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Preparation of Tarakeswara Rasa- A Herbo Mineral Formulation

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ABSTRACT

Tarakeswara rasa is a popular herbo-metallic preparation mentioned in almost all Rasashastra literatures. There are about 79 yoga's under the same name which differ in combination and quantity of Rasaushadhis. The current yoga is mentioned in Basavarajeeya bahumutra prakarana contains Rasasindoora, Abhraka, Vanga and Loha bhasmas. It is prescribed specifically for Diabetes and related urinary disorders like nephropathies. Each of these bhasma's are potent Rasa Rasayanas used in treating Diabetes and its complications. In this research paper, the work done on pharmaceutical aspect of Tarakeswara rasa is detailed. Here preparing bhasmainvolves samanya, visesha shodana and marana of abhraka, vanga and loha respectively. Parada and Gandhaka undergo shodana, bhavana and kupipakwa nirmana to achieve Rasa sindoora. Abhraka, vanga and loha bhasmas are prepared as per classics andare mixed as per yoga to prepare Tarakeswara rasa.

Key words: Diabetes Mellitus, Tarakeswara Rasa, Rasa Rasayana, Abhraka, Vanga, Loha Rasasindoora

INTRODUCTION

Ayurveda, more than a medical system is a science of life which has within itself the testaments for a healthier today and tomorrow. It beholds the codes for a sound body and mind. This science had stood the test of times, had modified itself and validates the theories it beholds in current health care situation. Rasashastra, which is believed to have originated from Rasayana tantra, employs various methods to ensure safe processing of Rasaushadhis for effective therapeutics. One such methodology is attempted here for preparing a Rasa Rasayana, the Tarakeswara rasa.

MATERIALS AND METHODS

Various steps for the preparation of this formulation are as follows.

1. Preparation of Rasasindoora
2. Preparation of Vangabhasma
3. Preparation of Lohabhasma
4. Preparation of Abhrakabhasma
5. Mixing of the drugs to prepare the formulation

RASA SINDOORA NIRMANA

Rasasindoora is a type of Kupipakwa Rasayana. It involves subjecting mercury and Sulphur to even stages of variable temperature at which they get safely bonded into a compound called Rasasindoora, having substantial therapeutic benefits. Rasasindoora preparation was done according to the textbook Rasatarangini involving several steps: -

1. Parada Shodana

The shodana of paradawas done according to paradasamhita/yogaratnakara.

[(1)] Parada (99.99% pure distilled mercury) mardana (trituration) is done in kumari-swarasa (aloevera juice), triphalakasaya, trikatukasaya, chitrakakasaya and nimbu-swarasa (lemon juice) for a period of 12 hours each. The quantity of mardanadravya specified in commentary is 1/4th or 1/16th of parada. Here 1/4th quantity of dravadravya is taken (75ml). After each shodana, parada was washed with hot water and filtered through a bilayer of cotton cloth and was used for the next shodana. 300g of parada was taken initially of which 280g was obtained after shodana.

2. Gandhaka shodana

Shodana was followed according to Ayurveda prakasha [(2)] saaajyakurmaputa method. 500gm of laboratory grade pure Sulphur (Gandhaka) was taken, powdered and sieved until fine. A wide mouthed earthen pot of five litre capacity with a suitable earthen lid was selected. 100ml of cow's ghee was smeared on the insides of earthen pot. To these three litres of freshly procured cow's milk was added. Double layered cotton cloth was placed with a little indentation inside the mouth to hold gandhaka and tied with a thread. To this the powdered gandhaka was spread evenly and closed with earthen lid. Sandhi bandhana was done with cloth and multanimitti for seven rounds. On drying the apparatus was carefully placed inside a round pit. The gap surrounding the wall of pit and earthen pot was filled with fine sand. The top portion of the apparatus was exposed. To this coconut husk (3 medium coconut husk divided to 36 triangular pieces) were arranged on exposed top portion of the sarava (earthen lid) and ignited. It was allowed to fume without visible flame. On progression of the procedure, new pieces of coconut husk were introduced until all the pieces of coconut husks were exhausted. The apparatus was allowed to self-cool, after which the gandhaka globules were collected from the bottom of mud pot, washed with hot water dried on tissue cloth weighed as 475 gms and stored.

