7.10 %	0.11%	Nil

Showing FT-IR Peak values

Pottali	Functional Group
RGPK	Amides, Carboxylic Acid, Ketone, Aromatic, Secondary amines, Nitro, Esters, Alcohol, Bromides, Iodides,





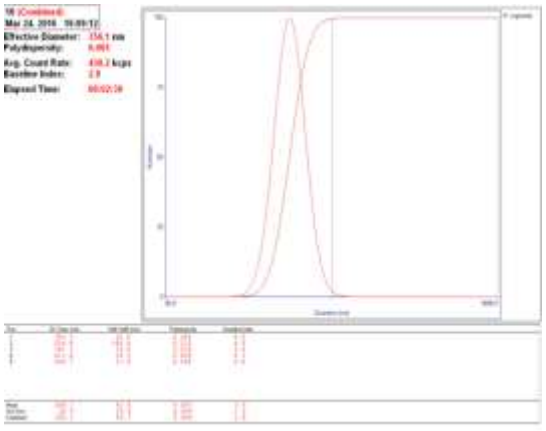
SEM-EDX

X-Ray Diffraction Results

Sample	RGP-K
Compound Name	Meta-cinnabar
	Gold Sulphide
Chemical Formula	Hg
	Au_2S
Crystal Structure	Cubic
	Cubic

	RGP-K	
Elements	Wt. %	At %
C	33.12	64.45
O_2	3.30	4.80
S	36.94	26.83
Hg M	26.06	3.02
Au M	0.58	0.90

Practical Size



Samples	Effective diameter	Half width diameter
RGP-K	Mean diameter-368.1nm Std error-28.5 nm Combined-356.1nm	Mean diameter-61.6nm Std error-25.4 nm Combined-90.7nm

DISCUSSION

R.G.P. is a Sagandha, Sagni, Bahirdhooma, Gandhaka jaarita, Kajjali bandha Pottali Kalpana containing Parada, Shuddha Gandhaka churna, Swarnatanutantu Khanda.

It is explained by Pandith Hariprapannaji in Rasa yoga sagara along with other Pottali Kalpanas. It can be used in Shwasa, Kaasa, Rajayakshma, Jeernajwara & Sannipathaavastha along with Rogochitha Pathya.
Kajjali mardana: After 72 hrs. Kajjali appeared Smooth and Rekhapornata test found positive. For better fineness and smoothness of kajjali, mardana was continued up to 280 hrs.

Bhavana dravya
Kumari swarasa: Constitutes aloe resin A, B, C and Aglyconealoesone.

"These resinous constituents bind the ingredients of RGP-K firmly and gives shape and compactness." Other constituents are: Hydroxyanthraquinone, barbaloin.

γ-hydroxyaloinisomers and emodinchrysophanol, derivatives will aid medicinal attributes to the kajjali.
Paka kala and Compactness of Pottali

Paka kala of RGP-K is found to be 9 hrs. It is well compact with good hardness.

PH of RGP-K is slightly acidic in Nature.

It possess least amount of 'Acid insoluble ash' and on par with standards, which signifies that, a considerable amount of drug is soluble in the acidic media of stomach. It also has least 'water soluble ash value', indicating that water is not soluble media for it. So salivary secretions, gastric enzymes play an important role in its dissolution.

'Loss on drying at 110^0C' is 0.00%, hence it has the least amount of moisture content and very rare chance of bacterial and fungal growth. The drug is having least hygroscopic activity with less chances of contamination of drug. Concurrently it can be stated that the shelf life of the drug in the present study is more.

As the number of trituration period increased and effect of Gandhaka paka it is observed that there is increase in percentage of Mercuric mercury (11.64 %) and decrease in percentage of Mercurous mercury (3.51%). "Means after subjecting to Gandhaka paka Mercurous mercury is less compared to the Mercuric mercury" This clearly indicates that RGP-K is more mercuric mercury form rather than the Mercurous form.
'Percentage of Free Sulphur' is Nil.

This clearly indicates by doing Kajjali and Gandhaka paka there is a reduction in free sulphur and it forms more bondage with mercury.

There is no drastic change in the percentage of Gold in before Gandhaka paka and after Gandhaka paka of RGP-K (0.45%)

XRD: The d-space and 2 theta values of the sample RGP-K when compared with the standards, confirmed the presence of cubic crystal of Meta-cinnabar (Hg) and Gold sulphide (Au_2S).

EDAX: RGP-K Shows Presence of C, O_2, S, Hg and Au elements in slight difference in their percentage.

The change percentage of elements may be due to the heat treatment, which causes breaking of bond and the formation of new bond with the evaporation of certain gases like SO_2 resulting in the increase and decrease of other elements.

