

Preparation of Soolanirmoolana Rasa - A Herbo-Mineral Formulation

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ABSTRACT

Soolanirmoolana Rasa is a herbo mineral formulation explained in Rasatarangini- Vishopavisha vijnaneeya tarangam under the description of kupilu. It contains rasasindoora, gandhaka, sankha bhasma, saindhava, trikatu, jeeraka, amlavetasa and kupilu. It is prescribed in gastrointestinal diseases associated with pain. The work done on the pharmaceutical aspect of Soolanirmoolana rasa is explained in this research paper. For preparing rasasindoora, parada and gandhaka were subjected to sodhana separately, then samaganagandhaka kajjali was prepared and bhavana was done in vatankura kashaya. Sankha was subjected to sodhana first followed by three putas to get sankhabhasma. The upavisha kupilu was also purified, powdered and levigated in ardraka swarasa along with powders of other herbal and mineral drugs and finally rolled into pills having gunja pramana i.e. 125 mg size. The shade dried pills were then measured and stored in airtight glass bottles and kept away from sunlight and moisture. The process was done with 10g rasasindoora and a final product of 2134 pills having average weight of 124mg was obtained.

Key Words: Soolanirmoolana rasa, Agnivardhaka, Amahara, Sodhana, Bhavana, Upavisha

INTRODUCTION

Ayurveda, the science of life, is one of India's traditional health-care systems as well as one of the oldest in the world which offers a holistic approach to maintain the health in the healthy people and to cure diseases and restore health in case of diseased. When it comes to Rasasastra, the drugs of which are known for their fast and specific activity in various chronic conditions, remain in the text books unexplored. Rasoushadhis are having fast action, palatability and good results even with small doses of drug.^[1] Soolanirmoolana rasa is one among the unexplored yogas described in Rasatarangini which is a combination of herbal and mineral drugs.^[2] The drugs in this yoga are having deepana, pachana,

amasoshaka and soolahara properties that help in the pacification of disease. The balya, vrishya and rasayana properties of the components will help to improve the general health also. Preparation of Soolanirmoolana includes the preparation of ingredients such as rasasindoora, sankha bhasma and sudha kupilu choorna. This article is aimed at describing the whole pharmaceutical procedures for the preparation of Soolanirmoolana rasa.

MATERIALS AND METHOD

The steps involved in the preparation of this formulation are as follows:

1. Collection of Raw drugs
2. Preparation of Soolanirmoolana Rasa
 - a) Rasasindoora nirmana
 - b) Sankha bhasma nirmana

- c) Kupilu sodhana
- d) Powdering of the ingredients
- e) Bhavana of all drugs in ardraka swarasa to prepare the formulation

Collection of Raw drugs

Parada (99.5% pure distilled mercury) and gandhaka (Sulphur powder) were purchased from laboratory supply store. Amlavetasa (fruit rind of *Garcinia pedunculata*) was collected from HM herbals, Ranchi, Jharkhand and identity was verified by consulting Dravyaguna vijnana department. All other drugs saindhava (Rock salt), sunthi (rhizome of *Zingiber officinale*), maricha (fruit of *Piper nigrum*), pippali (fruit of *Piper longum*), jeeraka (fruit of *Cuminum cyminum*), kupilu (seeds of *Strychnos nux-vomica*) were purchased from local suppliers at Thiruvananthapuram, Kerala. Vatankura was collected from Poojappura herbal garden, Govt. Ayurveda College, Thiruvananthapuram. All the herbal drugs were authenticated with the help of Dravyaguna Vijnana department.

Preparation of Soolanirmoolana Rasa

The preparation of soolanirmoolana rasa includes the following steps:

1. Rasasindoora nirmana

Rasasindoora is a kupipakwa Rasayana described in Rasasastra. There are several methods for preparation of rasasindoora in different samhitas. Here the preparation was done as per Rasendrasara Sangraha reference.^[3] It involves following stages

- **Parada sodhana**

It is the purification of parada by triturating it in different herbal media. In different samhitas different bhavana dravas are mentioned for parada sodhana. The reference from Rasendrasarasangraha is adopted here which mentions kumari swarasa, sodhita chitraka kwatha and kakamachi swarasa as bhavana dravas.^[4] 200 g parada was subjected to bhavana in each drava dravya for 8 hours and after each

bhavana it was washed with hot water and filtered through a bi-layered cloth.

