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Pharmaceutico-Analytical Study of *Agnikumara Rasa* - A *Kupipakwa Kalpana*

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ABSTRACT

Agnikumara Rasa is a *Sagandha*, *Sagni*, *Kantastha Bahirdhuma Kupipakwa Rasayana* mentioned in *Rasakamadhenu* under *Sangrahani Chikitsa Adhikara*. It is prepared under *Kramagni Tapa* for 18 hours as per classics. The core ingredients are *Shuddha Parada*, *Shuddha Gandhaka*, *Shuddha Vatsanabha* and *Hamsapadi Swarasa*. It is indicated in conditions like *Sannipata Kasa*, *Shwasa*, *Kshaya*, *Panduroga* and *Mandagni*. Even though a total of 50 formulations have been explained in classics under the name of *Agnikumara Rasa*, no research work has been done till date on this particular *yoga* explained in *Rasakamadhenu*.

Key words: *Agnikumara Rasa*, *Kupipakwa Rasayana*, *Rasashastra*, *Ayurveda*

INTRODUCTION

Rasashastra and *Bhaishajya Kalpana* is a major branch in the field of *Ayurveda* which deals with preparation of various formulations involving metals, minerals and herbal drugs. In the classics of *Rasashastra*, 4 types of *Rasayanas* have been mentioned. They are *Pottali*, *Kupipakwa*, *Parpati* and *Kharaliya Rasayana*. *Kupipakwa Rasayana* was firstly mentioned in 12th century A.D by *Acharya Dundukanath*. Formulations prepared by subjecting *Shuddha Parada*, *Shuddha Gandhaka* and any of other *Rasa Dravya* to a specific

heat in any selected glass bottle following the unique method of preparation mentioned in the classics is known as *Kupipakwa Rasayana*. They are the best examples for “*Murchana*” concept of *Ayurvediya Rasashastra* and it is a highly evolved pharmaceutical technique. *Agnikumara Rasa* is a classical *Kupipakwa* formulation. There are many formulations found in the name of *Agnikumara Rasa*. For the present study, *Agnikumara Rasa* which was described in *Rasakamadhenu* was selected. It has *Shuddha Parada*, *Shuddha Gandhaka*, *Shuddha Vatsanabha* as its ingredients and *Hamsapadi Swarasa* as *Bhavana Dravya*. Till date no research work has been done on this particular *yoga*, hence it was chosen for the study.

METHODOLOGY

Ingredients^[1]

1. *Shuddha Parada* : 250gm
2. *Shuddha Gandhaka* : 250gm
3. *Shuddha Vatsanabha* : 45gm
4. *Hamsapadi Swarasa* : 190ml

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PHARMACEUTICAL STUDY

Raw *Hingula* was procured from market and its *Shodhana* was done using *Nimbu Swarasa*. *Shodhita Hingula* was subjected to *Urdhwapatana* to obtain *Parada*. *Hingulottha Parada* was then triturated with *Haridra Churna* for 24hrs and filtered to obtain *Shodhita Parada*.

Gandhaka Shodhana was done by *Kurmaputa* method. Granules of *Shodhita Gandhaka* was obtained immersed within the milk, which was washed with hot water and dried under shade.

250gm of each *Shuddha Parada*, *Shuddha Gandhaka* was taken in a *Khalva Yantra* and triturated till *Kajjali Siddhi Lakshanas* are obtained.

Raw *Vatsanabha* was taken and its *Shodhana* was done by *Gomutra Sthapana* for 3 days. 22.5gm of *Shuddha Vatsanabha* was added to *Kajjali* and made into a homogenous mixture.

To this mixture *Hamsapadi Swarasa* was added and *Mardana* was done for 1 day.

328 *Vatis* (262.5gm) were prepared from this mixture and were kept to dry. This was then placed into *Kachakupi* and was subjected to *Kupipaka*.

Procedure

The whole procedure of preparation of *Agnikumara Rasa* through *Kupipakwa* method involves the following steps:

Purva Karma

- Preparation of *Kachakupi*.
- Kupi bharana* with *Vati* prepared from *Kajjali*.
- Kupi sthapana* into the *Valuka Yantra*.

Pradhana Karma

- Kramagni Tapa*.
- Observation and recording of temperature.
- Kupi Mukha Mudrana*.

- Swanga Shithileekarana*.

Paschat Karma

- Removal of *Kachakupi* from *Valuka Yantra*.
- Kupi Bhedana*.
- Collection of final product.

