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PHARMACEUTICAL PREPARATION OF PASHANA VAJRAKA RASA

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ABSTRACT

Rasa shastra, the Iatrochemistry of Ayurveda deals with therapeutic processing and use of various minerals and metals, including mercury, are purified and combined with herbs in an attempt to treat illnesses. The word Rasa shastra literally means the 'Science of Mercury'. However, it is a specialized branch of Ayurveda dealing mainly with materials which are known as 'Rasadravyas'. They have the following three characteristic attributes: instant effectiveness, requirement of very small doses and extensive therapeutic utility irrespective of constitutional variation. Rasoushadhis are a category of Ayurvedic formulations that has to be explored technically as well as therapeutically. Rasoushadhis although named after mercury (Rasa or Parada), can be classified in two distinct classes-Mercurial and Non-Mercurial. Based on the method of preparation, the Mercury based drugs are classified as Khalvi Rasa, Parpati Rasa, Koopipakwa Rasa and Pottali Rasa. The non-mercurial preparations include Dhatu Bhasma, Satva and Pishti. There are some other Herbo mineral Ayurvedic dosage forms (Kalpana) also, where these Rasadravyas are formulated along with herbal drugs. Different types of Ashmarighna formulations ranging from herbal to mineral have been described in Ayurvedic classical texts. Pashana Vajraka Rasa, a herb mineral preparation prescribed for Mutrashmari is mentioned in Ayurveda which contains Kajjali which acts like catalyst, Punarnava and Pashanabheda as Ashmarihara. The present study is concerned with the formulation called Pashana Vajraka Rasam, mentioned in the classical literature Yogaratnakara Ashmari Nidana-Chikitsa Prakaranam, which has indication on Ashmari. Mutrashmari (Urolithiasis) is one among the Ashtamahagada (eight fatal conditions). It is the common diseases of Mutravaha Srotas (urinary tract) that occur due to disequilibrium between stone inhibiting and promoting

factors in the urinary system. Till now no scientific studies has been carried out on this formulation. So, this study aims to prepare Pashana Vajraka Rasam, analyze the physicochemical parameters.

KEYWORDS: Pashana Vajraka Rasa, Kajjali, Mutrashmari, Urolithiasis.

INTRODUCTION

Based on the method of preparation, the Mercury based drugs are classified as Khalvi Rasa, Parpati Rasa, Koopipakwa Rasa and Pottali Rasa. The non-mercurial preparations include Dhatu Bhasma, Satva and Pishti.

Rasoushadhis are a category of Ayurvedic formulations that are not yet explored to its maximum. The elaborative description of Rasoushadhis (formulations with metal/mineral) and their therapeutic benefits is found from the time of Chakradutta (11th cent. A. D). He was the first Acharya to talk about Parpati Kalpana (Rasoushadhis resembling thin flakes). The texts up to 12th century mentioned about the techniques needed for the 'Lohavada' purpose. After 13th century the books started describing about the methods needed for the various metals and minerals to be converted into 'Bhasma' (very fine powder after incineration) so that they could be used for 'Dehavada' purpose. This knowledge about Dehavada slowly gained importance and was followed to prepare many Herbo-mineral formulations to treat various diseases. The introduction of Rasoushadhis (Herbo-mineral Ayurvedic medicines) to Ayurvedic pharmacopoeia has revolutionized the treatment aspect of the system. Rasoushadhis are quick acting, efficacious in lower dose, have long shelf life of the formulation and easily palatable. According to the different process involved and shape of the product, Rasaushadhies are classified as Khalveeya, Parpati, Pottali, Koopipakwa Kalpanas.[1] Ayurveda described Mutrashmari (Urolithiasis) disease of Mutravaha Srotas and considered as Ashtamahagada. Urolithiasis is an effect of complex physic-chemical process, which involves sequence of events in the formation of any urinary stone. It is a most common clinical condition observed in clinical practice, affecting more than 10% of population in industrialized countries. Ayurveda described various treatment approaches for the management of disease; use of herbs, Ayurveda formulation and Kshara, etc. Pashana Vajraka Rasa is one such formulation mentioned in various texts of Ayurveda like Yogaratnakara, Bhaishajyaratnavali etc. for the management of Mutrashmari. This Yoga is coming under Khalveeya Kalpana. 'Pashana' means stone and 'vajra' means diamond; so, the name Pashana Vajraka Rasa suggests a formulation which may be capable of treating the