3. Kajjalinirmana

For preparing kajjali, 280g each of shoditaparada and 280g shoditagandhaka was ground in a khalwa yantra (mortar)until the mixture satisfies tests for kajjali [(3)] like Slakshnatwa [fine smooth powder], Kajjalabhasatwa [look like collyrium], Nischandratwa [having no mercurial lustre], Rekhapurnatwa [getting within lines of thumb and index fingers when rubbed] and Varitaratva [floats on surface of water]. Varitaratwa and Nischandratwa were attained at 12 and 36th hour of grinding respectively.

4. Kajjali bhavana

Prepared kajjali was ground in kumariswarasa. [(4)] Here 375gm of kajjali was taken and ground with 450ml kumariswarasa for 5 days in total, dried and stored.

5. Kupi and pidhananirmana

A clean dark amber bottle (kupi) of 650ml capacity was taken, enwrapped with clay smeared cloth for seven rounds and dried. Similarly, a chalk piece was taken as cork (pidhana),wrapped in clay cloth and dried. It should fit snugly inside the mouth of glass bottle.

6. Valukasthapana

An iron trough of 12 inches top diameter, 10 inches depth and 8 inches diameter at the bottom was selected. Any hole in it was closed by placing Krishna vajrabhraka patra (sheet of mica). Coarse river sand was procured and inspected to remove any organic impurities, stones etc. was then dried, filled inside the trough up to 2 inches. The kupi was placed in centre, remaining sand was filled in and around until the sand level reached the neck portion of the kupi.

7. Kupi bharana

220g of kumari bhavita kajjali was filled upto 1/3rd [(5)] of the kupi using a funnel and a glass rod after which it was corked.The valuka containing sand and kupi

was carefully placed inside an ignited kiln [bhatti] and the edges were pasted secure using clay smeared cloth.

8. Kupi paka@ prathama, dvithiya agni

At first stage of heat Mild heat (Mandagni) was given. During this period the kajjali inside the kupi was starting to melt and fumes started coming out of the kupi. Mandagni is maintained until fumes stop coming out of bottle and blue flame starts appearing at the mouth.

Pakavidhi- dvitiya

When blue flame starts coming out of the bottle it is to be understood that the process of Gandhakajarana has started. At this juncture, heat was increased to Medium(Madhyamagni), heat is continued till blue flame stops coming from bottle. During this stage volatile sulphur particles gets adhered to the neck of the bottle which was gently pushed down using usnasalaka (5mm in diameter heated iron rod). By doing this, the opening of the kupi may not be choked by a thick coating of subliming sulphur; otherwise, the pressure of the vapour may break the kupi. When blue flame stops coming out, it is to be understood that gandhakajarana is complete and sindoora formation has begun to taken place. At this stage the bottom of bottle appears red hot in colour. One can view, with help of torch light the sindoora particles arising at the neck portion of kupi. A copper plate test and sitasalakatest (cold iron rod), was done at this time to confirm the stage. A copper plate was taken and placed on mouth of the kupi, if extra sulphur is remaining then a yellow coating is formed on copper and if not, a white coating is seen of Mercury deposition. When a red-hot iron rod was inserted into the kupi and removed it was covered with smoke. But there should not be any fumes on inserting the sitasalaka, the material sticking to the rod when cool, should be red in colour.

9. Kupi mudrana

On conformation of completion of jarana, one needs to cover the mouth of kupi using cork to prevent further escape of parada. Immediately cork was inserted inside the mouth of bottle and sealed tightly with the help of several rounds of clay smeared cloth. Simultaneously the sand at the mouth and neck was removed.

10. Kupi paka –tritiya agni paka

Agni was increased to tivra (High) by using blower and more firewood, maintained for one Yama [3hours]. Temperature during tivraagni peaked up to 720^0C. After that the whole apparatus was left undisturbed for 3 days to self-cool.