Purva Karma

Preparation of *Kachakupi*^[2]

- An amber-coloured beer bottle with 650ml capacity was taken, cleaned and dried completely.
- Initially paste of *Multani Mitti* was taken and applied at the base of the *Kupi* after which it was covered using the 2 layered cloth and kept to dry.
- Once it dried, a thin layer of *Multani Mitti* was applied over the surface of bottle. A cloth sufficiently big enough to cover the entire bottle was taken. Starting from the bottom of the bottle, the cloth was rolled upwards covering up to the neck of the bottle and was allowed to dry completely. This process was continued for 6 more times once the previous layer had completely dried, making a total of 7 layers over the *Kachakupi*.

Kupi Bharana with Vati prepared from Kajjali^[3]

- 262.5gm of *Vati* prepared from *Kajjali* were filled within the *Kachakupi* which occupied the lower 1/3rd part.

Kupi Sthapana into the Valuka Yantra and filling of Valuka Yantra with Valuka.^[4]

- A *Loha Bhandha* with height of 24cm, with circumference of 80cm at the base and 93cm at the top was taken, having a 2 cm hole at the centre. The circular rim of the *Valuka Yantra* aligned with the iron ring of the *Agnibhatti*.
- Valuka* was filtered through Mesh No. 20 and kept separately.

- 2 *Abhraka Patras* measuring 4cm x 4cm were placed at the centre covering the hole. Over this 2cm of *Valuka* was put and spread evenly.
- Kupi* filled with *Vati* was placed over this at the centre and remaining portion of the *Yantra* was filled with *Valuka* upto the neck of the *Kupi*.

Placing of *Valuka Yantra* over *Agnibhatti*.

- Valuka Yantra* consisting of *Valuka* and *Kachakupi* filled with *Vati* was placed over the rim of *Agnibhatti* carefully.

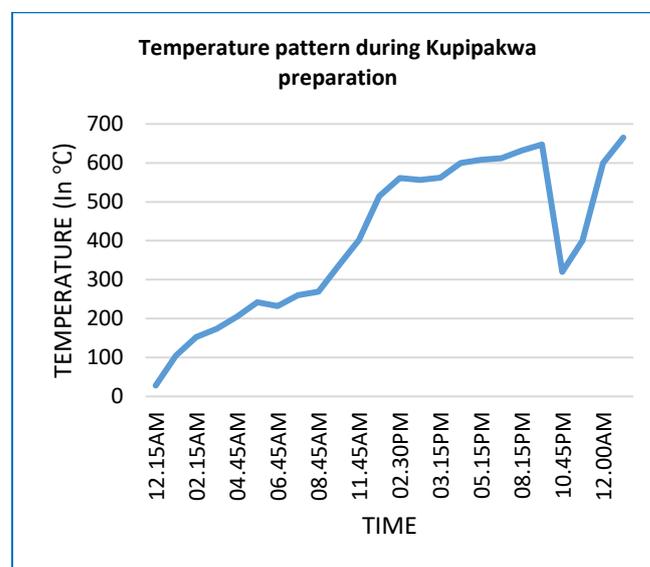
Pradhana Karma

Preparation of *Agnikumara Rasa* through *Kupipakwa Method*.^[5]

- Kachakupi* filled with *Vati*, kept in *Valuka Yantra* was placed in *Agnibhatti*.
- Pyrometer was placed in *Valuka Yantra*, 5-6cm away from *Kupi*, upto 2cm above the base of the *Valuka Yantra*.
- Wood was placed into the *Agnibhatti*.
- Pooja* was done with chanting of *Aghora Mantra*.
- Agni* was initiated using *Karpura*. Temperature monitoring was carried out with the help of pyrometer with thermocouple for every half an hour. *Kramagni Tapa* was maintained according to the classical reference.
- For the first 7 hours *Mrdvagni* was given, by maintaining the temperature between 100°C–250°C.
- For the next 16 hours, *Agni* was gradually increased to *Madhyamagni*. Temperature was maintained between 250°C – 450°C.
- Tivragni* was given for next 4 hours. Temperature was gradually increased and maintained between 450°C – 650°C and above.
- After observing *Aushadhi Siddhi Lakshanas*, corking was done. Addition of wood was stopped

after 27hrs and the apparatus was allowed for self-cooling.