- **Gandhaka shodana**

There are different methods of gandhaka sodhana according to different classics like Dalana, patana, etc. Here kurmaputa method mentioned in Ayurveda prakasha was used for sodhana.^[5] A five-liter wide-mouthed earthen pot was smeared with little quantity of ghritha inside and filled with 3 liters of freshly collected cow's milk. A double-layered cotton cloth was inserted within the mouth with a small depression and knotted with a thread at the neck of pot. 500 g fine powder of gandhaka was uniformly spread over this and covered with an earthen sarava and sandhibandhana was done with 7 layers of mud smeared cloth. On drying, this was carefully placed inside a pit enclosing the pot up to the above neck portion and coconut husks were placed on the uncovered top portion of the sarava. It was then ignited and was permitted to fume without the presence of a visible flame. New pieces of coconut husk were inserted as the method progressed until 48 pieces of coconut husks were consumed. After attaining ambient temperature, it was taken out and opened. The gandhaka globules were removed from the bottom of the pot, rinsed with hot water, dried on tissue cloth, weighed, and powdered after complete drying.

- **Preparation of kajjali for Rasasindoora**

120 g each of sudha parada and very fine sudha gandhaka choorna were taken in a mortar and ground well until the kajjali siddha lakshanas such as varitaratwa, unnama, nishchandrata, rekhapoornatwa and kajjalabha were satisfied.

- **Kajjali bhavana in vatankura kashaya**

Vatankura kashaya was selected as bhavana drava as per Rasendrasara sangraha.^[3] Vatankura kashaya was prepared in the ratio mentioned for bhavana

kashaya nirmana i.e. by boiling one part of dravya with 8 times water and reducing to one eighth portion. 60 ml kashaya was added to completely immerse the kajjali and ground until complete dryness. The process was repeated for 3 times.

- **Preparation of kupi and pidhana**

A dark amber coloured glass bottle of 650 ml capacity was wrapped with clay smeared cloth and dried completely. This was repeated for 7 times by wrapping one round of two horizontal cross layers which would uniformly cover the bottle from base to mouth. For making pidhana or lid, a chalk piece was wrapped in clay smeared cloth and dried. The process was repeated till the pidhana fit perfectly inside the mouth of glass bottle.^[6]

- **Rasasindoora nirmana**

A conical iron trough was filled with river sand up to 2 inches. Then the corked kupi was placed at the center and valuka was filled with sand until the sand level reached the neck portion of kupi. 240g of vatankura bhavita kajjali was filled in the kupi using a funnel. The kupi was corked again and sand was filled around the mouth of kupi in such a way that only the mouth portion was remained outside. The kupi was kept closed during sand filling to avoid any sand particles falling inside. The whole apparatus containing kupi was carefully placed inside a bhatti and the edges were pasted with clay to the sides of bhatti and then ignited the kiln using coconut shell and camphor.

A pyrometer was introduced in between sand and bottle to monitor the temperature. In the first stage fire was slowly increased up to 300°C using dry tamarind firewood logs. New logs were introduced after completely burning the previous one to maintain the mandagni. During this stage at 184°C mild white fumes started coming out of the kupi which changed yellow dense fumes after sometime. An ushna salaka was inserted to remove the clogging of sulphur at the neck

of kupi frequently. When the blue flame started to appear, the agni was changed to madhyama and maintained at around 500 to 550°C. At the stage when the stoppage of blue flame at the mouth of bottle occurred and the bottom of kupi became red hot in colour the corking was done for enabling Rasasindoor formation. To confirm this, a copper plate was placed on mouth of kupi and checked if any sulphur particles on the plate. If extra sulphur particles are present the copper plate will be coated with yellow sulphur otherwise white coating of mercury will be present. A seeta salaka is also inserted to confirm the starting of rasa sindoor preparation. Corking was done with pidhana prepared earlier and sealed with mud smeared cloth for several layers. At the same time the hot sand near the neck portion was removed for enabling the sindoor formation at the neck region. The corking was done at 520°C. After corking was completed the agni was increased to teekshna agni by placing more logs and using a blower for one yama. Temperature during this stage peaked up to 800°C. After attaining the peak temperature, the apparatus was left undisturbed for self-cooling.