stone (urinary calculi) as hard as diamond. Which contains Kajjali[1], Punarnava and Pashanabheda. Kajjali Kalpas are found to be effective in diseases of almost all Srotasas (systems). The effect may be multidimensional, free radicals scavenging, antioxidant, antimicrobial, catalytic, pro-enzymatic, immunomodulator activities. The properties like Rasayana and Yogavahi (as catalyst), Sarvaamayahara (broad spectrum) of Kajjali are essential to enhance efficacy & potency in prepared drug. Yogavahitwa property has importance in pharmacokinetics of drug as it drags whatever is mixed with it towards the target tissue down in to the deeper and most inaccessible parts of the system. When mixed with the other medicines they become more potent and act in low doses. Punarnava and Pashanabheda choornam having anti-urolithiatic property. Sweta Punarnava is having Ushna, Kaphahara, Mutrala properties. When triturating with Sweta Punarnava Swarasa, Kajjali attains the properties of it. Again, Pashanabheda is having Laghu, Tikshna properties, Tridosha Shamaka and having Ashmaribhedana, Mutrala, Shothahara, Vranaropaka properties. So, in total compound have the actions like Lekhana, Kaphavata Shamaka, Mutrala, Vedanahara, Mutrakrichhahara.

AIMS AND OBJECTIVES OF THE STUDY

1. To do sodhana of Hingula[2]
2. To do the extraction of Parada from Hingula using Urdwapatana[3] method
3. To do sodhana of Gandhaka[4]
4. To prepare Pashana Vajraka Rasa as per classical reference from Yogaratnakara[5]

MATERIALS AND METHODS

MATERIALS

It includes the metals, minerals and the drugs of plant and animal origin used for the preparation. Some of the drugs are repeating in few procedures and thus included under corresponding heading.

METHODS

- **Pharmaceutical study**

Generally, metals and minerals as such are toxic to human body but pharmaceutical processing make them into a susceptible form that they are highly effective without any untoward effect in therapeutic dose. Such different methods are explained in Rasa sastra along with complication if used without proper processing. Hence the aim of this pharmaceutical study is to prepare Pashana Vajraka Rasa ensuring its quality strictly

according to the classical methods. Each and every minute facts and observations regarding the processes were recorded. Keeping this in mind the following procedures were carried out:

1. Hingula sodhana

- 150 gm of Ashudha Hingula was taken and powdered in a Khalwa yanthra.
- The juice was extracted from lemon and kept aside.
- The Mardhana of Hingula was done with nimbu swarasa for 24 hrs.
- Chakrikas were made with measurement of 0.5cm thickness and 3.5gm weight

2. Hingulotha Parada by Urdwapatana method

Thoyadhara preparation[6]

- Decoction of Babboola thwak should be made by adding 16 times of water and when 1/4th of the water is left, filter the decoction and make it thick form like Avaleha
- After that, purana loha kittam (mandoora) mix with equal quantity of lime and Guda in it and knead them all well.
- Thoyadhara should made with this mixture
- Make a hole 1 angula below on the edge of it and put a tube in it
- Keep the mouth of the tube closed with a stopper

URDWA PATANAM

- Hingula made into Chakrikas after Shodhana with nimbu swarasa were kept inside the mud pot. This was closed by another pot which had a wider mouth and placed inversely on the lower pot. 7layers of sandhi bandana has been done with gopichandhanam and dried.
- Urdwapatana yanthra was placed over fire.
- 2hr Mandagni, 4hrs Madhyamagni and 18 hrs. Theevragni has been given.
- After attaining swangasheetha two pots were separated and Parada which was adhered to the upper pot was scrapped off.
- Later it was filtered through a four folded cloth.