Graph 1: Showing Temperature pattern during Kupipakwa preparation



Paschat Karma

Kupi Bhedana^[6]

- After *Swanga Sheeta*, the *Valuka Yantra* was removed from the *Agnibhatti*. *Kupi* was then carefully taken out after removing the *Valuka*.
- Outer layers on the *Kupi* made with *Multani Mitti* were scraped out. *Kupi* was cleaned with clean wet cloth and allowed to dry.
- A thread was taken, dipped in kerosene and it was tied around the middle of the bottle and was set on fire.
- After the fire was extinguished, the burnt thread was removed using a spatula.
- Kupi* was then rolled on a thick wet cloth and was broken into two pieces carefully.
- Deposits were noted at the neck of the *Kupi*, which was carefully collected by tapping.

Preparation of *Agnikumara Rasa* by adding of *Shodhita Vatsanabha* to the *Kupi* product.

- The *Kupipakwa* product was taken in *Khalwa Yantra* and made into fine powder.

- To this, 22.5gm *Shodhita Vatsanabha* was added and triturated well until a homogenous mixture was attained.

ANALYTICAL STUDY

Table 1: Results of Organoleptic Characters of Agnikumara Rasa

Colour	Bright orange
Odour	Characteristic
Taste	Not perceived
Touch	Soft and smooth

Table 2: Physical tests of Agnikumara Rasa

pH value	8.17
Ash value	99.08%
Acid insoluble ash	58.12%
Water soluble ash	13.78%
Loss on drying at 110°C	3.3

Table 3: Chemical tests of Agnikumara Rasa

Total Mercury	28.01%
Mercurous mercury	13.73%
Mercuric mercury	14.05%
Free mercury	0.23%
Total Sulphur	0.20%
Sulphide form of Sulphur	BDL
Sulphate form of Sulphur	BDL
Free Sulphur	0.01%

X-Ray Diffraction peaks of *Agnikumara Rasa* matched to standard peaks of Cinnabar with Hexagonal crystal structure.

Scanning Electron Microscopy (Edx) study of *Agnikumara Rasa* revealed that the elements present

in *Agnikumara Rasa* were Hg - 58.87%, S - 2.28%, O - 31.04%, Na - 7.80%.

Particle Size Analysis of *Agnikumara Rasa* showed Mean particle size of 21.18nm.

FTIR Analysis of *Agnikumara Rasa* showed it contained functional groups like Alcohols, Phenols, Alkenes, Alkanes and Fluro compounds.

NPST of Agnikumara Rasa

Table 4: NPST of Agnikumara Rasa

Sample	1 st Phase (0-5min)	2 nd Phase (5-20min)	3 rd Phase (20min – 1day)
Agnikumara Rasa	Central spot was of orange colour. Drop was slowly spreading. White coloured margin was developed around the central spot. It was surrounded by brick red coloured intermediate circle. Peripheral circle was being formed which was dark brown in colour.	Central spot gradually faded. The white ring was seen to be prominent. Intermediate circle faded and turned orange. Peripheral circle faded and turned dull brown. A thin white line was noted between the intermediate and peripheral circle.	Central spot was faded with faint brown colour. It was surrounded by prominent white ring. Intermediate ring faded to pale orange colour. Brown colour of the peripheral ring completely disappeared and turned faded grey colour. Thin white line became more prominent between the intermediate and peripheral circle.

DISCUSSION

Observations made during Kupipakwa method

After 3 hours of heating (205°C) white fumes along with sulphur smell was observed. This indicated the melting of *Kajjali* and evaporation of SO₂.The

transformation of *Kajjali* from a solid to semisolid form was evidenced with the insertion of *Sheeta Shalaka*.

After 6 and half hours (232°C), yellow fumes were noted along with strong smell of sulphur. This can be due formation of long polymer chains of sulphur which increases its viscosity.

After 14 hours (561°C), golden orange deposits were noted at the neck of the *Kupi*. This may be due to the condensation of evaporated Sulphur near the mouth of *Kupi*. These deposits and denser fumes further narrowed the neck of the *Kupi*. This choking of the neck was cleared using *Tapta Shalaka*.

At 556°C boiling of *Kajjali* was noted by the appearance of tarry mixture at the mouth of *Kupi*. This is the stage where *Kajjali* transforms from semi-solid to gaseous form.

After 15 hours (562°C), blue flames were seen 3-4 inches above the mouth of *Kupi* along with profuse smell of Sulphur causing irritation to the eyes and nose. This indicates the burning of extra sulphur in the form of SO₂. Beyond the vapour pressure, inflammable sulphur catches fire in the presence of oxygen. Once free sulphur is completely burnt, the blue flame will disappear. In the present study, the presence of blue flame persisted for a few hours. Here the temperature range was 562°C -632°C.