11. Kupi bhagnavidhi

The sand surrounding the kupi was carefully removed. Kupi was inspected for any meltdown or breakage. Then the bottle was taken out, the cloth enwrapping's scrapped using a knife and bottle was wiped clean. A jute wick soaked in kerosene was then taken, rolled over the bottle where it was desired to make a cut (usually $2/3^{rd}$ from the bottom). It was then lit for 45seconds and immediately wrapped inside cold wet jute cloth. By this, the bottle breaks up perfectly by sudden change in temperature.

12. Collection of Rasasindoora

Deposition of Rasasindoora was noted inside all parts of kupi, resembling silvery grey particles which on scratching showed sindoora red colour. Bottle was tapped gently to collect sindoora at the neck. A small portion of sindoora was also noted at the bottom of kupi and cork piece. All were carefully collected, weighed and stored.

Table 1: Rasasindoora obtained at various levels of kupi

	Item	Quantity
1.	Kajjali filled in kupi	220g
2.	Galastha Rasasindoorasublimed at Neck	124.6g
3.	Talastha Rasasindoora deposited at Base	1.3g
4.	Rasasindoora at base of cork	1.0g

Table 2: Temperature chart and changes during Rasasindoora nirmana

Time	**Temperature ^{0}C**
9.10am	Agni started- DAY 1
9.20am	52
9.30am	100
9.44am	175
10.00am	250 sulphur smell
10.15am	390 white fumes
10.45am	440 usnasalaka insertion started
11.00am	460 dense yellow fumes,yellow red flames on usnasalaka insertion
11.15am	474
11.30am	506
11.45am	521
12.00am	530[sand]/402[inside kupi]
12.30am	540
1.00pm	525 colourless fumes
1.30pm	545
2.00pm	550 blue flame
2.30pm	585
3.00pm	608
3.15pm	590 Copper plate and sitasalaka test was positive, kupi corked
3.30pm	519
4.00pm	597
4.30pm	632
5.00pm	682
5.30pm	720
6.00pm	705
6.30pm	**720 maximum temperature**
Day3: 11.00am	35 kupi broken to collect Rasasindoora

VANGA BHASMA NIRMANA

Vanga bhasma preparation is done in following steps

SHODANA

The shodana was carried out using 250g of 99.5% pure Vanga [Tin metal]powder by the method of Dalana(melted metal is poured in liquids) using Iron spoon and Pithara yantra [steel vessel with lid having hole in the middle].

- Samanya shodana of Dalana in churnodaka (lime water) initially for seven times [(6)]
- Visesha shodana of Dalana in haridra powder, nirgun dipatraswarasa for three times [(7)]

Churnodaka for samanya shodana was prepared according to the ratio of 2ratti: 5tola. (12.5g Sudha(lime): 3 litre water). Each time about 250ml of churnodaka was used. At the end the Vanga was collected, dried, weighed as 240g and stored. As the Vanga sample taken was of fine powder, about 30% of the sample turned into metal globules during this process. This churnodakashodita Vanga was then subjected to visesha shodana,250ml of nirgundipatraswarasa and 1/16th part [15.6g] of haridrachurna was taken for a single dalana. On cooling, the Vanga was collected, weighed as 252g and stored. The procedure was a combined method of nirvapa (heating and dipping in liquids) and dalana as the sample during the process contained both melted Vanga and powder Vanga.

JARANA

As the melting point of Vanga is low,on subjecting to putapaka the Vanga will melt and hence won't attain bhasma form. An intermediate jarana procedure enables the form change of globulated Vanga into powdery form through which it is easy for further bhavana and putapaka. As the sample taken for the study was already in the form of powder, the jarana samskara was easily completed.

The process of jarana was done according to Rasamrita. [(8)] Over to the mouth of the bhatti place an iron kadai with Agni maintained at madhyama using ignited coal pieces. Initially the shodita Vanga globules were put into the kadai and allowed to melt. On melting Apamargachurna was added little by little and rubbed with the base of a Loha darwee (Iron spatula) rigorously until all Vanga globules turned to powder. The remaining

shodita Vanga powder was added to kadai, mixed. It was noted that this powder Vanga didn't change to globular form and all the Apamarga and Vanga got mixed evenly. A total of 252g of apamargachurna and 3hrs was required to complete the process. This mixture was then consolidated to the centre of the kadai and an earthen sharava was used to cover. The heat was increased from madyamagni to tivragni with help of a blower and the mixture was kept on tivragni for 4 hrs. The base of the Loha kadai and the Vanga mixture in contact turned red hot. Later it was allowed to attain room temperature. Next day it was collected and stored in an airtight jar.