After 3 days on attaining ambient temperature, the kupi was taken out carefully and broken by using an ignited jute wick. Rasasindoor was found deposited inside the kupi especially at the neck portion with a silvery grey appearance which turned to red color on scratching. The product deposited at neck, bottom and in the cork were collected, weighed and stored separately.

- **Sankha bhasma nirmana**

Preparation of Sankha bhasma was done in two steps – Sankha sodhana and Sankha marana

Sodhana of sankha was done according to Rasatarangini reference,^[7] by dolayantra swedana in nimbu swarasa for ardha yama i.e. one and half hours. 500 g sankha was broken into small pieces and was washed thoroughly in hot water to

remove the external impurities. 150 g of it was placed in a 3 layered cloth and tied well to make a pottali. A medium sized mud pot was taken and it was then added with nimbu swarasa (3 liter) to fill up to the half portion. The pottali was then hung by a rod placed over the brim of the pot so as to immerse completely in the liquid inside. The apparatus was placed in mandagni and swedana was done for one and half hour. The level of nimbu swarasa in the pot was maintained so that the pottali was completely immersed in it. After 3 hours it was taken out and the sodhita sankha pieces were washed in hot water.

According to Rasatarangini, sankha marana is done by subjecting sodhita sankha to gajaputa for two times.^[8] 275 g of sodhita sankha pieces were arranged in an earthen sarava and closed with another sarava. The sandhibandhana was done with clay smeared cloth and dried under sun. 7 layers of sandhibandhana were done by wrapping with mud smeared cloth and drying in sun successively. After sarava samputa, it was subjected to puta in muffle furnace at a temperature of 700°C and maintained for 2 hours.^[9] On self-cooling and reaching room temperature, on 4th day, sarava was taken out. The cloth layers were removed and opened carefully. The burnt sankha pieces were powdered and subjected to bhavana in nimbu swarasa, chakrikas were made and dried under shade. 150 ml of nimbu swarasa was added to completely immerse the sankha bhasma prepared in first puta and while adding the swarasa frothing of bhasma was noted. Average weight of chakrikas was 5.4 g and total number was 48. Totally 3 putas were done to get sankha bhasma.

- **Kupilu sodhana**

Sodhana of kupilu was done according to Rasatarangini reference.^[10] 500 g of kupilu seeds were washed thoroughly in fresh water to remove mud and other external impurities. Then it was made into pottali of 150g each in a double layered cloth. A medium sized mud pot was taken

and pottali was hung inside it by tying on a rod. The pot was filled with milk till it completely immerses the pottali. Swedana was done under mild fire for 3 hours. Milk was added frequently to ensure complete immersion of pottali. After 3 hours, it was taken out and washed in hot water to remove the milk completely. Then the outer skin and heart shaped inner cotyledons were removed and made into 4 pieces each. After drying it was fried in ghee to make it brittle for easy powdering. It was then powdered well using a pulverizer and sieved through sieve no.85 to get a fine choorna of sudha kupilu.

- **Preparation of choornas of other raw drugs**

100 g each of Sunthi, Maricha and Pippali were washed to remove the external impurities like mud, etc. and dried well separately. Each of them was then powdered and sieved through sieve no.85 to get fine choorna. 50 g of jeeraka was also powdered in the same way. 20 g saindhava was also powdered and kept aside.