3. Hingulotha Parada sodhana

- The collected Parada was subjected to trituration with 1/16 part of Haridra choornam, Saindhava, and nimbu swarasa for 2 days using stone Khalwa yanthra
- Initially trituration was done with Haridra choornam for 3 hrs. later nimbu swarasa and Saindhava was added.
- After completion of 48hrs, the whole mass was scrapped off and washed in hot water

- Collected Parada was filtered through a 14 folded cloth.

4. Gandhaka Sodhana

- 250gm of Gandhaka was taken and powdered well in a Khalwa yantra.
- Equal amount of ghee was taken in an iron pan.
- When ghee is completely melted, powdered Gandhaka was added to it.
- After complete melting of Gandhaka, it was filtered through cloth into a steel vessel containing milk.
- Then Milk is discarded and Gandhaka is washed thoroughly in hot water and kept for drying under shade

5. Kajjali Nirmana

- 70gm of accurately weighed Hingulotha Parada and 210gm of Sodhita Gandhaka was taken and ground in Khalwa yanthra.
- Grinding was continued till it attains a jet black colour was obtained

6. Mardhana of kajjali with Punarnava swarasa

- 275gm of Kajjali was taken in a Khalwa yanthra
- It was added with 50ml of fresh Punarnava swarasa
- After 3hrs, added swarasa was dried off. After that swarasa was added in frequent intervals.
- Then the mixture was triturated for 24hrs

Preparation of Pashana Vajraka Rasa

1. MUSHA PREPARATION[7]

100gm of horse dung, coal, jute and burned husk are taken and mixed with 4 times of total ingredient i.e. 400gm of mrittika. Mixed all and made them into homogenous mixture. Make musha with particular shape and size based on the quantity of drug taken.

2. BHUDARA YANTHRA PREPARATION[8]

- A pit measuring 30cm height and 36 cm breadth was dug. The musha with powdered Punarnavabhavita kajjali were kept in center of another pit of measurement with 24 cm height, leaving 4 angulas space from top, bottom and all the sides and these spaces were filled with sand.

- Cow dung cakes were arranged over the sand and ignited. The temperature recorded with non-contact infrared pyrometer every 30 minutes till it reached room temperature.

3. PREPARATION OF FINAL PRODUCT

The Putita kajjali of above wt. was placed in a porcelain Khalwa and triturated till it became fine powder form. It was weighed and stored in a clean container.

OBSERVATIONS

1. Hingula sodhana

- Colour of Hingula changed from brick red to orange red.
- After 2hrs, added nimbu swarasa was dried off. After that swarasa was added in frequent intervals.

Table no. 1: Showing ingredients for Hingula sodhana and quantity taken.

No	Drugs	Quantity
1.	*Ashudha Hingula*	150gm
2.	*Jambeera swarasa*	160ml

2. Hingulotha Parada by Urdwapatana method

During Urdwapatana

- A characteristic smell was felt during the procedure
- Wide range of temperature difference noted between the lower pot and upper pot
- Flame 450-550
- Base of the pot 109
- Base of the upper pot 42.5

3. Hingulotha Parada sodhana

- After a few hours of trituration, colour of Haridra has changed to green gram colour
- Parada started to disintegrate within ½ an hour of trituration.
- Till the addition of nimbu swarasa disintegration was not complete and some amount of Parada remained as large globule.
- After the addition of nimbu swarasa, Parada has remained as fine globules till the completion of Mardhanam.

Table no. 2: Showing drugs required for the shodhanam of Hingulotha Parada and quantity taken.

No.	Drugs	Quantity
1.	*Hingulotha Parada*	72gm
2.	*Haridra choornam*	4.5gm
3.	*Saindhava*	4.5gm
4.	*Nimbu swarasa*	Q. S

4. Gandhaka sodhana

- At 112°C Gandhaka started to melt and complete melting was observed around 119-122°C.
- The whole process of Dalana completed within 10 minutes
- The flame temperature was between 450-550°C
- Colour of Gandhaka at the time of melting - golden yellow.
- During melting characteristic smell of Gandhaka was observed.
- Physical impurities such as stone, sand particles were present in filtered cloth.
- Milk become hot after the Dalana process and ghee was found on the upper surface of milk.
- After Dalana Gandhaka was seen as solidified form at the bottom of vessel.
- While washing small particles of Gandhaka was lost along with water.