MARANA

After jarana, the Vanga was subjected to bhavana with kumariswarasa for maranasamskara. [(9)] On attaining samya-kbhavita lakshanas it was made into chakrikas (flat round pellets) and dried. Then saravasamputa was done and Vanga was subjected to puta in a muffle furnace at 600 deg Celsius for 1 hr. On cooling the bhasma was collected and the process was repeated. Such 6 putas were done to get Vanga bhasma.

Table no. 3 Quantity and change after each puta of Vanga bhasmas preparation

Puta	Initial wt of Vanga chakrika	Qty of kumariswarasa	Weight before puta	Weight after puta	Change in weight	Varna
1	**225g**Jarita Vanga	150ml	230g	220.5g	10g	Off-white
2	220.5g	100ml	222.7g	221g	1.7g	Ivory
3	221g	100ml	241g	221g	20g	Ivory
4	221g	100ml	242g	220g	22g	Ivory
5	220g	100ml	240g	220g	20g	Ivory pink
6	220g	100ml	238g	**220g**	18g	Ivory pink

LOHA BHASMA

Loha bhasma is prepared byusing Iron metal powder (electrolytic with100mesh size) has following steps

SHODANA- Samanya shodana [(9)] & Visesha shodana [(10)] as Nirvapa.

Loha churna was heated until red hot and quenched immediately into the tilataila, allowed to cool. On cooling the taila was strained off and Loha churna was taken, washed in hot water and heated to red hot for the next nirvapa in taila. In total, seven such nirvapa was carried out in taila. Similar nirvapa's were carried out with go takra, gomutra, aranala [(11)] and kulathakasaya, seven times each, taking litre of liquids for each time. Finally the shodita Loha churna was washed in hot water, dried weighed and stored.For Visesha shodana of Loha, theshodita Loha churna was subjected to nirvapa in thriphalakasaya (1 part triphala: 8 parts water heated and reduced to ¼) seven times, to get black coloured loha churna.

MARANA

The shodita Loha was then subjected to marana according to Rasatarangini. [(12)] It involves three steps namely

Bhanupaka-920g of shodita Loha was immersed in a vessel containing triphalakasaya (455ml each) and kept under sun for 24hours/until dried. As the paka occurs in the presence of sunlight, it is called Bhanupaka. Next day on drying again freshly prepared kasaya is used and this process is continued, seven times in total. Final weight was noted as 1280g.

Sthalipaka-BhanupakitaLoha churna was taken in a kadai and heated. To this triphalakasaya (1litre each) was added and heated till all the kasayaboiled, reduced and got dried eventually. This process was repeated seven times, final weight was 2640g. As the paka is occurring in a sthali/ kadai, under heat it's called Sthalipaka.

Putapaka-905g of above Loha churna was taken, grinded in triphalakasaya in a grinder until samyakbhavitalakshanas were found. Then they were shaped into chakrikas and dried. On drying saravasamputa and sandhi bandhana was done. This on drying was placed in a muffle furnace at a temperature of 600 degree Celsius and maintained for 1 hour. On cooling down, thebhasma was collected and again this process was repeated nine times to obtain Loha bhasma.

Table no: 4 Quantity and change after each puta of loha bhasmas preparation

Puta	Initial weight in gram	Qty of Triphalakasaya in millilitre	Weight before puta in gram	Weight after puta in gram	Change of weight in gram	Varna
1	**905**	500	990	775	215	Blackbrown
2	775	450	1005	753	252	Red black
3	753	350	856	698	158	Red black
4	698	300	781	670	111	Reddish black
5	670	250	734	641	93	Dark Reddish
6	641	250	674	635	39	Dark reddish
7	635	250	657	622	35	Red brown
8	622	235	655	621	34	Deep red brown
9	621	200	656	**623**	33	Purple red

ABHRAKA BHASMA

A genuine sample of krishnavajrabraka (biotite mica) as per classical reference was collected from Jharkand for preparing abhraka bhasma. Then it was subjected to Abhraka shodana [(13)] &Abhraka marana

SHODANA

650g of Abhraka patras were heated to red hot in an Iron kadai and quenched in triphalakasaya (1300ml each time). This process was repeated for seven times to get 770g of shodita abhraka.