- **Preparation of final product – Soolanirmoolana rasa**

For the preparation of the study drug 10g each of Rasasindoora, Sankha bhasma, Amlavetasa, powders of Pippali, Sunthi, Jeeraka, Gandhaka, Saindhava, 20g Maricha choorna and 50 g of kupilu choorna were weighed and kept aside. All the fine powders of herbal drugs were mixed well and passed through sieve no. 85 to get a homogenous mixture. 500 g of fresh ardraka was purchased; the outer skin was removed and washed well to remove all the impurities. It was then crushed and swarasa was extracted without adding water. 10 g amlavetasa was immersed in 10 ml of boiled and cooled water in a khalwa yantra for one hour. To this 10 g each of rasasindoora, sudha gandhaka choorna, sankha bhasma and saindhava choorna were added successively and grinding was done for some time after adding each drug. The homogenous mixture of herbal drugs was

also added and ground well in the khalwa yantra to get a homogenous blend. To this mixture ardraka swarasa was added to completely immerse the mixture and ground well till the mixture attained a pill rolling consistency. Then it was rolled into pills weighing 125 mg each which was then dried under shade. After complete drying it was stored in a clean and dry air tight container.

RESULT

200 g parada was subjected to bhavana for sodhana. During the process, the parada changed to small globules first which changed to fine powder-like particles later. During later stages of bhavana, formation of cement like particles was also observed. When washed with hot water, the form of parada was regained by joining the globules. The loss of weight was more during the bhavana in kakamachi swarasa (2.4%) and the loss was less in chitraka kashaya bhavana (0.11%).

Table 1. Weight of parada after sodhana in each bhavana drava

Bhavana drava	Quantity used	Quantity of parada before bhavana	Time taken for bhavana	Weight of parada after bhavana
Kumari swarasa	200 ml	200 g	8 hrs	196.77 g
Chitraka kashaya	150 ml	196.77 g	8 hrs	196.56 g
Kakamachi swarasa	200 ml	196.56 g	8 hrs	191.86 g

500 g of gandhaka was taken for sodhana. The gandhaka got melted by the indirect heat given from the top of the sarava and got filtered through the cloth to the milk in the form of small globules. The peak temperature was found to be 492°C and the time taken for the entire process of burning was 4 hours from the ignition of fire to complete burning of the coconut husks. 468 g of sodhita gandhaka was obtained after the complete procedure.

Table 2. Gandhaka sodhana

Sl No.	Item	Quantity
1	Gandhaka	500 g
2	Sodhita gandhaka	468 g
3	Milk	3 L
4	Coconut husk	6 medium sized coconut husk divided to 48 pieces
5	Mud pot with sarava	5 L capacity
6	Multani mitti and water	QS

- For kajjali nirmana 120 g each sudha parada and finely powdered sudha gandhaka were ground in khalwayantra.

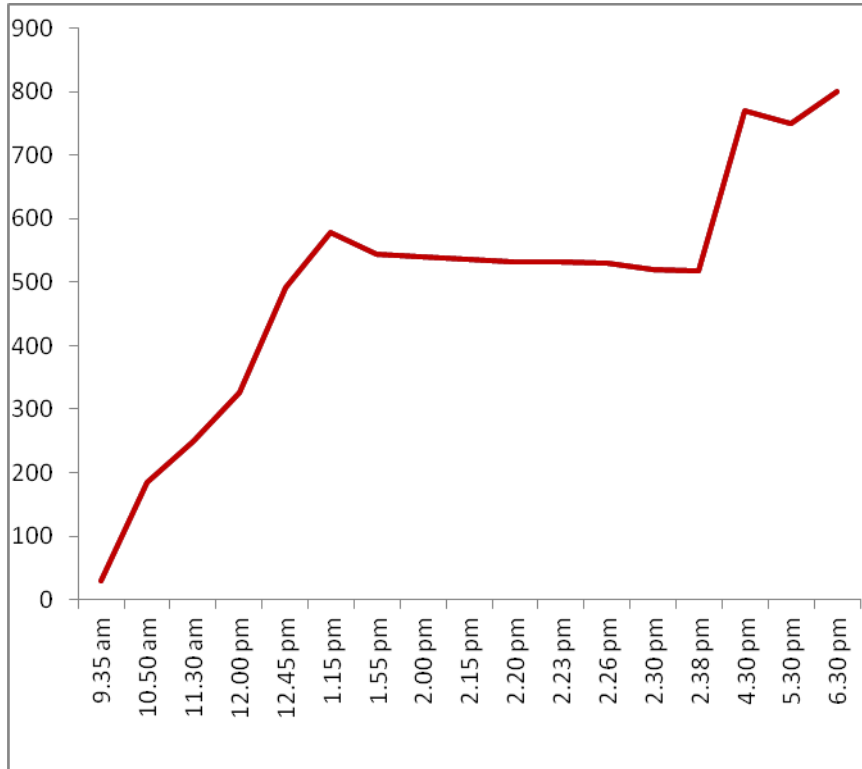
Varitaratwa, Unnama and Rekhapoornatwa were attained after 5 hours of grinding. Nishchandratawa obtained after 75 hours of grinding. The final weight of kajjali was 240 g.