After 21 and half hours (647°C), *Suryodaya Lakshana* was noted. The bottom of the bottle appeared red. This maybe the reflection of the red-hot bottle as most of the contents within in it has already evaporated towards the periphery. *Sindura* test was positive. Copper coin test was positive. It was conducted to confirm the presence of mercury vapours due to dissociation of HgS. Copper plate was kept over the mouth of *Kupi* for 5mins, after which presence of white discoloration over the copper plate confirmed the presence of Mercury vapours escaping from *Kupi*. Corking of *Kupi* was done to prevent further loss.

While corking of *Kupi*, temperature was reduced to 320°C by reducing the fuel. *Valuka* around the neck of the *Kupi* was removed carefully. This will facilitate

condensation of the sublimated drugs at the neck of the *Kupi*. Maximum conversion of ingredients into their gaseous form happens during this time.

After corking *Tivragni* was initiated. Temperature was maintained between 600°C - 665°C. After 4 hours of *Tivragni*, addition of fuel was stopped and it was allowed to self-cool.

CONCLUSION

Agnikumara Rasa is a classical *Kupipakwa* formulation. It is a *Sagandha Sagni Kantastha Bahirdhooma Kupipakwa Rasayana*. The key ingredients were *Shuddha Parada*, *Shuddha Gandhaka*, *Shuddha Vatsanabha* and *Hamsapadi Swarasa* as *Bhavana Dravya*. It is indicated in *Sannipata Kasa*, *Swasa*, *Kshaya*, *Pandu* and *Mandagni* in the dose of 1 *Gunja* (125mg). *Anupana* mentioned is *Nagavalli Swarasa*. Physical tests shows that *Agnikumara Rasa* is bright orange in colour and has a characteristic odour. Physico-chemical analysis of *Agnikumara Rasa* revealed pH - 8.17, Total ash - 99.08%, Acid insoluble ash - 58.12%, Water soluble ash - 13.78% and Loss on drying at 110°C - 3.3%. Total mercury of *Agnikumara Rasa* was 28.01%. Mercurous mercury was 13.73% and Mercuric mercury was 14.05%. Total Sulphur was 0.20%. Sulphide and Sulphate form of Sulphur were not detected. Only traces of Free mercury and Free sulphur were noted. XRD peaks of *Agnikumara Rasa* matched to standard peaks of Cinnabar with Hexagonal crystal structure. As confirmed by SEM-EDX study, the elements present in *Agnikumara Rasa* are Mercury - 58.87%, Sulphur - 2.28%, Oxygen - 31.04%, Sodium - 7.80%. Mean particle size of *Agnikumara Rasa* was found to be 21.18nm. FTIR analysis of *Agnikumara Rasa* shows that it contains Alcohols, Phenols, Alkanes, Alkenes and Fluoro compounds. NPST of *Agnikumara Rasa* at 3rd phase showed central spot which was faded with faint brown colour. It was surrounded by prominent white ring. Intermediate ring faded to pale orange colour. Brown colour of the peripheral ring completely disappeared and turned faded in grey colour. Thin white line became more prominent between the intermediate and peripheral circle.

PHOTOS



Fig 1
Vati prepared from
Kajjali



Fig 2
Prepared KUPI



Fig 3
Filling of KUPI with
Vati



Fig 4
Abhakra patra
sthapana inside Valuka
Yantra



Fig 5
Filling of valuka



Fig 6
KUPI sthapana in
Valuka Yantra



Fig 7
Valuka yantra completely
filled



Fig 8
Valuka yantra kept in
Agnibhatti along with
Thermocouple



Fig 9
Initiation of Mridwagni



Fig 10
White fumes



Fig 11
Yellow fumes



Fig 12
Sheeta shalaka
pareeksha



Fig 13
Blue flames



Fig 14
Insertion of Tapta
shalaka



Fig 15
Suryodaya lakshana

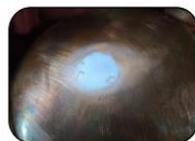


Fig 16
Copper coin test



Fig 17
Sindura test



Fig 18
KUPI mukha mudrana



Fig 19
Scraping of KUPI



Fig 20
KUPI bhedana



Fig 21
KUPIpakwa product



Fig 22
Mixing of KUPIpakwa product with
Shodhita Vatsanabha



Fig 23
Agnikumara Rasa

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