MARANA

670g of shoditaabhraka was subjected to marana directly, without any intermediate Dhanyabharaka conversion methods. According to Sindhooramanjari, [(14,15)] shodita Abhrakabhavana was done in kumariswarasa until Abhraka turned into butter like consistency. Later bhavana was done in triphalakasaya for four yamas (12hrs). Chakrikas were prepared out of this, dried under shade, transferred to sarava and sandhibandhana with cloth and multanimitti was done. Later, on drying it was subjected to puta in a muffle furnace at a temperature of 800 degree Celsius for first 5 putas and then at 900 degree celsius. The process was continued till15putas, when bhasmalakshanas were attained. 370.3g of abhrakabhasma was obtained.

Table 5: Quantity and change after each puta of Abhraka bhasmas preparation

No: of puta	Initial weight of chakrika in gram	Final weight after puta in gram	Loss in weight	Colour	Quantity of Kumari	Quantity of Triphalakasaya
1	788.35	566	222.35	Golden brown	1300g	700ml
2	662.8	530	132.8	Clay	750g	565ml
3	688.5	525.9	163.5	Clay	700g	530ml
4	575.9	525	50	Clay with brown tint	545g	150ml
5	574.9	519	56	Clay with slight red-brown tint	525g	150ml
6	545	515	30	Clay with red brown tint	450g	150ml
7	545	510	35	Clay with red brown	450g	150ml
8	523	507	16	Clay with red brown	450g	150ml
9	531	504	27	Clay with red brown	330g	120ml
10	529	510	17	Clay with red brown	300g	100ml
11	507	494	13	Brown with slight red tint	300g	70ml
12	501	491	11	Brown with red tint	300g	60ml
13	503	490	13	Reddish brown	300g	50ml
14	378	372	6	Reddish	300g	50ml
15	375.3	**370.3**	5	Brick red	250g	50ml

PREPARATION OF TARAKESWARA RASA

In a khalva yantra 50gms of Rasasindoora was added. It was then powdered well using a pestle until the whole of the Rasasindoora turned to fine powder. To this 50gms of Vanga bhasma was added little by little mixed, powdered well with Rasasindoora to attain a homogenous mixture. Then add 50gms of Loha bhasma to this and repeat mixing. Finally, 50gms of Abhraka bhasma was added and the whole mixture was thoroughly mixed until homogenous, for a period of 3hours. In the text it is mentioned to do bhavana in honey for 1 day. But this was not adopted considering the difficulty in storage and dispensing of the drug, if so, the drug becomes hygroscopic and semisolid in

nature. The final product weighed 200gms, was stored in an airtight glass bottle.

Figure 1: Preparation of Tarakeswara rasa

DISCUSSION

For the preparation of Tarakeswara rasa, there involve various steps. Firstly, the shodana of parada, this method was a comprehensive one, no separate samanya visesha shodanas needed to be done for parada. Moreover kumari, triphala and trikatu help in removing the naisargikadoshas in parada. One can save time and prevent drug loss during the procedure. Bhavana of parada in all the dravadravyas for a period of 12 hrs was done. It was observed that with the increase in rukshata of the dravadravyas like triphala, trikatu and chitraka, parada lost its snigdatwa and was rendered into a motionless powdery state. The recovery of parada to its original state was a challenge initially and subsequent loss was also feared, especially during bhavana wihtriphalakasaya. But on kshalana and galanashoditaparada could be well separated. Gandhaka shodana is a procedure which requires skill and manpower but the kurmaputa method has its advantages of better yield in a single go. It should be noted that if the temperature rises by any chance there would be chances of burning and colour change to gandhaka globules. The saajya method itself has more edge than nirajyakurmaputa, as addition of ghrita ensures removal of vishadosha in gandhaka. Moreover, gandhaka purified by this method is crystalline in nature and absorption of such shodita*g andhaka* is more compared to its ashodita amorphous counterpart. Kajjali was ground meticulously for 36hours until lakshanas were achieved. It was noted that the kajjali became unstable if kept idle for some days. Therefore, frequent grinding was ensured till Rasasindoora nirmana. Of various methods tried for kupi wrapping like covering it spirally and in rectangular sheets, the one with horizontal vertical strips was found to cover the kupi evenly. While making Rasasindoora measuring temperature inside the kupi and in the bhatti gave a perspective of heat difference in the valuka yantra. Also visualizing the Rasasindoora formation with the aid of a pen torch helped to understand the staging process.