- Kajjali bhavana was done in vatankura kashaya. 180 ml of kashaya was used for the entire process and final weight of vatankura bhavita kajjali was 246 g. The black colour of the kajjali was changed to deep black and three bhavana took about 30 hours to complete
- Observation during Rasasindoora preparation can be summarized as Table 3. Final weight of the product rasasindoora was 105.5 g out of which 93.5 g was from neck portion, 7.5 g from bottom portion and 4.5 g was from cork portion.

Table 3. Temperature chart for Rasasindoora Nirmana

Time	Temperature in °C	Observations
9.35 am	30	Kupipakwa started
10.50 am	184	Mild white fumes present
11.30 am	250	Mild yellow fumes present
12.00 pm	327	Yellow fumes became dense
12.45 pm	491	Reddish yellow fumes on insertion of ushna salaka
1.15 pm	579	Bluish flame on insertion of ushna salaka
1.55 pm	545	Bluish flame persist
2.00 pm	541	Intensity of flame started to decrease
2.15 pm	535	Fumes stopped

2.20 pm	531	Reddish shade at the bottom of kupi
2.23 pm	531	Seeta salaka test positive
2.26 pm	530	Copper coin test positive
2.30 pm	520	Corking started
2.38 pm	518	Corking completed and temperature intensified
4.30 pm	770	-
5.30 pm	750	-
6.30 pm	800	-



Graph 1. Temperature chart of Rasasindoora preparation

- During sankha sodhana, the colour of sankha turned white and it became more porous in texture. The colour of nimbu swarasa turned to brown which was pale yellow before the procedure. The pH of the nimbu swarasa before and after sodhana was found to be same. Total 4.5 liter of nimbu swarasa was used for the sodhana. 300 g of sankha was purified by two dolayantra swedanas and 280.5 g of sodhita sankha was obtained. 6.5% loss of weight was observed after the sodhana procedure.
- During marana, after first puta the sankha pieces were found to be burned to get a greyish white color, but didn't attain an ash like or bhasma like consistency. When ground in a khalwa it was changed to fine powder. Second puta was done after making chakrikas using nimbu swarasa. While adding the

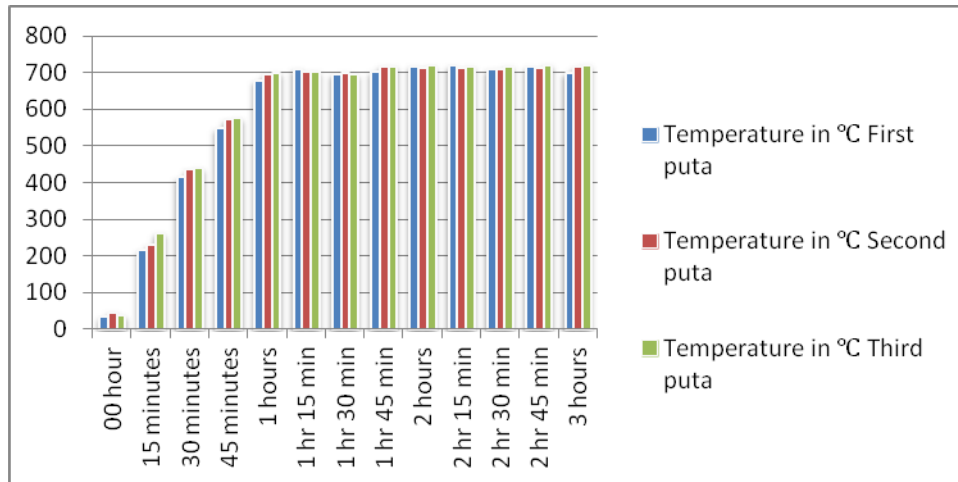
swarasa frothing of bhasma was noted. The quantity of swarasa needed for the bhavana was less and drying of the mixture was fast. The bhasma obtained after 3 putas was found to be greyish white in colour. It was having no taste (niswadu) or smell.