FTIR: Analysis of RGP-K Shows Presence of *Amides, Carboxylic Acid, Nitro, Secondary Amides, Easters, Alcohol, Alkenes, Ketone, Bromides* and *Iodides.*

This shows the presence of organic compounds in the drug. Here milk and ghee may be the source for *Amines, Iodides, Esters.* Nimbu swarasa is the source for *Carboxylic acids.* Kumari swarasa may be the source of *amines* and *Carboxylic acids.*

Particles Size: Mean particle size of: RGP-K is 368.1nm

CONCLUSION

1. Pottali Kalpana can be understood as a specific Pharmaceutical technique which is intended for keeping different constituents in their processed,

purified, incinerated, sindhoora form into unique complex formula.
2. As per the classical reference Rasagarbha pottalis is prepared by the bhavana dravya 'Kumari swarasa'
3. By analyzing the pharmaceutico-Analytical points one can conclude that RGP-K can be prepared in 9hrs of Paka kala. Paka kala should be optimum. Giving more heat may break the pottali into cracks and it hardness will reduce.
4. By the Loss on drying at 110^0 C it can be stated that a considerable amount of drug is soluble in the acidic media of stomach.
5. A considerable amount of drug is soluble in the acidic media of stomach since it possess least amount of 'Acid insoluble ash'
6. Shape of RGP-K is retained in Poogakara even after Gandhaka paka.
7. The drug is composed of cubic crystal of Meta-cinnabar (Hg) and Gold sulphide (Au_2S) and Presence of C, O_2, S, Hg and Au elements.
8. It also contains *Amines, Iodides, Chloride, Esters* and Carboxylic acids. It is having least hygroscopic activity with less chances of contamination of drug.
9. 368.1nm is the particle size of Kumari bhavita Rasa garbha Pottali.
10. Kumari swarasa attribute Rasayana property to the pottali. Further Scope for Toxic and clinical study is encouraged for its therapeutic application.

ACKNOWLEDGEMENT

Author is thankful to IISc, Bangalore, for carrying out XRD, SEM - EDX scan and Particle size analysis. Quality Control Laboratories, ALN Rao Ayurvedic Medical College and PG Centre, Koppa for conducting the Chemical analysis. Chemistry Department MIT, Manipal for FTIR Analysis. Teaching staff, Ayurvedic Medical College, Guntakal, AP. Teaching staff, Physicians and non-teaching staff of T.G.A.M.C Hospital, Bellary for their generous and kind help for making this work success.

REFERENCES

1. Vagbhata Acharya, Rasaratna samuchaya, 1st Edn, Varanasi, Choukambha Orientalia, 2011; 633.
2. Pandith Hariprapannaji, Rasayogasagara, 1st Edn, Varanasi, Krishnadasa Academy Publication, 1998; 2: 582.
3. Dr.K.Raghunathan, Pharmacopoeial Standards for Ayurvedic Formulations, 1st Edn, Delhi, published by CCRIM & H, prologue, 1976.
4. Anonymous: Yogaratnakara, Hindi commentry byVaidya Lakshmipathi Shastri, edited by Bhishgratna Brahmashankara Shastri, 6th edition, Varanasi, Chaukhambha Sanskrit Sansthan, Poorvardhagata Vishaya Suchi verse-1, 1997; 128.
5. Vaidya Yadavaji Trikamji Acharya, Rasamritam, edited by Dr. Damodar Joshi and Dr. G. Prabhakara Rao with English translation, 2nd edition, Varanasi, Chaukhambha Samskrita Bhavana, 1st chapter 18 verse, 2003; 14.
6. Pandith Hariprapannaji, Rasayogasagara, 1st Edn, Varanasi, Krishnadasa Academy Publication, 1998; 2: 582.
7. Shri Sadananda Sharma, Rasa Tarangini,Edited by Pandit Kashinath Shastri, 11th Edition New Delhi, Motilal Banarasidas Publication, 5thTaranga, verses, 1979; 38-42-82.
8. Acharya Shri Madhava, Ayurveda Prakasha Edited by Shri Gulraj Sharma Mishra, Varanasi, Published by Chaukhambha Bharati Academy, reprint, 2nd Chapter, Verse, 2007; 19: 260.
9. Anonymous: Yogaratnakara, Hindi commentry byVaidya Lakshmipathi Shastri, edited by Bhishgratna Brahmashankara Shastri, 6th edition, Varanasi, Chaukhambha Sanskrit Sansthan, Poorvardhagata Vishaya Suchi verse-1, 1997; 128.
10. Pandith Hariprapannaji, Rasayogasagara, 1st Edn, Varanasi, Krishnadasa Academy Publication, 1998; 2: 582.
11. Vaidya Yadavaji Trikamji Acharya, Rasamritam, edited by Dr. Damodar Joshi and Dr. G. Prabhakara Rao with English translation, 2nd edition, Varanasi, Chaukhambha Samskrita Bhavana, 2003; 18: 14.
12. Pandith Hariprapannaji, Rasayogasagara, 1st Edn, Varanasi, Krishnadasa Academy Publication, 1998; 2, 582.