A new attempt was undertaken by using tin metallic powder for Vanga

bhasmas nirmana. Vanga shodana possessed huge challenges as the tin metal powder was fine and difficult to handle, but also had advantages. Clear cut nirvapa or dalana was not achieved as some part remained as powder and some changed to liquid metal. For the preparation of churnodaka, two samples of chunna were taken and churnodaka was prepared according to the ratio of 2 ratti: 5 tola. Out of these, the sample containing near neutral pH was selected for the process. The sudha procured from market on preparing churnodaka, acquired a pH of 8.5 and the churnodaka out sudha stone (chunnambukallu) had a pH of 7.5. *Chunnambukallu* used for churnodaka yielded better results than sudhachurna,as the latter on nirvapa made the metal hard clumpy and difficult to melt on subsequent nirvapas. About 62% [155g] of vanga remained as powder and 38% [95g] got converted to globules after shodana. Due to its powdery nature, jarana with tin metal powder was done very easily and was preferred to metallic Vanga jarana which required more time and effort. On puta, fast results were noted from first puta itself. One can save time and energy by using the metallic powder form of tin to prepare Vanga bhasmas.

Loha bhasma preparation included the combination of Loha with triphalakasaya at varying ratios, temperatures and procedures. In *bhanupaka* UV radiation present in the sunlight reduces the oxidation state of iron in presence of vitamin C in the Triphalakasaya thereby improving the bioavailability. Constituents of Triphalakasaya form coordination compounds with iron oxide, by a slow reaction under prolonged exposure to UV radiation present in the sunlight. The useful ingredients of Triphalakasaya are expected to be available to body upon the consumption of Loha bhasma, thereby imparting their therapeutic properties to it. The antimicrobial activity of Triphala is also an important feature which helps in inhibiting the fungal growth during storage of Loha in intermediate stages.

While dealing with Abhraka, the major challenge faced was during marana. Usually about 30-60 putas are required for Abhraka bhasmikarana and through sindooramanjari it was reduced to 5 putas. But, difficulties such as absence of bhasmas lakashanas after 5^{th} puta as per sindhooramanjari were due to the temperature inefficiencies. The temperature was kept reduced at initial putas so as to bring a consistent slow change in bhasmas and as it was aimed at therapeutics, a better quality bhasmas was in need which was safe for internal use. It was later understood that a temperature of 900^0C was essential for bringing up the desired change in Abhraka bhasamas. After 14 putas Abhraka seemed not to show istika varna. In the 15^{th} puta when the temperature control was set to 900^0C which could be maintained for a period of 1 hour, yielded promising Abhraka bhasma.

While mixing the bhasmas, one can follow different methods. We can start from the denser bhasma and move on to add the lighter ones based on specific gravity or follow the order mentioned in the classical reference. Here the same was adopted, it striked similar chords with the order mentioned in Tarakeswara rasa nirmana.

CONCLUSION

- Abhraka requires a temperature of 900^0C which needs to be maintained for 1 hour to yield proper bhasmalakshana.
- Following the reference from sindhooramanjari, one can skip the tedious process of Dhanyabhrakanirmana yet achieve good quality abhraka bhasmas.
- Vanga bhasma prepared out of Tin metal powder reduces the effort required for jarana and marana procedures.
- Gandhaka shodana by kurmaputa enables an easy and uniform quantity of shoditagandhaka that can be handled at one single time.

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