Number of puta	Weight of sankha before marana	Quantity of Jambheera swarasa	Weight of sankhabhasma after puta
First puta	275 g	Nil	268 g
Second puta	268.5 g	150 ml	261 g
Third puta	262 g	150 ml	251.5 g

- During kupilu sodhana, Total 8 liters of milk was used for the entire procedure. After sodhana and removal of skin and cotyledons, 629 sodhita kupilu was obtained which was not brittle enough to make it to powder form. So it was fried

in ghee. From 500g of asodhita kupilu, only 262 g of sudha kupilu choorna was obtained.

- Results of powdering of drugs are given in the table no.4.



Graph 2. Temperature chart of sankha marana

Table 5. Loss on powdering of drugs			
Drug	Quantity taken	Weight after powdering	Percentage loss in weight
Sunthi	100 g	82 g	18 %
Maricha	100 g	93 g	7 %
Pippali	100 g	86 g	14 %
Jeeraka	50 g	36 g	28 %
Sodhita Kupilu	629 g	267.5 g	42. 52 %
Saindhava	20 g	20 g	0 %

for the bhavana procedures and proper mixing with the ingredients. 150 ml ardraka swarasa was used for the complete immersion of the powders of the drugs. After drying the average weight of pills was found to be 124 mg and a total of 2134 pills were made. The pills were brown in colour and smooth in texture.

- For the final drug preparation amlavetasa was immersed in 10 ml water in the khalwayantra to make it soft

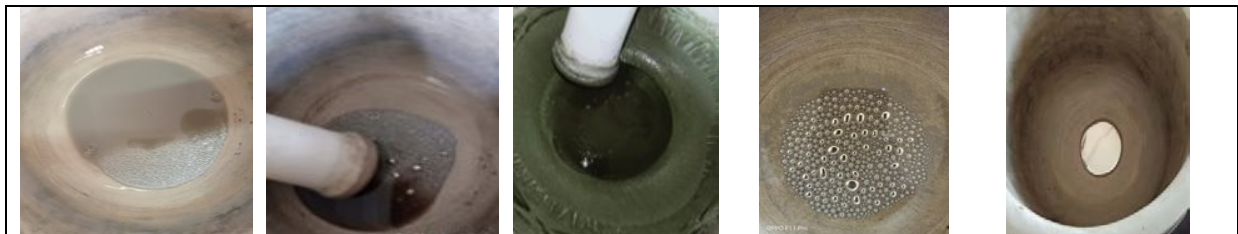


Figure 1. PARADA SODHANA



Figure 2. GANDHAKA SODHANA



Figure 3. VATANKURA KASHAYA BHAVANA OF KAJJALI



Figure 4. RASASINDOORA PREPARATION



Figure 5. SANKHA SODHANA AND MARANA



Figure 6. KUPILU SODHANA

DISCUSSION

The sodhana method of parada selected here includes only three bhavana dravyas and also no visesha and samanya sodhana were required for the same. Hence the procedure was less time consuming and less man power was needed for the entire procedure. The bhavana in the above drugs were helpful in removing the doshas found in parada as the surface area of the liquid metal is reduced significantly during the process. The percentage loss was more during the bhavana in kakamachi swarasa which might be due to the gurutwa of kakamachi swarasa than other dravas used for the bhavana. The total loss of weight after the entire sodhana process of parada

was 4.07%. After sodhana, parada was found to be more bright, clean and more lustrous than asodhita parada. On washing with hot water, the particles got united eventually forming a single big globule and on filtering through a cotton cloth the mercury appeared clean and was bright in colour.