Table no. 3: Showing drugs for Gandhaka sodhana and quantity required.

No	Drugs	Quantity
1.	Ashudha Gandhaka	250gm
2.	Ghee	250gm
3.	Milk	250ml
4.	Water	Q. S

5. preparation of kajjali

Table no. 4: showing observations of Kajjali preparation.

Features	Time
Parada turned into fine globules	After 7-10 mts of grinding
Colour of the Mixture changed to a grey colour	After 12-15 mts of grinding
Colour of the mixture changed to a blackish grey colour	After 20-25 mts
Mixture turned to black colour	After 30 mts
Globules of *Parada* completely disappeared	After 1hr
Varitaratwam	After 35hrs
Rekhapurnatva	After 20hrs
Nischandratva	60hrs

6. Mardana with Punarnava swarasa

- pH of Punarnava swarasa was 4.54
- The colour of kajjali was changed into dark black

Table no. 5: Showing drugs for Mardhana and quantity taken.

No	Drugs	Quantity
1.	Kajjali	275gm
2.	Punarnava swarasa	320ml

7. Preparation of Pashana Vajraka rasa

Table no. 6: showing temperature on giving puta using 50 Upala.

Time	Temperature of outer	Temperature of centre	Temperature of sand
0	40.7	51.2	31.8
10.30am	45.6	66.3	32.6
11.00am	47.2	174.6	84.5
11.30am	54.8	524.2	187.6
12.00pm	62.6	548.8	190.1
12.30pm	58.8	558.1	250
1.00pm	57.7	449.1	249.3
1.30pm	56.7	354.5	235
2.00pm	64.5	89.9	230.1
2.30pm	66.7	89	194
3.00pm	64.3	82.1	180.4
3.30pm	53.6	62.4	153.8
4.00pm	53.5	61.6	86
4.30pm	53.1	55.2	54
5.00pm	50.2	38.6	35.1

RESULTS

Table no. 7: Showing result of Hingula sodhana.

Weight of *Ashudha Hingula*	150gm
Weight after *Shodana*	137gm
Duration	24hrs
% of loss	8.6
Colour	Orange red
Total quantity of *swarasa* used	160ml

Table no. 8: showing Result of Hingulotha Parada.

Weight of *Hingula*	Duration of *patana*	Weight of *Parada*
137gm	24hrs	72

Table no. 9: showing result of Hingulotha Parada Sodhana.

Weight of *Parada* before *sodhana*	Weight of *Parada* after *sodhana*	% of loss	Colour	Appearance
72gm	70.25gm	2.43%	Silver white	Liquid shining

Table no. 10: showing result of Gandhaka sodhana.

Weight before sodhana	250gm
Weight after sodhana	230gm
Amount of ghee used	250ml
Amount of milk used	250ml
Total weight loss	20gm
%of loss	8%

Table no. 11: showing result of Kajjali.

Features	Time
Total time taken	60hrs
Parada taken	70gm
Gandhaka taken	210gm
Weight of Kajjali	275gm
Weight loss	5gm
% of loss	1.7%

Table no. 12: showing results of Mardhana.

Weight of Kajjali	275gm
Weight of kajjali after trituration with Punarnava swarasa	278gm
Duration	24hrs
% of change	1% increased
Colour	Black
Consistency	Fine powder

Table no. 13: showing the features of the final product.