Gandhaka sodhana was done by koorma puta method which is suitable for sodhana of large quantity of gandhaka. The purification process was done by melting the gandhaka powder which will be filtered through the cloth into the milk which was layered above by ghrita. The presence of milk and ghrita in the purification medium will help in the removal of all types of

gandhaka dosha. In rasasastra classics it is said that during sodhana, the cloth removes the pashana (impurities such as mud and sand), ghrita removes the visha (poisonous impurities).^[11] For the preparation, 48 pieces of coconut husks were used which was standardized by in-house experiments for the maintenance of temperature at desired level. The purified gandhaka should be rinsed thoroughly in hot water till the complete removal of milk from it. This method was less time consuming and easy as compared to dalana process.

Before the preparation of kajjali, sodhita gandhaka was powdered and sieved through sieve no.120 get a very fine powder consistency. It is helpful in increasing the surface area of the gandhaka particles and thus proper grinding of kajjali. The varitaratwa, rekhapoorantwa and unnama lakshanas were obtained within 5 hours which might be due to the smaller particle size of sudhagandhaka choorna. Nischandratwa was obtained only after 75 hours of grinding. The black coloured and lustrousless powder was then subjected to vatankura kashaya bhavana. The weight was found increased by 6 g after three consecutive bhavanas making it 246g which might be due to the addition of herbal ingredients by the bhavana process. The temperature during the rasasindoora preparation was assessed frequently using pyrometer inserted into the sand closer to the kupi. A maximum temperature of 838°C was attained during the entire process. The elevation of temperature in three stages such as mridu, madhyama and teevraagni should be followed carefully for the proper paka of kajjali inside. The corking of kupi at the correct time is another important factor determining the proper paka and maximum yield of rasasindoora.

The sankha sodhana in nimbu swarasa for one and half hour as per rasatarangini reference is an easy and less time consuming sodhana method. This method was selected as it is proved that the sodhana of shankha bhasma by lemon juice method is better than sour gruel method in a

study conducted in GERD patients.^[12] The acidic nature of the drava dravya and application of heat will help in making the sankha pieces porous. After first puta, the sankha became porous and was easy to powder using mortar and pestle. Second marana was done after subjecting to bhavana in nimbu swarasa and making chakrikas. In classical reference two putas are mentioned for sankha marana. But after second marana, rekhapoorantwa and varitaratwa were not attained. So third puta was done after which the lakshanas were satisfied. The varitaratwa test has to be done immediately after taking out the saravasamputa from electrical muffle furnace after self-cooling to ambient temperature and it should be kept in airtight glass jar as it is having hygroscopic nature.

The kupilu sodhana has different methods in Ayurveda classics. In this preparation dolayantra swedana in milk was selected. Dried kupilu seeds after sodhana were not able to powder easily. So it was fried in ghee for making it brittle and then powdered using pulverizer and finally sieved through sieve no.85, to get a fine powder. While powdering the other raw drugs, powdering of sunthi was the difficult one as it had more fibrous matters in it. Amlavetasa was having a tough consistency and hence powdering was difficult. So it was immersed in boiled and cooled water for one hour and ground into a fine paste. To this paste taken in a khalwa, the mineral drugs were added in the order rasasindoora, gandhaka choorna, saindhava choorna and sankha bhasma. After adding each drug grinding was done for some time to ensure proper mixing of the contents. All the herbals drugs were added after making it to a homogenous mixture. The bhavana dravya, ardraka swarasa, added in a quantity to immerse the contents completely. The bhavana was done for 3 days to attain pill rolling consistency. During the procedure and rolling pills strong smell of ardraka was present. The shade dried pills were having katu tikta pradhana rasa and the smell of

ardraka. The pills having an average weight of 124 mg after drying was obtained.

CONCLUSION

- While preparing Rasasindoora, proper assessment of the paka laskhanas is very important to get the final product with maximum yield. The maintenance and elevation of temperatures should be monitored frequently.
- For preparing sankha bhasma, a temperature of 700°C should be maintained for 2 hours. The puta should be repeated till the classical bhasma pareekshas are attained.
- The sodhita kupilu by the method of dolayantra swedana in milk should be again subjected to frying in ghrita for making it brittle and thus to make choorna maximum cost effectively.
- The method selected for sankha sodhana and parada sodhana were easy and less time consuming compared to other methods mentioned in classics.
- Gandhaka sodhana by kurmaputa method can be used to purify larger quantities of gandhaka at one single time with less time and fuel consumption.

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