FEATURES	PRODUCT
Colour	Black colour
Consistency	Powder
Touch	Soft

PREPARATION OF PASHANA VAJRAKA RASA

DISCUSSION

After Mardhana of kajjali with Punarnava swarasa, the dried powder form is kept inside the musha (samanya musha) prepared with mrittika, horse dung, jute, husk and lime according to classical references. Then doing sandhibandhana of musha with gopichandhanam. After the sandhibandhana should dry up, place it on Bhudhara yanthra prepared outside according to R.R.S. While doing pilot study the maximum temperature of sand inside the Bhudhara yanthra measured by the thermocouple is 2500c. For the assessment of temperature, 2 gm of same sample were placed on emf with a temperature of 2500c and 3500c. after doing emf the product's appearance was entirely different. And also, Bhasma pareekshas like Varitaratwam, Rekhapurnatva were negative. So can conclude from this, there is a low-grade temperature needed to from the product, also there is no need to get a direct temperature for the product. There are no other classical references about upala for puta. According to R.R.S, mentioned two references about upala in kukkuta puta for Bhudhara puta. i.e. 10 Upalas or 50 Upalas. After pilot study with 10 Upalas as well as 50 Upalas, so as to decide whether 50 Upalas are needed to get proper temperature. Each upala has 172gms of weight as in standard.

That which indicates the quantum of heat required by Rasadidravyas for their proper paaka is called Puta. Parada is the only metal which is available in liquid state at room temperature and also having low boiling point of 357.50C, which if crossed, starts evaporating and there will be no outcome of final product. For this purpose, a puta method with low temperature is needed. Bhudhara puta is one such kind of puta where indirect heat is given by means of valuka (sand) heated with limited no. of cow dung cakes so that temperature doesn't exceed boiling point of Parada. Moreover, the heated valuka provides slower and uniform distribution of heat for a given period of time, which facilitates the formation of Bhasma. Keeping these parameters in mind Acharyas might have selected Bhudhara puta for the preparation of Rasa Bhasma.

There is no direct description about dimension of Bhudhara yantra or regarding the intensity of heat or duration of heat supply. In this study, Bhudhara yanthra was made as per expert advice and the pilot study conducted, which was convenient for the size of musha used.

The peak temperature was observed 558.10C after 1 hour of ignition of puta. Above 3000C temperature was maintained for approx. 2 hours and above 1000C temperature was maintained for approx. 2 hours and 30 minutes. Total duration of puta till swangasheetha Lakshana attained was 6 hours 30 minutes. The classical examinations like Varitara, Nischandra, Rekhapurna, and Unama pariksha was positive for the product after puta.

CONCLUSION

Pashana Vajraka Rasa is one among many remedies mentioned for management of Mutrashmari in Ayurveda. It contains Punarnavabhavita kajjali which is having anti-urolithiatic property. Kajjali acts a catalyst. Sweta Punarnava is having Ushna, Kaphahara, Mutrala properties. When triturating with Sweta Punarnava swarasa, kajjali attains the properties of it. Pashanabheda used as an Anupana has laghu, Tikshna properties, Tridosha Shamaka and having Ashmaribhedana, Mutrala, Shothahara, Vranaropaka properties.

So, in total compound have the actions like Lekhana, Kaphavata Shamaka, Mutrala, Vedanahara, Mutrakrichhahara. Because of these, as a whole drug might be act as the prominent medicine for urinary calculi.

The pattern of heat (Bhudhara puta) plays a major role in the proper pharmaceutical processing and thus to make the drug therapeutically fit for administration. Efficacy of

individual ingredients has been already proven by many preclinical and clinical studies in the management of Mutrashmari. Combination of these ingredients as Pashana Vajraka Rasa seems to be potent.

Preparation of Pashana Vajraka Rasa by Bhudhara yanthra method described in Yogaratnakara is found to be practically a successful method to prepare black colored Herbo-mineral compound. Sophisticated analytical techniques like XRD, SEM-EDAX etc. are found to be very useful in analytical characterization of Pashana Vajraka Rasa. Pharmaceutical processing and analytical characterization set in the present study can be taken as standard for further studies. Moreover, it is essential to subject this product to extensive toxicity study so that its safety is established and therapeutic application becomes feasible. Hence, this formulation can be further utilized in clinical practice to establish its therapeutic potential. Further studies needed to strengthen the data for pharmaceutical standardization, safety and efficacy of the formulation.

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